MANAGING ENTERPRISE RESOURCE PLANNING AND MULTI-ORGANISATIONAL ENTERPRISE GOVERNANCE: A NEW CONTINGENCY FRAMEWORK FOR THE ENTERPRISATION OF OPERATIONS

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December 2015

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Thesis Summary

This research has been undertaken to determine how successful multi-organisational enterprise strategy is reliant on the correct type of Enterprise Resource Planning (ERP) information systems being used. However there appears to be a dearth of research as regards strategic alignment between ERP systems development and multi-organisational enterprise governance as guidelines and frameworks to assist practitioners in making decision for multi-organisational collaboration supported by different types of ERP systems are still missing from theoretical and empirical perspectives. This calls for this research which investigates ERP systems development and emerging practices in the management of multi-organisational enterprises (i.e. parts of companies working with parts of other companies to deliver complex product-service systems) and identify how different ERP systems fit into different multi-organisational enterprise structures, in order to achieve sustainable competitive success.

An empirical inductive study was conducted using the Grounded Theory-based methodological approach based on successful manufacturing and service companies in the UK and China. This involved an initial pre-study literature review, data collection via 48 semi-structured interviews with 8 companies delivering complex products and services across organisational boundaries whilst adopting ERP systems to support their collaborative business strategies – 4 cases cover printing, semiconductor manufacturing, and parcel distribution industries in the UK and 4 cases cover crane manufacturing, concrete production, and banking industries in China in order to form a set of 29 tentative propositions that have been validated via a questionnaire receiving 116 responses from 16 companies. The research has resulted in the consolidation of the validated propositions into a novel concept referred to as the 'Dynamic Enterprise Reference Grid for ERP' (DERG-ERP) which draws from multiple theoretical perspectives.

The core of the DERG-ERP concept is a contingency management framework which indicates that different multi-organisational enterprise paradigms and the supporting ERP information systems are not the result of different strategies, but are best considered part of a strategic continuum with the same overall business purpose of multi-organisational cooperation. At different times and circumstances in a partnership lifecycle firms may prefer particular multi-organisational enterprise structures and the use of different types of ERP systems to satisfy business requirements. Thus the DERG-ERP concept helps decision makers in selecting, managing and co-developing the most appropriate multi-organistional enterprise strategy and its corresponding ERP systems by drawing on core competence, expected competitiveness, and information systems strategic capabilities as the main contingency factors. Specifically, this research suggests that traditional ERP(I) systems are associated with Vertically Integrated Enterprise (VIE); whilst ERPII systems can be correlated to Extended Enterprise (EE) requirements and ERPIII systems can best support the operations of Virtual Enterprise (VE).

The contribution of this thesis is threefold. Firstly, this work contributes to a gap in the extant literature about the best fit between ERP system types and multi-organisational enterprise structure types; and proposes a new contingency framework – the DERG-ERP, which can be used to explain how and why enterprise managers need to change and adapt their ERP information systems in response to changing business and operational requirements. Secondly, with respect to *a priori* theoretical models, the new DERG-ERP has furthered multi-organisational enterprise management thinking by incorporating information system strategy, rather than purely focusing on strategy, structural, and operational aspects of enterprise design and management. Simultaneously, the DERG-ERP makes theoretical contributions to the current IS Strategy Formulation Model which does not explicitly address multi-organisational enterprise governance. Thirdly, this research clarifies and emphasises the new concept and ideas of future ERP systems (referred to as ERPIII) that are inadequately covered in the extant literature. The novel DERG-ERP concept and its elements have also been applied to 8 empirical cases to serve as a practical guide for ERP vendors, information systems management, and operations managers hoping to grow and sustain their competitive advantage with respect to effective enterprise strategy, enterprise structures, and ERP systems use; referred to in this thesis as the "*enterprisation of operations*".

Keywords: Enterprise Resource Planning (ERP), Management of multi-organisational enterprises, Operations strategy, Multi-organisational collaboration, Grounded Theory-based methodology, Contingency Framework

Acknowledgements

First of all, I would like to express special thanks to my family and friends for their absolute and kind support in all matters over the past few years. Without them it would have been much harder to accomplish this challenging goal.

Extensive thanks are also given to all the companies, interviewees, and questionnaire respondents from the UK and Chinese manufacturing and service industries who have greatly contributed to this research with their expertise. For reasons of ensured confidentiality they remain anonymous.

I would like to acknowledge my colleagues from the Operations and Information Management Group to their input, encouragement, and inspirations.

Furthermore, I would like to take this as opportunity to thank Jeanette Ikuomola, Ranjit Judge, Elizabeth Bridges and Irene Vickers from the Doctoral Services Team of the Research Degrees Programme for their constant support in all administrative issues with Doctoral Research at Aston Business School. They made it happen for me.

I would particularly like to thank Prof. Chris Hicks, Prof. Julia Kotlarsky and Dr Daniel Chicksand for their extensive and very constructive feedback and recommendations on my MPhil thesis.

Last but not least I would like to express my immense gratitude to Prof. Prasanta Dey as my associate supervisor, and especially to Prof. Ben Clegg, as my main supervisor, for his guidance, ceaseless support, and encouragement over the years it has taken to complete this study; as well as many stimulating discussions that led to a variety of published work resulting from this research.

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LIST OF ACRONYMS

ABV: Agent-Based View
APS: Advanced Planning and Scheduling
B2B: Business-to-Business
BI: Business Intelligence
BPIF: British Printing Industries Federation
BPR: Business Process Reengineering
CAQDAS: Computer Assisted Qualitative Data Analysis Software
CAD: Computer-Aided Design
CAS: Complex Adaptive Systems
CBA: Competence-Based Approach
CDF: Consumer Direct Fulfilment
CEG: Collaborative Enterprise Governance
CIM: Computer Integrated Manufacturing
CMS: Content Management System
CPR: Customer Process Engineering
CRM: Customer Relationship Management
CSF: Critical Success Factors
CT: Configuration Theory
DCM: Demand Chain Management
DCV: Dynamic Capabilities View
DE: Defunct Enterprise
DERG-ERP: Dynamic Enterprise Reference Grid for ERP
DSS: Decision Support Systems
DW: Data Warehouse
EAI: Enterprise Application Integration
EDI: Electronic Data Interchange
EE: Extended Enterprises
EIS: Enterprise Information Systems
ERBV: Extended Resource-Based View
ERP: Enterprise Resource Planning
ES: Enterprise Systems **ET**:
Empirical Statements **EU**:
European Commission **GT**:
Grounded Theory
GTM: Grounded Theory (based) Method
HR: Human Resource
ICT: Information and Communications Technology
IMC: Inward Mailing Center
IOIS: Inter-Organisational Information Systems
IPA: Interpretative Phenomenological Analysis
IS: Information Systems
ISFM: IS Strategy Formulation Model

IT: Information Technology
JIT: Just-in-Time
M&A: Merger and Acquisition
MES: Manufacturing Execution System
MIS: Management Information Systems
MOB: Make-or-Buy
MRP: Material Requirements Planning
MRPII: Manufacturing Resource Planning
OA: Office Automation
ODMs: Original Design Manufacturers
OEMs: Original Equipment Manufacturers
OM: Operations Management
OSS: Open source software
PaaS: Platform as a Service
PCM: Product Content Management
PDM: Product Data Management
PLC: Product Life Cycle
PLM: Product Life Management
POD: Print-on-Demand
PSS: Product Service Systems
RBV: Resource Based View
R&D: Research and Development
RDT: Resource Dependency Theory
RFID: Radio Frequency Identification
SaaS: Software as a Service
SCI: Supply Chain Integration
SCM: Supply Chain Management
SLA: Service Level Agreement
SME: Small and Medium Enterprises
SOA: Service Oriented Architecture
SRM: Supplier Relationship Management
TCE: Transaction Cost Economics
TQM: Total Quality Management
VE: Virtual Enterprises
VERP: Virtual Enterprise Resource Planning
VI: Vertical Integration
VIE: Vertically Integrated Enterprises
VMI: Vendor Managed Inventory
VPN: Virtual Private Network
VVC: Virtual Value Chain

GLOSSARY

The terms explained below define specific terminology used in the context of this research study; particularly for the novel contingency management framework – *the Dynamic Enterprise Reference Grid for ERP* discussed in Chapter 7 of this thesis.

Defunct Enterprise
An enterprise that does not operate as intended, i.e. simplex operations with limited amount of commercial active engagement and limited information systems maturity.

Engage-ability
Engage-ability determines the ability of a value member to be involved in a collaborative activity based on its value propositions.

(Multi-organisational) Enterprise
An entity, regardless of its legal form, including partnerships or associations regularly engaged in economic activities. Practically this means parts of companies working with parts of other companies to collectively deliver complex product service systems.

Enterprise Resource Planning
An electronic information system which supports operational functions in an organisation.

Enterprise Supporting ERP Capability
Enterprise Supporting ERP Capability determines the type and ability of ERP systems to be applied in the multi-organisational enterprise due to its specific information systems competences, capabilities supporting the targeted enterprise structure and the feasibility of deploying their functionalities within the enterprise.

ERPI
Internally integrated information systems used to gain operational competitive advantage by primarily supporting core internal (operational) functions.

ERPII
An enterprise information system recognised as an integral part of business strategy enabling multi-organisational collaborations through extension of operations to close and trusted partners.

ERPIII
A flexible, powerful information system incorporating web-based technology which enables (multi-organisational) enterprises to offer increasing degrees of connectivity, collaboration and dynamism through increased functional scope and scalability.

Extended Enterprise
Parts of companies working with parts of other companies to collectively deliver complex product service systems. This is a semi permanent multi-organisational enterprise structure designed to be flexible and agile.

Enterprise Governance
Multi-organisational structure is referred to as collaborative enterprise and their design and management activities is defined as enterprise governance.

Inter-organisational Information Systems
An information system which is used jointly by at least two organisations that draws upon common and/or shared information technology capabilities.

(Multi-organisational Enterprise) Value Member
Individual companies which contribute value through the delivery of their core competencies to one or more specific tasks of a collaborative activity within (multi-organisational) enterprises.

Value Proposition
Value proposition is the potential of a value member to create a distinct value for the (multi-organisational) enterprise based on the transferability, attractiveness, maturity, and uniqueness of its core competencies.

Value Stream
The value stream is a collection of tasks that have to be fulfilled in the collaborative product/service development and realisation stages within a collaborative activity.

Vertically Integrated Enterprise
Parts of companies working with parts of other companies to collectively deliver complex product service systems. A multi-organisational vertically integrated enterprise operates almost as large single well-integrated multi-functional firm striving for scales of economy.

Virtual Enterprise
Parts of companies working with parts of other companies to collectively deliver complex product service systems. A multi-organisational virtual enterprise is designed to be short term and highly agile.

Virtual Value Chain
A sequence of value-generating activities throughout a virtual multi-organisational enterprise.

Chapter 1 – Introduction

This introductory chapter provides readers with a general insight into the selected research area – Enterprise Resource Planning (ERP) systems management and Multi-organisational Enterprise Governance whilst highlighting the growing importance of the research topic; and outlines the purpose, shape, and boundaries of this research project. In the first Section 1.1 the research background, context, motivation, and unit of analysis to the work are presented; and two concepts (i.e. ERP and multi-organisational enterprises) are explained. The resulting need for sustainable ERP systems-enabled multi-organisational enterprise collaboration is further highlighted from an empirical viewpoint in Section 1.2. Section 1.3 clearly outlines the aim of this research study and four research objectives (a.k.a. research questions) that are formulated to achieve the research purpose. Knowledge contribution in the fields of information systems and strategic operations management (particularly multi-organisational relationships and collaboration) is articulated in the Section 1.4. The main body of the thesis is presented in Section 1.5. Finally, the key aspects of this chapter are summarised in Section 1.6.

1.1 Research background

Enterprise Resource Planning (ERP) information systems have developed extensively over the last decades in response to changing business requirements, technological developments, and new organisational strategies. According to the *APICS Dictionary* (11th Edition) (Blackstone and Cox, 2005), ERP is defined as a "framework for organising, defining, and standardising the business processes necessary to effectively plan and control an organisation so the organisation can use its internal knowledge to seek external advantage" (p. 38). This definition also indicates that ERP is an information management strategy which enables the integration of various business units through a common system platform.

It has been noted that most existing research on ERP systems design and management focuses on improvements in ERP functionality within a single unitary organisation (Chen, 2001; He, 2004; Michel, 2000). Nevertheless, dynamic turbulent business environments as we are currently experiencing can encourage firms to think differently and move beyond traditional single organisational boundaries whilst becoming involved in multi-organisational collaborations (Hoffmann, 2007; Rayport and Sviokla, 1995). This has stimulated the emergence of a new operations strategy in which competitive advantage is based on the development of relationships with partners (Walters, 2004). In this context, cooperating organisations are increasingly being seen as *enterprises* that share assets, processes, and capabilities to create and sustain value-adding competencies (Yu and Krishnan, 2004; Post *et al*., 2002). This research follows this premise and thereby uses the European Commission's definition of an *enterprise* to explore how ERP systems can be designed and managed to effect changes in multi-organisational enterprise structures and *vice versa*. The EC's definition of an *enterprise* is, "**… an entity including partnerships or associations that can be made up of parts of different companies**" (European Commission, 2003). As a result, the author refers to multi-organisational structures as a *collaborative enterprise* and to their design and management activities as enterprise governance; which indicates that "Collaborative Enterprise Governance (CEG) is an approach to design enterprises" (Paton *et al*. 2011, p. 122). This research builds on this definition and *does not* therefore consider manufacturing or service operations to be single legal entities operating in isolation, but instead embodies the *enterprise management* and *collaborative enterprise governance* concepts (Binder and Clegg, 2006; 2007a; European Commission, 2003), where **parts of companies work with parts of other companies to deliver complex product and service systems**.

Some operations management researchers already realise that multi-organisational enterprises cannot be described through simple contractual exchanges; but are better thought of as operational interdependencies based on complex interactivities of operations and information technology (IT) (Banker *et al*., 2010; MacBeth, 2002). Likewise, information systems (IS) researchers suggest that integrated technical solutions – particularly ERP systems, which could make the multi-organisational enterprise management concept a full technical reality, are not far away (Chorafas, 2001). These works emphasise the fact that successful multi-organisational enterprise strategy relies on the correct type of ERP information systems being used, as well as highlighting the importance of investigating how an ERP system fits into the multi-organisational operation, structure, and strategy to implement collaborative strategies.

There is an emerging body of studies beginning to advocate the inter-organisational information systems (IOIS) (Saeed *et al*., 2011; Vathanophas, 2007). There is however a perennial pressing challenge for alignment between multi-organisational enterprise management thinking and ERP information systems development; which is imperative to provide a useable decision making framework for thinking innovatively about co-development of ERP systems and multi-organisational collaboration. Thus, this research study takes ERP systems enabled multi-organisational entity that delivers complex products and services as the unit of analysis; and the analytical focus will be on exploring and analysing **the sustainable success of multi-organisational enterprises collaboration through the efficient and effective governance of their collaborative activities and different corresponding ERP systems design and management**. Further, the rationales for selection and investigation of cases are (i) parts of different companies work together to deliver complex products and services; (ii) the companies extensively use ERP systems to support their core operations and collaborative strategies; and (iii) the companies heavily rely on outsourcing strategy.

1.2 The need for ERP systems-enabled multi-organisational enterprises

It is widely thought that in the near future there will be a continuous transformation process driven by a fundamental rethinking of current business strategies and industrial models; which will be characterised by moving away from the traditional adversarial and contractual model based on the 'linear supply chain concept' towards a multi-organisational partnerships and relation model based on the 'virtual value chain concept' (Rayport and Sviokla, 1995) between all players within the same industry when delivering complex products and services. At the same time the establishment of an intensive collaboration culture and interdependency for information and knowledge exchange between value members within different orchestrations of multi-organisational enterprises should create more efficient multi-organisational collaboration (Johnson and Mena, 2008). This implies that manufacturing and service organisations will undertake initiatives aimed at mastering complexity and driving out complication to achieve multi-organisational collaboration over the coming years (adapted from IDC Manufacturing Insights, 2012). This will primarily be through:

- Improved demand planning and forcasting, and customer fulfillment
- More strategic sourcing strategies and core competence focus
- Increased holistic, integrated decision-making environment
- Improved collaboration and reduction of organisational silos mentalities
- Better alignment of IT with the business
- More flexible enterprise information systems
- Streamlined new product and service design process

These above factors are believed to be the driving forces in challenging the industry and enterprise information systems. Major vendors and some managers of operations and information systems have begun to adopt the enterprise concept into their ERP design and implementation. Researchers, however, have not responded to new business practices so hastily and there is very little written on the subject as regards how ERP systems enable multi-organisational enterprises strategy. Most extant research exploring the next generation ERP systems and success of IOIS, unfortunately, are often focused on either the merits of featured software (Daniel and White, 2005; Tarantilis *et al*., 2008) or "new" ERP technical developments which do not actually represent new management concepts (Ponis and Spanos, 2009). This state fuelled the motivation for conducting this research – with the purpose of extending existing theory on ERP systems-enabled multi-organisational enterprises.

Therefore, in the opinion of the author, *models, guidelines, and frameworks on a larger scale to support practitioners in their strategic decision making for multi-organisational collaboration supported by different types of ERP information systems are still missing from an empirical perspective*. This creates the need for this systematic and extensive research which focuses on **how the strategic partnership alliances can gain a sustainable competitive success through the efficient and effective governance of their collaborative activities and the corresponding ERP information systems design and management**. As a result, the companies delivering complex products and services across organisational boundaries whilst adopting ERP systems to support their organisational strategies were selected for investigation; these included: print solutions provider, semi-conductor, crane, and concrete manufacturers, parcel distributor, and banking service provider, which span ERP system enabled manufacturing and service-oriented operations in the UK and China. These multiple research sites from different industry sectors represent replication allowing for the development of a rich theoretical framework and thus could be more generalisable, transferable, and credible (Eisenhardt, 1989; Yin, 2003). Besides, multiple sites from manufacturing and service industries in the UK and China allow for 'cross-case' analysis (e.g. UK versus China, manufacturing versus service) for providing new data and suggesting new theoretical propositions in diverse contexts (Glaser and Strauss, 1971); *although it should be noted that the main aim of this work is not to explore and analyse comparative elements between the countries/industry sectors selected*.

1.3 Research aims and objectives

This research focuses on designing and managing ERP systems in different multi-organisational enterprise settings. Therefore, the aim of this research is to explain how different types of ERP systems fit to different types of multi-organisational enterprises to create sustainable competitive advantage; and how to manage them using a dynamic and sustainable business model. This aim is fulfilled by achieving four research objectives (a.k.a. research questions):

- Explore developing *trends* in ERP systems and the principles of multi-organisational enterprise governance.
- Examine the *relationship* between ERP systems design and management within multi-organisational enterprise structures and strategies; and *vice versa*.
- Develop a new *conceptual contingency framework* to explain how different ERP system types fit into different multi-organisational enterprise structure types.
- Illustrate the new conceptual contingency framework using *empirical case studies* from the UK and China.

1.4 Intended knowledge contributions of the research

This research study makes a theoretical contribution in the areas of Information Systems Management (ISM) and strategic Operations Management (OM) by extending existing theory on designing and managing ERP information systems and multi-organisational enterprise collaboration. Specifically, this research develops a new contingency framework (fully explained in Chapter 7) to explain how different ERP systems fit with different multi-organisational enterprise paradigms; it is illustrated with example cases from the field work.

In addition, this research makes a practical contribution by offering guidelines for ERP vendors, practicing information systems management and operations managers hoping to grow and sustain their competitive advantage. Guidelines are in regard to multi-organisational enterprise strategy, multi-organiational enterprise structure, and ERP systems development and use through the effective use of the new conceptual contingency framework (fully explained in Chapter 7).

Moreover, this research uses a Grounded Theory-based Methodological (GTM) approach to understand complex phenomenon of ERP systems enabled multi-organisational enterprises design and management, which demonstrates that GTM is a useful methodology in the areas of OM and ISM – particularly ERP information systems and multi-organisational enterprise management.

1.5 Outline of the thesis

This thesis is structured into seven chapters as shown in Figure 1.1.

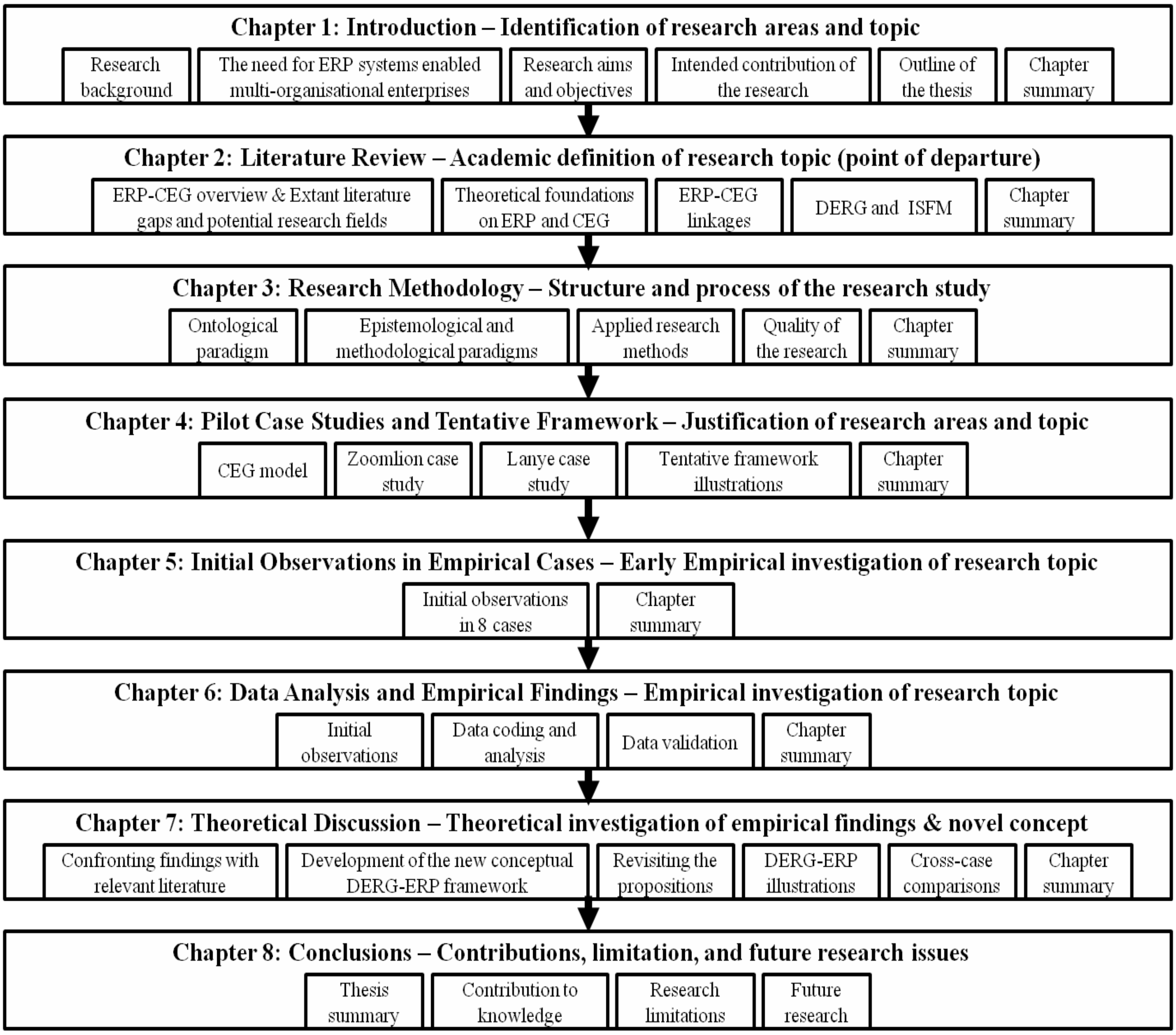

Figure 1.1. Overview of the thesis structure

Chapter1 introduces this thesis and gives a brief background, research questions, intended contributions and an overview of the thesis structure.

Chapter 2 critically investigates the relevant literature on the topic. This highlights four major research gaps; and leads to the points of departure from current literature and the need for this research study.

Chapter 3 describes the research methodology for the fieldwork and the ontological, epistemological, and methodological background of this *qualitative theory generating* study that is based on the philosophical paradigm of *constructive realism*. Specifically this chapter presents the inductive Grounded Theory based methodological approach using semi-structured interviews, self-administered questionnaire surveys, and focus groups together with narrative case studies as triangulated research design. Furthermore, this chapter outlines the peculiarities of Ground Theory based methodology (GTM) which involves coding and analysis processes based on its two main elements – constant comparison and theoretical sampling.

Chapter 4 uses the Collaborative Enterprise Governance concept along with template analysis technique to build two empirical pilot case studies in order to initially explore significant relationships between ERP systems and multi-organisational enterprise strategy. A tentative new framework is delivered to focus fieldwork upon which the Grounded Theory based Methodology will be applied.

Chapter 5 presents initial observations in empirical cases in order to facilitate the data coding and analysis, as well as further theoretical and practical discussion.

Chapter 6 gives extensive details of the research analysis and findings. The first part of the results is based on the semi-structured interviews in the form of theoretical narratives of the codified data which leads to a set of tentative propositions. The second part of the results is based on the validation of these theoretical propositions using a self-administered questionnaire survey.

Chapter 7 presents the theoretical discussion based on confronting the empirical findings with relevant existing theoretical concepts, models, frameworks, and theories involving the inter-disciplinary body of knowledge. A comparison of two perspectives (i.e. the empirical results in the form of validated propositions and the related literature) forms the empirical and theoretical foundation for the development of a new conceptual framework. This provides the novel contribution from this research study to the fields of information systems and multi-organisational management by introducing a (core) competence and strategic IS transformation based contingency model for a sustainable governance of ERP systems enabled multi-organisational relationships and collaboration within the manufacturing and service industries. Additionally, how the new conceptual framework was applied to empirical cases is graphically illustrated.

The contrast between the UK and Chinese companies, as well as between manufacturing and service industries are further discussed to strengthen the outcomes from this research study.

Chapter 8 summarises the main contributions made by this research study, which also outlines the research limitations and future research issues emerging from this study.

Moreover, each chapter (apart from Chapter 8) concludes with a brief summary of the main aspects discussed within it to support the reader in reflecting on the content.

1.6 Chapter summary

The aim of this research is to investigate and theorise about how different types of ERP systems fit to different multi-organisational enterprises; and develop a framework and practical guidelines on how to govern (i.e. design and manage) these ERP information systems and multi-organisational relationships in a sustainable way to grow competitive advantage through innovative and contemporary strategic operations.

Chapter 2 – Literature Review on Enterprise Resource Planning and Multi-Organisational Enterprise Management

This chapter describes the research topic from a theoretical point of view to provide the appropriate setting for the detailed theoretical discussion in Chapter 7 (i.e. theoretical discussion of empirical findings) of this thesis. Specifically, the general literature on Enterprise Resource Planning (ERP) and multi-organisational enterprise management is reviewed in Section 2.1. Gaps in the extant literature are identified which form the rationale and focus of this research study from an academic standpoint in Section 2.2. This leads to two subsequent Sections, 2.3 and 2.4 which critically review, classify, and summarise the ERP systems capabilities and multi-organisational enterprise structures and strategy primarily from an evolutionary perspective; whilst highlighting four major research gaps which should be addressed. In Section 2.5, the strategic and potential linkages between ERP and multi-organisational enterprise management are described. In Section 2.6, two *a priori* conceptual frameworks namely the “Dynamic Enterprise Reference Grid (DERG)” and the “IS Strategy Formulation” model are reviewed and used as partial bases for the new contingency framework discussed in Chapters 4 and 7. In the final Section 2.7, the main aspects of this chapter and a set of critical points – literature review justification are summarised.

2.1 ERP and multi-organisational enterprise management – an overview

As shown in Chapter 1, the underlying research of this thesis aims to make a knowledge contribution in the areas of *information systems management* and *operations management* by exploring and investigating ERP systems capabilities, multi-organisational enterprise structures and strategy, and how different ERP systems fit into different types of multi-organisational enterprises, in order to create a new strategic concept which is referred to as the ‘*enterprisation of operations*’ (Clegg and Wan, 2013). It particularly involves aspects such as recent trends in ERP systems development and multi-organisational enterprise management; and how they can be used concurrently in contemporary operations management thinking to grow and sustain competitive advantage.

The author initially reviewed a total of 167 journals with 796 articles to acquire data on several variables like key issues, year, search key terms, etc. (see Appendix A – Table I and III) Journal articles were sourced from a variety of academic databases including Elsevier, Emerald, JSTOR, ABI/Inform Global (from ProQuest), Wiley, Taylor & Francis, etc. (see Appendix A – Table II). The aim of the review was to capture a snapshot and identify existing deficiencies of the diversity of research being conducted in the ERP information systems and multi-organisational relationships and collaboration fields, in order to establish the final point of departure for this research study. The selection of relevant high quality journals to be reviewed was guided by the author’s subjective assessment of the research area but was also based on more objective selection criteria covering journal ranking, frequency of keyword (e.g. ERP, inter-firm, supply network) occurrence, etc. With these additional restrictions, the number of journals was reduced to 53 (journals) with 644 research papers, which can be clustered into five different disciplinary groups as shown in Table 2.1.

Table 2.1 High quality journals and total number of papers relevant to ERP systems and multi-organisational relationships and collaboration research

Group	Selected Journals	No. of Articles	
		Frequency	**Percent**
Operations, Manufacturing & Supply Chain Management	European Journal of Operational Research	9	1.40
	International Journal of Operations & Production Management	60	9.32
	International Journal of Physical Distribution & Logistics Management	12	1.86
	International Journal of Production Economics	22	3.42
	International Journal of Production Research	13	2.02
	Journal of Intelligent Manufacturing	3	0.47
	Journal of Operations Management	40	6.21
	Journal of Supply Chain Management	23	3.57
	Production Planning & Control	14	2.17
	Supply Chain Management	1	0.16
	Supply Chain Management: An International Journal	22	3.42
	Total Quality Management & Business Excellence	4	0.62
Subtotal	12 Journals	223	34.64
Information Technology, Engineering & Innovation Management	Communications of the ACM	5	0.78
	Computers in Industry	15	2.33
	Decision Support Systems	4	0.62
	Enterprise Information Systems	1	0.16
	European Journal of Information Systems	34	5.28
	Global Journal of Enterprise Information System	2	0.31
	International Journal of Advanced Manufacturing Technology	6	0.93
	International Journal of Computer Integrated Manufacturing	3	0.47
	International Journal of e-Collaboration	9	1.40
	International Journal of Enterprise Information Systems	1	0.16
	International Journal of Information Management	22	3.42
	International Journal of Management and Information Systems	4	0.62
	Information & Management	14	2.17
	Industrial Management & Data Systems	9	1.40
	Information Systems Journal	72	11.2
	Information Systems Management	8	1.24
	Information Systems Research	8	1.24
	Journal of Advanced Manufacturing Systems	3	0.47
	Journal of Database Management	2	0.31
	Journal of Enterprise Information Management	40	6.21
	Journal of Information Technology	5	0.78
	Journal of Management Information Systems	4	0.62
	Journal of Manufacturing Technology Management	48	7.45
	Journal of Strategic Information Systems	1	0.16
	Robotics and Computer-Integrated Manufacturing	2	0.31
	Technovation	3	0.47
Subtotal	26 Journals	325	50.51

General Strategic Management & Business Practices	Academy of Management Journal	1	0.16
	Academy of Management Review	4	0.62
	Benchmarking: An International Journal	3	0.47
	Business Process Management Journal	34	5.28
	California Management Review	2	0.31
	Harvard Business Review	4	0.62
	MIS Quarterly	2	0.31
	Sloan Management Review	1	0.16
	Strategic Management Journal	6	0.93
Subtotal	9 Journals	57	8.86
Organisation & Management Science	Decision Sciences	2	0.31
	Journal of Enterprise Transformation	8	1.24
	Management Decision	3	0.47
	Organisation Science	4	0.62
Subtotal	4 Journals	17	2.64
Economic & Marketing Management	Journal of Business & Industrial Marketing	21	3.26
	Journal of Economics & Management Strategy	1	0.16
Subtotal	2 Journals	22	3.42
Total	53 Journals	644	100.00

In order to gain a comprehensive and contemporary picture of the topic, the most significant journal articles within ERP and multi-organisational relationships and collaboration fields were decided to be included for the final in-depth review; this was also based on a simple content analysis of the articles in terms of six major themes in the context of ERP and multi-organisational enterprise governance (see Appendix A – Table IV): (i) designing and building ERP systems, (ii) managing ERP systems, (iii) ERP systems evolutionary trend, (iv) designing and building multi-organistional relationships and collaboration, (v) managing multi-organisational relationships and collaboration, (vi) ERP and multi-organisational collaboration strategy. Ultimately, this resulted in a quite exhaustive and detailed overview of ERP and multi-organisational enterprise management including 255 relevant publications with the most significant Journals being: *Information Systems Journal*, *International Journal of Operations & Production Management*, *Journal of Manufacturing Technology Management*, *Journal of Enterprise Information Management*, and *Journal of Operations Management* (accounted for 40 percent of the publications). The remaining 60 percent of articles were "thinly" spread over the rest of the 48 journals.

Each of the relevant articles is categorised regarding to one (or more) of the six themes, its author(s), focus of study/contribution, unit of analysis, theoretical perspective, applied research methodology, and industry sector(s). **This extensive literature can be justified by the necessity to draw on previous research studies in order to avoid redundancy and ambiguity**. In the following Table 2.2 only an excerpt of the full table is given, which highlights some contributions that seem most relevant to the major aim of this research study. The full table is available in Appendix A – Table IV.

Table 2.2 Classification of literature on ERP and Multi-organisational Enterprise Governance

Theme	Author(s)	Year	Focus of study/contribution	Unit of analysis	Theoretical perspective	Applied research methodology	Industry sectors
Designing and building ERP systems (ERPI, ERPII, ERP capabilities, cloud-based ERP, etc.)	Ayal and Seidmann	2009	Investigate the business value of integrating enterprise information systems in large scale clinical context by measuring financial, operational, and marketing aspects	ERP, EDI	IT and organisational capability	Case study, Longitudinal data set	Clinical
	Demirkan *et al*.	2010	Examine the performance of an SaaS set up under different coordination strategies between the ASPs and AIPs in SC network	SaaS, Cloud computing, Supply network	Relational view, SCM	Conceptual, Simulation experiments	Cloud-based ERP provider (e.g. SAP, NetSuite)
	Mohamed *et al*.	2010	Propose an architecture to build integrated B2B e-Commerce hub solutions and inter-organisational systems (IOS) based on Service Oriented Architecture (SOA)	e-commerce, SOA, EDI, IOS	Bottom-up/top-down approaches, Configuration theory, New architecture development	Case studies	Oil and gas
Managing ERP systems (ERP implementation, ERP systems management, strategic issues, organisational issues, etc.)	Al-Mashari *et al*.	2003	Present a novel taxonomy of the critical success factors in ERP implementation process; and argue that ERP benefits are realized when a tight link is established between implementation approach and business-wide performance measures	ERP (CSFs)	CSF-based view, Benefit-based view, Business process management, Taxonomy view	Case studies	PC software
	Laframboise and Reyes	2005	ERP and TQM are complementary resources that lead to competitive advantage and improved organisational performance	ERP, TQM	RBV, SCM (Supplier-buyer relationship)	Qualitative case studies	Aerospace
	Meissonier and Houze´	2010	Conceptualize the 'IT Conflict-Resistance Theory' to cope with conflict situations and to express tacit causes of resistance during IT (ERP) pre-implementation	IT (ERP) implementation	Management and organisation theory	Action research, Case applications	Broadcasting
ERP systems evolutionary trend (impacts/benefits of ERP, competitive advantage, sustainability, future ERP, etc.)	Demirkan *et al*.	2010	Examine the performance of an SaaS set up under different coordination strategies between the ASPs and AIPs in SC network	SaaS, Cloud computing, Supply network	Relational view, SCM	Conceptual, Simulation experiments	Cloud-based ERP provider (e.g. SAP, NetSuite)
	Møller	2005	Formalize and capture the ERPII concept and the next generation enterprise systems (ES)	ERPII	Evolutionary view, Configuration theory	Retrospective analysis	ERP vendors
	Sharif	2010	Bring together of the recent discussions within the business and computing press on social	SaaS, ICT computing,	Evolutionary view,	Conceptual, Case applications	Software

			networking, open source and utility computing for ERP solutions in the cloud	SOA, ERP, ERPII	Cloud-based view		
Designing and building inter-firm relationships and collaboration (enterprise structure, enterprise strategy, core competence, etc.)	Ahuja and Carley	1999	Examine distinct dimensions of emergent network structure in virtual organisations; posit that the fit between task routineness and network structure is associated with superior network performance	Virtual organisations, Network	Network theory, Organisational theory, Configuration theory, RBV	Questionnaire survey, Interviews, Content analysis, Case study	Artificial intelligence architecture
	Binder and Clegg	2006	Propose a conceptual framework for the design and management of an enterprise (i.e. inter-firm) based on contingency planning of an enterprise (including VIE, EE, and VE)	Vertical integrated enterprises, Extended enterprises, Virtual enterprises	Network theory, Contingency and configuration theory, Competence theory, RBV, TCE	Grounded theory, Semi-structured interviews, Questionnaire survey	Automotive
	O'Neill and Sackett	1994	Describe the extended manufacturing enterprise paradigm and practice; indicate EE model applicable in sectors where the importance of customer service is increasing	Extended enterprise	Configuration theory, Competence theory	Conceptual, Case applications	Aerospace
Managing inter-firm relationships and collaboration (collaboration governance, enterprise transformation, sustainability, dynamic capabilities, etc.)	Arnold *et al.*	2010	Explore the impacts of global supply chain partners' absorptive capacity, B2B e-commerce business risk on an organisation's willingness to commit to and share information with supply chain partners	Global supply chain, inter-organisat ional relationships	Relational view, SCM, RBV	Survey, Structural equation modeling	Construction, Energy, , Insurance, Aerospace, Transportation, Telecommunication
	Clegg *et al.*	2012	Discuss the importance of collaboration with suppliers and partners during R&D technology projects, which can be accomplished using the collaborative enterprise governance (CEG) concept (VIE, EE, VE)	CEG (VIE, EE, VE), Supply chain	Contingency and configuration theory, Relational view	Grounded theory, Case study, Interviews	Automotive
	Lewis *et al.*	2010	Provide insights into how organisations can combine both classic and extended resource-based advantage in seeking to establish long-term competitive advantage	Resource, Competitive advantage	RBV, ERBV	Longitudinal case study, Interviews,	Food service
ERP and inter-firm collaboration strategy (ERP support strategic networking, inter-organisational information systems, ERP	Cao and Hoffman	2011	Explore the relationship between the alignment of VE strategies, IT support and firm performance by comparing operations manager and general manager's perceptions	Virtual enterprise, IT	IT and business alignment	Questionnaire survey, Validity assessment	Mining, quarrying, and oil & gas, Construction, Manufacturing, Transportation
	Chi *et al.*	2010	Argue that while network structure provides firms with the opportunity to tap into external resources, the extent to which they are	Inter-firm network, IT, Competitive	Social network theory, Competence	Secondary data (database), Action coding, Variables	Automobile

adoption at SMEs, ERP-CEG linkages, etc.)			actually exploited depends on firms' IT-enabled capability; develop a theoretical model to examine the relationships between IT, network structure, and competitive action	action	theory, DCV, RBV	measurement	
	Rai and Tang	2010	Expand the competitive dynamics perspective and the IOS by integrating them to develop the understanding of the role of IT and process capabilities in leveraging external resources for competitive advantage	IOS, Inter-organisational relationship	Competence theory, DCV, Configuration theory, Relational view	Questionnaire survey, Validity assessment	Automotive, Chemicals, Electronic

It should be noted that at present there seems to be little consistency within the wider literature about enterprise information systems (EIS) capabilities, multi-organisational enterprise structures and strategies, and how these terms are applied (see Appendix A – Table IV); most of them are summarised by Table 2.3 (Parts A and B). Therefore, rather than establishing the differences between these types and terms on EIS and multi-organisational structures and strategies respectively, this research is typically focusing on the impact that EIS (e.g. ERP systems) *could*, *would* and *should* have on the multi-organisational *enterprise* structures and strategies and *vice versa*.

Accordingly, labels covering the ERP and ERPII systems were considered primarily by this research for the purpose of probing the next generation ERP systems, whilst the most three significant inter-firm forms known as *vertically integrated enterprise*, *extended enterprise*, and *virtual enterprise* that constitute the modern multi-organisational *enterprise* structures and strategies were identifying.

Table 2.3 (Parts A and B): Types and terms used in enterprise information systems and multi-organisational *enterprise* management literature

Types and terms	**Authors**
(a) *Types and terms used for describing the enterprise information systems*	
ERP systems	Al-Mashari *et al.* (2003); Ayal and Seidmann (2009); Beretta (2002); Palaniswamy and Frank (2000); Samaranayake (2009)
ERPII systems	Beatty and Williams (2006); Beheshti (2006); Koh *et al.* (2008); Møller (2005); Sammon and Adam (2005); Sharif (2010)
Electronic data interchange (EDI)	Davis and O'Sullivan (1998); Hanseth and Lyytinen (2010); Mohamed *et al.* (2010)
MRP, SCM, CRM, DSS, DW, BI, PDM, TQM, etc. (a.k.a. ERP 'add-ons')	Bull (2010); Collins *et al.* (2010); Gargeya and Brady (2005); Hendricks *et al.* (2007); Laframboise and Reyes (2005); Li *et al.* (2008); Müller *et al.* (2010); Wei *et al.* (2009)
Open source systems/applications (OSS)	Benlian and Hess (2011); Dwivedi and Mustafee (2010)
Service-oriented-architecture (SOA)	Daniel *et al.* (2004); Gulledge and Deller (2009); Hauser *et al.* (2010); Lee *et al.* (2010); Maurizio *et al.* (2007); Mueller *et al.* (2010)
Cloud computing (SaaS, PaaS, IaaS) and Web-based ERP systems	Demirkan *et al.* (2010); Katzan Jr. (2010); Tarantilis *et al.* (2008)
Enterprise application integration (EAI)	Lee *et al.* (2003); Sharif *et al.* (2005)
Inter-organisational information systems (IOIS)	Daniel and White (2005); Ibbott and O'Keefe (2004); Lyytinen and Damsgaard (2011)
(b) *Types and terms used for describing the forms of an enterprise (i.e. multi-organisational relationships)*	
Vertically integrated enterprises & vertical integration	Anderson and Weitz (1986); Binder and Clegg (2006); Doğan (2009); Harrigan (1994); Mahoney (1992); Ray *et al.* (2009); Richardson (1996)
Extended enterprises	Boardman and Clegg (2001); Browne and Zhang (1999); Childe (1998); Jagdev and Browne (1998); O'Neill and Sackett (1994)
Virtual enterprises & virtual organisations	Ahuja and Carley (1999); Browne and Zhang (1999); Camarinha-Matos and Pantoja-Lima (2001); Gou *et al.* (2003); Jagdev and Thoben (2001); Kaihara and Fujii (2002); Katzy and Dissel (2001); Martinez *et al.* (2001)

Quasi firm	Luke *et al*. (1989)
Strategic and dynamic (supply & manufacturing) network	Albani and Dietz (2009); Bititci *et al*. (2004); Cheng *et al*. (2011); Choi *et al*. (2001); Harland and Knight (2001); Lockett *et al*. (2011); Sawhney and Parikh (2001)
Inter-enterprise and inter-firm (relationships)	Arnold *et al*. (2010); Cambra-Fierro *et al*. (2011); Chen *et al*. (2007); Cheng (2011); Cousins and Crone (2003); Klein (2007); Li and Williams (1999); Trienekens and Beulens (2001); Tuusjärvi and Möller (2009)
Enterprise integration and network & supply chain integration	Chen *et al*. (2008); Flynn *et al*. (2010)
Inter-operability	Chituc *et al*. (2009); Panetto and Molina (2008)
Extraprise	Karlsson (2003); Karlsson and Sköld (2007)
Triads	Choi and Wu (2009); Wu *et al*. (2010)

2.2 Extant literature gaps and potential research fields on ERP and CEG

Although massive amounts of scholarly research have addressed the issues in respect to ERP systems and multi-organisational enterprise structures and strategies (see Table 2.2), important and new significant issues require further theoretical and empirical investigation. In this section, the author discusses the extant literature gaps and some potential research fields (i.e. future research needs), which motivates the need for the identified research topic of *managing enterprise resource planning and multi-organisational enterprise governance: a new contingency framework for the enterprisation of operations*. All the issues can be subsumed under the following headings (based on the categories from Table 2.2 and Appendix A – Table I and IV), which form the rationale and focus of this research study. For brevity, the discussion in this section mainly covers two aspects – unit of analysis and applied theoretical perspectives. Detailed analysis of all aspects and full results can be found in Appendix B.

2.2.1 Unit of analysis applied in research on ERP and Multi-Organisational Enterprise Management

Owing to the nature of the field, a suitable way to present the ERP concepts is to logically group them into "units of analysis" or "constructs". Agreement on a common set of unit does not appear to exist (as shown by Table 2.2). Different researchers use a myriad collection of defined unit of ERP or enterprise systems. However, according to the results of "unit of analysis" on designing, building and managing ERP systems, as well as the ERP developing trends illustrated in Table 2.4 (and Appendix A – Table IV), the most seven popular units related to ERP themes were analysed and discussed. These are (i) ERP (C = 55), (ii) ERPII (C = 8), (iii) supply chain management (SCM) systems (C = 6), (iv) cloud computing (technologies) (e.g. SaaS) (C = 6), (v) service-oriented architecture (SOA) (C = 10), (vi) open source applications (OSS) (C = 4) and (vii) inter-organisational information systems (IOIS) (C = 5). However as competition increases and markets become more turbulent and dynamic, ERP – as the most prevalent enterprise information systems – have to be re-designed to facilitate the new operational strategies (e.g. extended and virtual enterprise structure and strategy) to have even greater flexibility and agility by incorporating new web-based information technologies.

Even if this notion has been discussed from the "post-ERPII" (the next generation of enterprise information systems strategy aims at coping with the highly dynamic changes in the turbulent market; a.k.a. ERPIII (Clegg and Wan, 2013)) level by mentioning and analysing the terms such as 'Web-based ERP' (Tarantilis *et al*., 2008) and 'IOIS' (Daniel and White, 2005; Lyytinen and Damsgaard, 2011) in recent years, the *next generation ERP systems* has still not been defined with a *unified name* to act as a guide to the future IS research direction. This limitation of existing ERP theory can be overcome by shifting the analytical focus from the intra-organisational ERP to the inter-organisational ERP, and even the 'cloud-based' ERP concept and its impact on business performance. Hence, ERP systems have to be studied as situated multi-organisational enterprises as overall unit of analysis.

Table 2.4 Classification of articles according to 'unit of analysis' (ERP themes)

Unit of Analysis	Count (mentions)
ERP	55
ERPII	8
Supply chain management (SCM) systems	6
Cloud computing (technologies) (e.g. SaaS)	6
Service-oriented architecture (SOA)	10
Open source applications (OSS)	4
Inter-organisational information systems (IOIS)	5

Due to the global competition and increasing complex world, the interconnected forces are pushing companies to rethink the basic operational processes, and develop new ways of interacting with their business partners (Jain and Benyoucef, 2008) across the entire global or virtual value chain. Nevertheless, referring to the collaborative (or multi-organisational) enterprise governance area, most consequences (i.e. unit of analysis) identified in Table 2.2 (and Appendix A – Table IV) have still been analysed and discussed from the supply chain management (C = 38), dyadic (C = 19) and triadic (C =3) relations, individual firm (buyer or supplier/vendor) (C = 7), and inter-firm network (C = 23) levels (as shown in Table 2.5). This phenomenon can be criticised as there are lack of sufficient considerations and contributions to the *collaborative enterprise governance* (CEG) concept (Binder and Clegg, 2006) by embracing the core competence and resource-based views.

In spite of this, Table 2.5 reveals that the VIEs (C = 14), EEs (C = 13) and VEs (C = 20) (i.e. different multi-organisational *enterprises* types) have also been the main analysing units with relatively strong research attention in multi-organisational relationships and collaboration disciplinary area, which affirms the mantra of "operations strategy has been developed from single firm level to dyadic and triadic relationships, and been upgraded into multi-organisational enterprises level" contended by many researchers (Eisenhardt and Martin, 2000; Gottfredson *et al*., 2005) and organisational improvers. Even so, one thing should be noted is that by reviewing the 255 articles, only a few papers (Clegg *et al*., 2012; Purchase *et al*., 2011) have actually applied the terms VIE, EE and VE or *enterprise* in the sense of Binder and Clegg (2006) and European Commission's (2003) definition; nearly all others just refer to them as general terms which still took shape based on supply chain management roots (Chen *et al*., 2008; Childe, 1998) or even simple contractual exchanges (Mahoney, 1992).

Table 2.5 Classification of articles according to 'unit of analysis' (multi-organisational enterprise themes)

Unit of Analysis	Count (mentions)
Vertical integrated enterprises (VIE)	14
Extended enterprises (EE)	13
Virtual enterprises (VE)	20
Supply chain management	38
Dyadic relationships	19
Triadic relationships	3
Individual firm	7
Inter-firm network	23

2.2.2 Theoretical perspectives applied in research on ERP and Multi-Organisational Enterprise Management

It is generally accepted that theory development is an essential requirement for the research of any field (Kuhn, 1970; Wacker, 1998). To develop a better understanding, the 255 articles were analysed to determine, in the first instance, if a theoretical perspective was apparent. Those articles that seemed to reflect theoretical perspectives were further analysed to ascertain if the theories were existing or new ones as well as whether they were commonly used or not. Where existing theories were being used, the author offered a suitably comprehensive list to demonstrate the classification and frequency of their occurrence. These consisted of theories in IT and business/organisational strategy (IT and organisational capability, IT and business alignment), economics (transaction cost economics – TCE, agent-based view), (general) strategic management (configuration theory, strategic management, resource based view – RBV & resource dependency theory – RDT, competence theory, dynamic capabilities view – DCV, value chain, critical success factors – CSF based view), sociology and organisational science (contingency theory, network theory, complex adaptive systems – CAS), and industrial marketing management (relational view). The results of classifying the articles according to theoretical stance are summarised in Table 2.6 (see Appendix A – Table IV).

As can be seen from Table 2.6, of all the articles (spanning both ERP and multi-organisational enterprise themes) that adopted theoretical perspectives, none proposed original ERP and multi-organisational management theories. Instead, they were all grounding in existing theories. Closer examination of specific theoretical perspectives that were adopted showed that the configuration theory (C = 64), relational view

(*C* = 51), RBV & RDT (*C* = 45), and network theory (*C* = 44) were most popular. Also, articles grounded in dynamic capabilities view (*C* = 17) and contingency theory (*C* = 15) were fairly under-represented. Very few publications attempted value chain-based view (*C* = 6), CAS grounding (*C* = 3) and agent-based view (*C* = 3).

Table 2.6 Classification of theoretical perspective

Theoretical Perspective	Count
IT and organisational capability	30
Contingency theory	15
Configuration theory	64
Network theory	44
Relational view	51
Complex adaptive systems (CAS)	3
Transaction cost economics (TCE)	21
IT and business alignment	36
Strategic management	14
Resource based view (RBV) & Resource dependency theory (RDT)	45
Competence theory	26
Dynamic capabilities view (DCV)	17
Value chain based view	6
Agent-based view	3
Critical success factors (CSF) based view	10
Total	385[a]

Specifically, for the field of ERP, the extent to which theories have been developed appears to be slight. In fact, most ERP research studies appears to have been largely practitioner-led, with theory following (Bull, 2010; Chen, 2009; Deep *et al*., 2008; Hendricks *et al*., 2007; Maurizio *et al*., 2007; Tarantilis *et al*., 2008). The most common applied theoretical perspectives are IT and business alignment, IT and organisational capability, configuration theory and CSF-based view. Accordingly, the author intends to make an original theory which can describe the next generation ERP, on the one hand, and link its relations to multi-organisational enterprise structures and strategy, on the other hand.

Similarly, most studies on multi-organisational management always mainly focus on the very common conceptual representatives within the streams such as TCE (Anderson and Weitz, 1986; Cao and Zhang, 2011), RBV (Duan *et al*., 2009; Fawcett *et al*., 2012), Relational view (Cambra-Fierro *et al*., 2011; Hansen, 2009) and network theory (Albani and Dietz, 2009; Harland and Knight, 2001). Thereby, these papers overlook the potential of less commonly used concepts including the RDT (Tsou and Chen, 2012), ERBV (Lewis *et al*., 2010; Squire *et al*., 2009), CAS (Choi *et al*., 2001), and agent-based view (Yu and Krishnan, 2004). In addition, it should be acknowledged that the current pre-occupation with a few existing theories

[a] While 255 journal papers were reviewed, some articles addressed more than one theory and were, therefore, placed in multiple categories (i.e. theoretical perspectives)

may not be sufficient to describe the multi-organisational operations field completely – especially from an information systems landscape.

Besides the above, many research studies about ERP and multi-organisational management fields in the literature take an isolated view of single theoretical concepts while neglecting the necessity for using a multi-perspective approach; even if this is widely postulated in the literature. As a result, as indicated by the identified topic and nature of this research, the author decided to apply an *interdisciplinary theoretical perspective* approach which prefers to cover the contingency theory, value chain, RDT (the ones that seem to be under-applied to date in ERP and inter-firm areas), competence theory, DCV, and configuration theory.

Section 2.2 has presented the results and findings (of literature review) in terms of the unit of analysis and theoretical perspective, in order to initially find literature gaps). In turn, the Sections 2.3 and 2.4 would critically and deeply evaluate the literature on the ERP information systems capabilities and evolution, and multi-organisational enterprise structures and strategy *per se* to acquire various theoretical viewpoints from different lenses in the extant literature on the identified topic of this thesis; and further highlight four major research gaps which should be addressed by future research.

2.3 Theoretical foundation on ERP

This section critically and comprehensively reviews the most relevant and latest research studies in respect to enterprise resource planning (ERP) systems. Specifically, it draws upon three key theoretical aspects – designing and building ERP systems (e.g. ERP capabilities, ERP solutions), managing ERP systems (e.g. ERP implementation, strategic issues), and ERP evolutionary trend (e.g. next generation ERP, impacts and benefits of ERP) (see the first three themes in Table IV) to achieve the conceptual foundations and dig the research gaps.

2.3.1 Research conducted on designing and building ERP systems

Over the last few decades, there has been acknowledged a tremendous change in enterprise-oriented business software where the place of traditional accounting and commercial management products have been gradually usurped by integrated solutions that would rigorously deal with every single business aspect of each individual company. These information systems, typically called 'enterprise resource planning' (ERP) systems, are enterprise-wide management systems made possible by information technologies.

ERP was originally designed and built to overcome problems associated with incompatible information systems and inconsistent operating practices in an organisation (Davenport, 1998; Palaniswamy and Frank, 2000). By providing end-to-end connectivity, ERP systems enable the companies to enhance their performance involving operations, manufacturing, and finance (Ayal and Seidmann, 2009; Hendricks *et al*., 2007). For instance, order cycle times can be reduced through entire cross-functional transaction automation, resulting in improved throughput and customer response time (Cotteleer and Bendoly, 2006; McAfee, 2002). In addition, smooth and streamlined data flows and real-time operating information can be ensured by ERP to translate into dramatic gains in productivity and delivery speeds (Davenport, 1998). Taken together, the standardised firm-wide business processes and centrally stored enterprise data greatly facilitate the governance of the firm (McAfee and Upton, 1996; Scott and Vessey, 2000). To put it bluntly: if a company's systems are fragmented, its business is fragmented; and this is the allure of designing and building an integrated ERP system.

Despite the widespread use of ERP systems, many companies are beginning to realise that the real impact of ERP systems on management styles and practices is actually well below expectations. This could be explained by failed reconciliation between the technological imperatives of ERP and the business needs of the company itself (Bingi *et al*., 1999). Therefore, researchers began to contend that the integration of functional applications (e.g. applications integration (AI)) and workflows in ERP system environment require integration of business processes with organisational elements and data structures (Samaranayake, 2009; Themistocleous *et al*., 2001). On the other hand, the (organisational) integration was viewed as one of the important issue in successful design and deployment of business processes in ERP (Beretta, 2002; Bhatt, 2000; McAdam and McCormack, 2001). Although these researches pushed the notion of linking real-time information provided by ERP systems with full tight process integration (Park and Kusiak, 2005; Samaranayake and Chan, 2006); these arguments can be criticised as most of them were still concerned with *single intra-organisational* level or *individual business* needs rather than multi-organisational (a.k.a. inter-firm) viewpoint.

Davenport (1998) raised a set of questions about the role of business (management) implications in building the enterprise systems (e.g. ERP). These included how ERP can strengthen the organisational competitive advantage; and the extent to which ERP should be adopted and rolled out (e.g. all functions versus certain modules, globally versus regional units). As a result, in recent years, a growing stream of research has focused on the competitive advantage of ERP and the importance of considering the organisational business models and core competencies when making decisions for or against ERP implementation (Holland and Light, 1999; Prahalad and Krishnan, 1999). Such business models and 'competitive-competencies' reflect the new expected impacts of ERP on supply chain management and multi-organisational collaboration trends. However, as mentioned above, traditional ERP systems are usually developed as individual monolithic applications or modular separable tools assembled in a suite structure for *individual* organisation (Tarantilis *et al*., 2008). Functionally, these systems primarily support the management and administration of the deployment of resources within a *single* (though possible multi-site) company (Akkermans *et al*., 2003) to increase the competitive advantage (Chen, 2001). In other words, ERP seems to be hindering the more strategic business trends such as outsourcing, vertical integration, extended enterprises (EEs) and virtual enterprises (VEs). At the same time, traditional ERP is seen to provide support for the more technical issues such as standardisation and global IT systems (Akkermans *et al*., 2003).

To cope with the challenges arising from new business environment, especially within the e-marketplace and strategic multi-organisational collaborations, some researchers postulated that companies should look to information technologies (ERP systems) that would provide a range of further functional modules (a.k.a. 'add-ons') such as supply-chain management (SCM) which is defined as "the integration of key business processes from end-user through original suppliers that provides products, services, and information that add value for customers and other stakeholders" (Lambert, 2008, p.2), customer relationship management (CRM) which is defined as "a holistic business and information systems strategy with the aim of enabling organisations to realise a stronger customer focus" (Bull, 2003a, 2003b), and e-business functionalities to enable the companies to jump ahead of their competitors (Koh *et al*., 2008). On the topic of enterprise systems integration (linking traditional ERP to the new designed (ancillary) applications) Lee *et al*. (2003) asserted that while ERP supports internal centralised and standard business strategies, the supplemental enterprise application integration (EAI) – "a business computing term for plans, methods, and tools aimed at modernizing, consolidating, and coordinating the overall computer functionality in an enterprise" (Lee *et al*., 2003, p. 57) – seek to enable external or decentralised business processes integration. Similarly, Bose *et al*. (2008), Bull (2010), Sammon and Adam (2005), and Wei *et al*. (2009) identified the prerequisites, strategic impacts and challenges of merging ERP with SCM, CRM, data warehouse (DW) which is defined as "a collection of consistent, subject-oriented, integrated, time-variant, non-volatile data in support of management's decisions" (Inmon, 1996), and product data management (PDM) – "a system that supports management of both engineering data (such as drawings, project plans and part files) and the product development process during the total product life cycle" (Rouibah and Ould-Ali, 2006) – information systems. Further, Davis and O'Sullivan (1999) outlined a framework used in offering an important roadmap in designing and building information infrastructure (a.k.a. ERPII systems) to deal with the extended (virtual) enterprises – though still grounded in the supply chain management perspective.

The configuration and strategies of a multi-organisational enterprise as a "network of cooperating business units" will evolve continually – with a high frequency business units will enter and leave the network. Having a monolithic, global ERP system or even contemporary ERPII version touted by systems vendors will put severe constraints on this flexibility and agility due to their salient (design) shortcomings and flaws – lack of flexibility in adapting to changes in dynamic business environment, lack of (web-enabled) modularity, and lack of EEs (VEs) operation capabilities (Akkermans *et al*., 2003; Tarantilis *et al*., 2008). In response to this, a new generation of web-based enterprise information systems is gradually gaining ground, where the system structure is entirely modular, pluggable and separable and no component or module is obligatory for the application's operation (Ramrattan and Patel, 2010; Tarantilis *et al*., 2008). Simultaneously, these web-based solutions are able to easily interoperate with the whole supply network entities (Tarantilis *et al*., 2008). With the recent advent of such web-based ERP technologies and Internet mediums, researches on designing and building ERP have begun to focus on linking an organisation's ERP systems to the ERP systems of other virtual enterprise participants in a seamless, near-real time collaborative manner (Beheshti, 2006; Koh *et al*., 2008; Lee *et al*., 2003).

On the subject of designing and building the web-based ERP systems, research studies in the extant literature can be generally divided into three main streams – distributed ERP systems architecture (similar to ERPII with 'add-ons' such as e-business), cross- and inter-organisational (a.k.a. multi-organisational) ERP, and Service-Oriented Architecture (SOA) – "the architecture style that supports loosely coupled services to enable business flexibility in an interoperable, technology-agnostic manner" (Knippel, 2005) or cloud-based ERP with open-source applications. Specifically, Frank (2004) illustrated the design of distributed ERP software in which the e-commerce system is totally integrated. However, this architecture was proposed to improve *local autonomy* rather than *multi-organisational* operational performance. Although Frank (2004) and Tarn *et al*. (2002) claimed that such distributed ERP systems also support heterogeneity, and therefore, the locations of supply chain partners can be integrated alike; by their design, the systems would only serve those companies who have physically functional locations – to some degree, this is in contradiction to the virtual enterprise IT requirements (especially in service-oriented industries (as discussed later in Chapters 6 and 7)). By comparison, Brehm *et al*. (2006), and Kovács and Paganelli (2003) presented another type of distributed ERP system in which EE and VE functionalities can be realistically expected to be available.

The second configurable form of web-based ERP is dubbed as cross- or inter-organisational enterprise system (Vathanophas, 2007) which has been recognised as a key requirement for the effective operation of multi-organisational (or inter-firm) relationships and collaboration (Breu *et al*., 2002; Christopher, 2000). Banker *et al*., (2010), and Daneva and Wieringa (2006) pointed out that cross-organisational ERP solutions are used to coordinate work from different organisations toward a common goal. The information system involved in cross-organisational ERP can be either mutually adopted by the related organisations or owned by only one of the organisations and is granted access to the other for the purpose and duration of the collaborative project (Banker *et al*., 2010). In particular, flexible integrated decision support systems (DSS) which are "IT-based systems focused on supporting and improving managerial decision making" (Collins *et al*., 2010, p. 437) should be incorporated to better support the multi-organisational business processes and managerial decisions in complex, dynamic environment (Collins *et al*., 2010). Moreover, an important element of cross-/multi-organisational ERP vision requires the ability of high agility and adaptability (i.e. the 'agile reconfiguration) (Chai *et al*., 1999). Wang *et al*. (2006) emphasized this by considering component-based ERP systems in which agile reconstruction and reconfiguration is supported from business model space to software space – though still focused on the technology layer.

The third configurable form of web-based ERP system is commonly referred to as 'cloud-based ERP' along with SOA technologies and open sources applications (Benlian and Hess, 2011; Gulledge and Deller, 2009; Johansson and Sudzina, 2008). Increasingly, many initiatives in realising the traditional inter-organisational systems (IOS) have been abandoned due to high cost per transaction over the systems such as distributed applications, component-based technologies and semantic standards (Albani and Dietz, 2009). This consequently gave birth to SOA (and web services) which promised to provide quick and inexpensive changes of the Internet technology and ERP configuration, in order to establish and sustain new business partnerships and network structures (Mohamed *et al*., 2010). On the other hand, Dwivedi and Mustafee (2010) argue that cloud-based operating (ERP) systems can facilitate dynamic virtual (multi-) organisations, with the objective of "coordinated resource sharing". However, existing literature on 'cloud ERP', SOA-based ERP, and open-source ERP systems is relatively scarce; most of studies focus too much on designing and using modern SOA, cloud or grid computing, Open Source Software (OSS) which is described as "when software was sold, macros and utilities were freely exchanged in user forums" (Johansson and Sudzina, 2008) and electronic data interchange (EDI) which refers to "the electronic exchange of standardised business documents which improve interorganisational coordination by reducing time lags associated with document delivery and internal information processing, among other things" (Hart and Saunders, 1997, p. 24) *per se* and, thus, on the technological level (Hauser *et al*., 2010; Katzan Jr, 2010) rather than actually merging them with ERP systems. Yet, Benlian and Hess (2011) and Shukla *et al*. (2012) indicate that the strategic links of ERP-SOA, ERP-cloud computing, and ERP-OSS are positive and imperative. Boulanger (2005) argued that OSS ERP is a viable alternative to proprietary (ERP) systems when taking software quality and reliability into consideration. This could particularly be of interest for SMEs that are highly flexible and adaptable to change (Raymond, 2005) as OSS ERPs design and adoption offer increased adaptability, ease of implementation (plug-and-play) at lower cost in comparison to 'high-cost' on-premises ERP (Benlian and Hess, 2011; Serrano and Sarriegi, 2006). Similarly the configuration and design of cloud ERP solutions are considered to be more flexible, scalable, efficient and affordable than traditional ones (Raihana, 2012; Shukla *et al*., 2012).

In spite of these exclusive benefits of web-based ERP systems (e.g. SOA-ERP, cloud-based ERP), their inherent drawbacks have also been disclosed and critically discussed. Lawton (2002) pointed out that organisations with legal security requirements, especially in service industry sectors, are less likely to use open source (ERP) tools. Instead, they will probably continue to depend on (ERP) vendors they can hold liable for security breaches. This is in line with the view of Katzan Jr (2010) who concerned issues related to security, privacy, trustworthy computing and commercial confidentialities in designing and applying OSS ERP and cloud-based ERP systems. Therefore, one could argue that web-based ERP systems are more suited to VEs whilst companies (particularly large-sized VIEs) would still prefer to use proprietary in-house ERP systems due to their physical operational locations. In the meantime, EEs may require a traditional ERP application for its internal operations while using distributed multi-database and web services – as the complementary tools to allow them (and partners) to access needed information more effectively.

2.3.2 Research conducted on managing ERP systems

Besides designing and building ERP systems, research on managing ERP systems can also be observed. Unfortunately, a significant body of past literature has been devoted to the studies of either ERP (project) selection and implementation (Pan *et al*., 2011) or ERP challenges and obstacles. On the one hand, the ERP adoption landscape is awash with buzzword 'critical success factors' (CSFs) – one of the best known approaches used to define, analyse and measure ERP implementation success (Al-Mashari *et al*., 2003; Holland and Light, 1999; Iskanius, 2009; Muscatello and Chen, 2008; Nah and Delgado, 2006; Sumner, 2000). Main factors concerned in CSF are business process reengineering (BPR) (Bancroft *et al*., 1998; Newman and Zhao, 2008; Subramoniam *et al*., 2009), ERP package and implementation strategy selection (Baki and Cakar, 2005; Capaldo and Rippa, 2009; Davenport, 1998; Rao, 2000), systems integration (Bingi *et al*., 1999; Soh *et al*., 2000), stakeholder perspective (Chetcuti, 2008; Nah *et al*., 2001), change management (e.g. training and education) (Aladwani, 2001; Gupta, 2000). On the other hand, challenges and obstacles (sometimes entitled "critical failure factors") of adopting and managing ERP systems are explored and presented (He, 2004; Momoh *et al*., 2010). And it should be noted that the factors that contribute to the success of ERP implementation and management are not necessarily the same as the factors that contribute to failure (Gargeya and Brady, 2005).

Although these identified determinants can be used as the precursors or cornerstones for understanding ERP governance in supporting business and operational strategies, most existing ERP management and implementation research are described as factor research at *single firm* level (Al-Mashari *et al*., 2003; Chou and Chang, 2008), which involves identifying the factors or variables that are critical for governing internal ERP successfully (Aladwani, 2001; Lin and Rohm, 2009). Such static, 'intra-organisational' views and interpretative models would limit the adequacy in investigating and explaining how the developmental transition from traditional ERP to web-based ERP systems has happened, and in turn, should be managed to become more supportive in multi-organisational enterprise management from a dynamic contingency perspective. In spite of this, some recent studies have attempted to disinter ERP managerial issues within multi-organisational context. For instance, the scope of business processes reengineering during ERP adoption is extended from intra-organisational processes to inter-organisational processes (Buzzell and Ortmeyer, 1995) due to the rapid development in technology and the recursive relationship between BPR and ERP (Subramoniam *et al*., 2009). At the same time ERP management has been studied from SCM (Yang and Su, 2009) and resource based perspective (RBP) (He, 2004); while outsourcing the IS operational systems and using the third parties in multi-organisational web service technology (ERP) adoption are considered (Berg and Stylianou, 2009; Daniel *et al*., 2004) in pursuit of a sustainable competitive advantage. Further, Malhotra and Temponi (2010) stressed the key decisions necessary for managing ERP systems integration at a *dynamic small business* level rather than large-sized companies.

According to some researchers, selecting the right solution is a critical factor for ERP system success, multi-organisational ERP management in particular. Given the paucity of empirical research in dynamic multi-organisational ERP governance, the author reviewed papers covering multisite ERP adoption, diverse ERP integration, supply chain integration (SCI) systems implementation, and inter-organisational IS (IOIS) management – which can be defined as an information system used jointly by at least two organisations that draw upon common and/or shared IT capabilities (Lyytinen and Damsgaard, 2011); these are theoretical foundations on which the strategic concept '*enterprisation of operations*' in this thesis is partly founded. Specifically, Markus *et al*. (2000) proposed five different ways in which organisations can arrange their business relationships and each is associated with a way to multisite ERP management. Three approaches are referring to the '*(multi-organisational) enterprise*-ERP management' therein – headquarters coordination of operations; network coordination of operations; and total centralisation. To accomplish a successful multisite ERP systems implementation and management it is also necessary to establish an ERP system-to-system linkage to ensure the data flow consistency and integrity. However, companies involved in the multi-organisational enterprises (or supply network) may adopt various ERP systems from different vendors; even a single organisation could opt to use best functional modules (a.k.a. 'best of breed') offered by different ERP vendors for different process areas (Maurizio *et al*., 2007). As a consequence, one of the best ways is to integrate diverse multiple ERP systems by applying EAI and SOA with 'best practices' at minimal customisation (Alshawi *et al*., 2004; Maurizio *et al*., 2007). Moreover, from the supply chain integration perspective (e.g. engineering-to-order), issues of managing integrated enterprise systems such as firm's structural characteristics (Bayo-Moriones and Lera-Lopez, 2007) and the product complexity (Childerhouse and Towill, 2011) have been addressed (Tsinopoulos and Bell, 2010).

Strategic outsourcing and vertical integration are now being used for many companies for seeking out the most consistent (operational) processes at the best cost. These new business paradigms in conjunction with the subsequent extended (virtual) enterprises structures and strategy, add to the complexity of the system landscape while requiring companies to look hard at an IOIS that can span multiple ERP systems and combine information as quickly and consistently as possible (Maurizio *et al*., 2007). Lyytinen and Damsgaard (2011) proposed that IOIS scholars need to look beyond the single adopting organisation in IOIS adoption studies. They detailed the necessity for forming an overall organising vision of how the IOIS helps organise better inter-organisational structures and processes, which is supported by Poon and Wagner's (2001) viewpoint. Simultaneously, they defined and elaborated different structural relationships among participating organisations that can vary from simple dyadic relationships into complex industry-wide hubs or distributed networks. In contrast, Ibbott and O'Keefe (2004), and Pouloudi and Whitley (1997) probed the 'soft' issues in respect to the dynamics of trust and the roles of stakeholders that can influence the governance and implementation of IOIS. They further suggested that the nature of the inter-firm (a.k.a. multi-organisational) relationship is more important than the approach to IOIS development. Additionally, Humphreys *et al*. (2001) presented six contingencies of deploying and managing IOIS in the context of global supply chain – typically from a *dynamic contingency* perspective. Although extant IOIS management literature has noticed the interdependencies among different contexts, adoption and adoption behaviours, understanding on governing IOIS is still rudimentary, fragmented and insufficient; and it is necessary to integrate these elements into a more analytical framework with practical guidelines.

On the technology side, Capaldo and Rippa (2009) argue that both technical and organisational issues must be considered in managing and implementing ERP systems. Also, ERP governance has new technological related requirements that have begun to surface along with the propensity from intra-organisational ERP to web-based inter-organisational ERP (as discussed in Sub-section 2.3.1). Seen from this point of view, how to manage the integration of ERP with other advanced information systems and technologies encompassing the SCM, CRM, business intelligence (BI) which is described as "concepts and methods to improve business decision making by using fact-based support systems" (Power, 2008), and SOA (a.k.a. ERP systems tailorability (Sharif *et al*., 2005)) are essential – particularly for inter-firm collaboration success and therefore, should be given a considerable attention. For instance, Laframboise and Reyes (2005), Li *et al*. (2008), and Schniederjans and Kim (2003) emphasised the positive correlation between ERP and total quality management (TQM) – "a management approach that ensures mutual cooperation of everyone in an organisation and associated business processes to produce products and services that meet, and hopefully exceed, the needs and expectations of custoemrs" (Laframboise and Reyes, 2005, p. 49) and indicated that merging ERP and TQM systems could significantly contribute to customer satisfaction performance. This in turn, enables a sustainable mutual cooperation with partners on the downstream side (of supply chain). More importantly, to warrant that ERP systems can provide high-impact business benefits to supply chain and extended (virtual) enterprises strategies, multiple ERP integration is required to comply with SOA in an EAI environment (Maurizio *et al*., 2007; Sharif *et al*., 2005). This might sometimes be complemented by BI and data warehouse (DW) applications (e.g. open hub) (Maurizio *et al*., 2007; Müller *et al*., 2010) to "make more informed and better decisions" (Turban *et al*., 2006). Besides the above, defining scope of technology application security foundation (Lee *et al*., 2010), information integrity (Mandke and Nayar, 2004), avoidance management (to cope with users' resistance toward ERP) (Meissonier and Houzé, 2010), and strong communication (Sharif *et al*., 2005) must be taken into account when governing (multi-organisational) ERP systems.

From a dynamic contingency point of view, enterprise systems (ES) implementations are seen as major change initiatives enabling organisational transformation and processes reengineering. Correspondingly, different multi-organisational enterprise structures and strategy require the best ERP solutions respectively to meet their requirements. Hence, companies who espouse the 'multi-organisational ERP' should consider the ES upgrade from single ERP to ERPII or web-based ERP systems. Olson and Zhao (2007) argued that ERP upgrades are mainly intended to take advantage of new technologies and business strategies to ensure that the organisation keeps up with the latest business development trends, and therefore, are expected to be more important than those extensive CSFs. However, it seems that extant literature conducting on ERP upgrade project management with best practices has no difference with traditional ERP in terms of the critical factors (Beatty and Williams, 2006). The reason for this is that (ERP) information systems have been developed for their own sake and not examined in the context organisation design as a whole (Oura and Kijima, 2002). Accordingly, distinct concerns about alignment ERP implementation (practices) with organisational development activities (e.g. evolution of firm networks – from emergency to early growth, to maturity, and so forth (Hite and Hesterly, 2001)) are demonstrated in some recent studies (Chen, 2009). One could then posit that the advance of (ERP) information systems is evolving toward a strategic role with the potential to shape new business strategies (Chen, 2009; Presley, 2006; Wideder *et al*., 2006); this somewhat indicates a 'dynamic transformational view' of multi-organisational ERP management – though still grounded in an antique 'IT and business alignment' model (Henderson and Venkatraman, 1993) rather than the 'contingency' perspectives.

Research Gap 1. It is suggested that scholars of designing, building and managing ERP systems should look beyond core ERP functionalities improvement and internal ERP adoption at single organisational level; and in contrast consider how ERP systems can be configured and governed to become more supportive of dynamic change in different multi-organisational *enterprises* contexts from a contingency viewpoint.

2.3.3 From ERP to ERPII and on towards ERPIII (ERP evolutionary trend)

As mentioned above (i.e. designing, building and managing ERP), *traditional ERP systems are internally integrated information systems which are used to gain operational competitive advantage* (Blackstone and Cox, 2005, p. 38; He, 2004) *by primarily supporting core internal functions such as operations and production, and which may be extended to include other closely related functions such as sales and distribution, and accounting and finance* (Al-Mudimigh *et al*., 2001; Davenport, 1998). These traditional ERP system types (sometimes also referred to as ERPI) typically have a high degree of proprietary in-house development requiring considerable financial commitment to implement and integrate with other organisational applications; such as Product Data Management (PDM) and Decision Support System (DSS) (Stevens, 2003; Themistocleous *et al*., 2001).

The origins of ERP systems are firmly based in manufacturing and their fundamental structure built upon Material Requirements Planning (MRP) (Harwood, 2003; Shehab *et al*., 2004) which "determines the quantity and timing of the acquisition of dependent demand items needed to satisfy master schedule requirements" (Ghobbar and Friend, 2004, p. 217), Manufacturing Resource Planning (MRPII) (Wight, 1984) which "has an excellent planning and scheduling capability that can offer increases in customer service and reduction in inventory and material costs" (Ip *et al*., 2000, p. 181), and later Computer Integrated Manufacturing (CIM) (Jacobs and Weston Jr., 2007; Rashid *et al*., 2002) which is defined as "a technology which integrates the design, manufacturing, and business functions in production/operations management" (Sabbaghi, 2011, p. 59). Apparently, traditional ERP does not necessarily support the increasing scope of future business requirements for Internet based commerce (Bond *et al*., 2000; Moller, 2005; Songini, 2002; Vazquez-Bustelo and Avella, 2006). In response, further functional modules are developed as 'add-ons' to form ERPII systems and the mantra of "ERP is dead – long live ERPII" is often used by contemporary systems developers (Eckartz *et al.*, 2009). Thus, traditional ERP systems are slowly being usurped by ERPII (sometimes also known as 'XRP' – eXtended Resource Planning); as *ERPII is recognised as an integral part of business strategy enabling multi-organisational collaborations through extension of operations to close and trusted partners* (Bagchi *et al*., 2003). Modules such as Advanced Planning and Scheduling (APS) which "improves the integration of materials and capacity planning by using constraint-based planning and optimisation modules" (Kristianto *et al*., 2011, p. 109), SCM, CRM, Demand Chain Management (DCM) which is defined as "practice that manages and coordinates the supply chain from end-customers backwards to suppliers" (Frohlich and Westbrook, 2002), Vendor Managed Inventory (VMI) which is defined as "a tool used to improve customer service and reduce inventory cost" while the vendor, or supplier, becomes responsible for manaing the inventory at the customer's site (Kuk, 2004), BI, and DW are all parts of ERPII systems (Kumar and van Hillegersberg, 2000); giving the potential for multi-organisational operations and Internet based commerce (Davenport and Brooks, 2004). One might say that the first generation of ERP primarily supported and enhanced *single* organisational operations (Akkermans *et al*., 2003) whilst ERPII supports "… resource planning co-operations *between* different organisations at a meta-level" (Daniel and White, 2005).

Currently ERPII is the dominant type of system to support modern manufacturing enterprises. However as competition increases and markets become even more turbulent, many manufacturers are trying to re-design their operations and ERP systems to have even greater flexibility (Anussornnitisarn and Nof, 2003). As a result information systems solutions based on technologies such as EAI, SOA, SaaS (Software as a Service) (Bass and Mabry, 2004; Sharif *et al*., 2005) which is "seen as a possible replacement to traditional software where the buyer obtains a perpetual license and installs and maintains all necessary hardware, software and other technical infrastructure" (Choudhary, 2007), utility and cloud computing technologies (Maurizio *et al*., 2007; Rappa, 2004; Sharif, 2010) and open-sources applications (Benlian and Hess, 2011) are becoming more prevalent. These technologies bring with them further flexibility, agility, efficiency, scalability and re-configurability for ERP systems and operations; because they provide the potential for multi-organisational connectivity (Torbacki, 2008; Wilkes and Veryard, 2004).

The future for ERP systems is still uncertain though as SOA, SaaS, Utility and openly-sourced enterprise applications bring new challenges around granularity of data-sharing, business privacy and de-centralisation of strategic objectives (Candido *et al*., 2009; Xu *et al*., 2002). Despite these new challenges one can observe these emerging technologies changing the way that ERP systems are currently being perceived and developed. For instance one can find "Virtual Enterprise Resource Planning (VERP)" and "Federated ERP" concepts being deployed using cloud computing, SOA, SaaS and PaaS (Platform as a Service) – "the provision of a development platform and environment providing services and storage, hosted in the cloud" (Boniface *et al*., 2010) technologies (Cummins, 2009; Pal and Pantaleo, 2005). These new technical and conceptual IS developments may provide more sustainable competitive advantage and make the enterprise management concept a future reality. For managers who may be seeking to temporise their structure and operations strategy in response to economic turbulence and uncertainty, this is an important trend to be aware of.

In this paper the author refers to the *next generation* of enterprise resource planning systems as '*ERPIII'*. The author defines ERPIII as *a flexible, powerful information system incorporating web-based technology which enables enterprises to offer increasing degrees of connectivity, collaboration and dynamism through increased functional scope and scalability*. Wood (2010) describes ERPIII from a practitioner-based definition, "Through collaboration, direct contact, social media, and various data streams, within and outside of the enterprise, ERPIII integrates marketplace fans and critics into the extending ERP and ERPII organisations. From the integration of customers and vendors beyond the single organisational boundaries a constructive dialog or information exchange is created to innovate, produce, and then sell (or distribute) better products or services". Woods' definition along with other visions (e.g. third generation of ERP systems (Johansson and Bjørn-Andersen, 2007)) is comparable to the authors', but falls short in considering contemporary management thinking about (multi-organisational) *enterprise* concepts (in the sense of European Commission) brought out by academic literature cited in this paper.

The exploration of designing and managing current and future ERP systems for *multi-organisational enterprise management* were operationalised by focusing on three ERP systems (technologies). As shown by the extant literature and the relevant quotations cited in Table 2.7, ERP, ERPII and ERPIII systems are both of considerable current interest and are expected to play a significant role in different multi-organisational enterprise structures and strategies, as well as shaping the future inter-organisational information systems.

Table 2.7 Extant literature relating to three ERP generations in the future *enterprise* strategies

ERP Generations and Related IS/IT	**Extant Literature and Key Works**	**Expected and Important Role in Future Collaborative Enterprise Strategies**
ERP (first generation)	Al-Mudimigh *et al*., 2001; Bagchi *et al*., 2003; Blackstone and Cox, 2005; Chen, 2001; Chorafas, 2001; Davenport, 1998; Lee *et al*., 2003; Michel. 2000; Moller, 2005; Monk and Wagner, 2009; Stevens, 2003; Themistocleous *et al*., 2001; Wang *et al*., 2006; Wortmann *et al*., 2000; Wylie, 1990	'Coordination across the inter-functional divisions is being made easier by the availability of ERP systems' (Moller, 2005) 'Information and process integration can be achieved and maintained by ERP systems' (Park and Kusiak, 2005)
ERPII (or XRP)	Akkermans *et al*., 2003; Beatty and Williams, 2006; Bendoly *et al*., 2004; Bond *et al*., 2000; Bowersox *et al*., 2002; Chen, 2001; Davenport, 1998; Eckartz *et al*., 2009; Moller, 2005; Sammon and Adam, 2005; Sharif *et al*., 2005; Songini, 2002	'Traditional ERP systems merge with new business tools can enable inter-firm collaboration' (Bendoly *et al*., 2004; Eckartz *et al*., 2009; Moller, 2005) 'ERP, PDM, and EAI integration will gain both internal and external processes connection' (Lee *et al*., 2003; Miller, 1999)
ERPIII (with SOA, SaaS, and Utility applications)	Bass and Mabry, 2004; Brown and Johnston, 2003; Candido *et al*., 2009; Johansson and Bjørn-Andersen, 2007; Maurizio *et al*., 2007; Papazoglou *et al*., 2006; Rotem-Gal-Oz *et al*., 2007; Torbacki, 2008; Tugnawat, 2008; Wan and Clegg, 2010; Wilkes and Veryard, 2004; Wood, 2010	'SOA, SaaS, and Utility applications could unify different ERP systems and reconfigure SCM within service-oriented environment' (Maurizio *et al*., 2007) 'By integrating customer and suppler through a constructive dialog and information exchange, ERPIII will create the borderless enterprise' (Wood, 2010)

Further, Table 2.8 summarises recent ERP systems development trends outlined above; from (traditional) ERP to ERPII, and on towards ERPIII on which the new contingency framework described in the Chapters 4 and 7 is partly founded. This is also illustrated by a timeline in Figure 2.1 which chronologically shows how the functionalities developed over time as MRP into MRPII and subsequently into traditional ERP, ERPII and on towards ERPIII in support of collaborative enterprise strategy.

Tables 2.7 and 2.8, Figure 2.1 along with the literature review in Section 2.3 critically, comprehensively and clearly address the theoretical foundations/issues with respect to the use of ERP information systems in supporting and developing different collaborative enterprise structurs as well as their related strategic capabilities and operational requirements, instead of explaining the use of particular ERP modules from a pure technology perspective.

Table 2.8 Summary of ERP trends: ERP to ERPII, and on towards ERPIII

Key Element	**ERP**	**ERPII**	**ERPIII**
Role of system	Single organisation optimisation and integration (Akkermans *et al*., 2003; Park and Kusiak, 2005; Scott and Vessey, 2000)	Multi-organisation participation with some collaborative commerce potential (Bagchi *et al*., 2003; Daniel and White, 2005; Zrimsek, 2003)	Multi-organisation, Internet based, with full collaborative commerce functionality (Hauser *et al*., 2010; Ponis and Spanos, 2009; Torbacki, 2008)
Business scope	Manufacturing and distribution, automatic business transactions (Al-Mudimigh *et al*., 2001; Chen, 2001)	Often sector-wide offering upstream and downstream integration (Bendoly *et al*., 2004; Bond *et al*., 2000)	Facilitating cross sectors strategic alliances (Muscatello *et al*., 2003; Wilkes and Veryard, 2004; Wood, 2010)
Functions addressed	Manufacturing, product data, sales and distribution, finance (Davenport, 1998; Monk and Wagner, 2009)	Most internal organisational functions supported with some limited supplier and customer integration (Li, 1999; "Ted" Weston, 2002, 2003)	All internal functions supported plus core inter-company processes (Hauser *et al*., 2010; Wood, 2010)
Processes supported	Internal, hidden, with an intra-company boundary (Al-Mashari *et al*., 2003; Markus and Tanis, 2000)	Externally connected with intra-enterprise (i.e. inter-company) focus (Bond *et al*., 2000; Moller, 2005; Songini, 2002; Tapscott *et al*., 2000)	Externally connected, open network to create borderless inter-enterprise/industry-wide focus (Muscatello *et al*., 2003; Ponis and Spanos, 2009; Wood, 2010)
Information system architecture	Web-aware closed and monolithic (Hicks and Stecke, 1995; Stevens, 2003; Themistocleous *et al*., 2001)	Web-based, componentized, non-proprietary (Callaway, 2000; Monk and Wagner, 2009) Internally and externally available, often subscribed to by joint ventures (Ericson, 2001; Li, 1999; Moller, 2005)	Web-based communication, service-oriented architecture (Hofmann, 2008; Ponis and Spanos, 2009) External exchange via open source and cloud computing (Buco *et al*., 2004; De Maria *et al*., 2011)

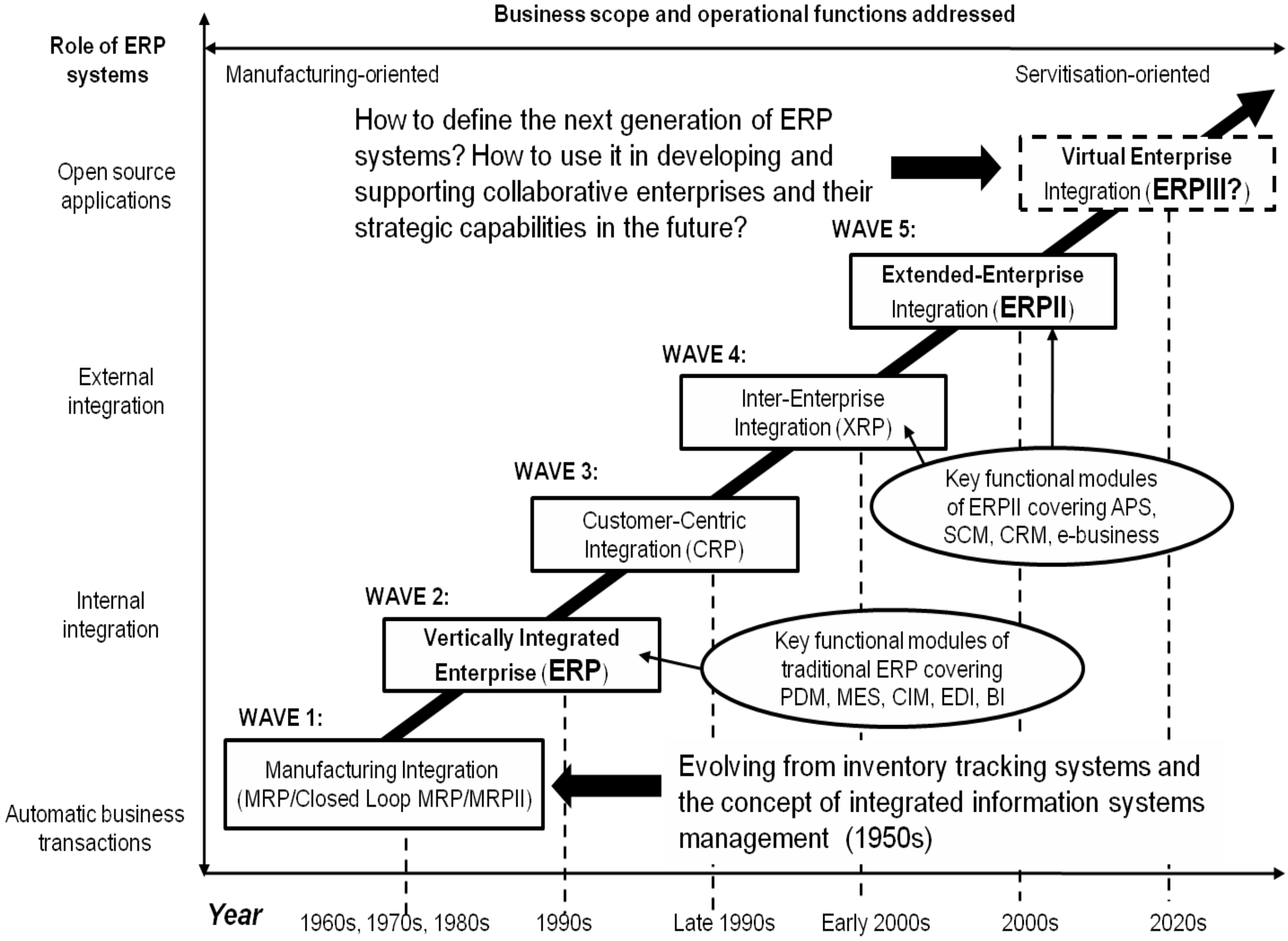

Figure 2.1. A timeline chronologically showing the ERP systems evolutionary trend in support of collaborative enterprise strategy

Research Gap 2. Research dedicated to the next generation ERP systems development should not merely focus on technical and practitioner-based perspectives. Rather, the emphasis should be placed on investigating how the advanced information system tools can upgrade or even change the current ERP systems to form future types that are capable of fulfilling multi-organisational *enterprise* structure and strategies through a dynamic, contingency management approach.

2.4 Theoretical foundation on multi-organisational enterprise governance

This section critically and comprehensively reviews the most relevant and latest research studies in respect to multi-organisational enterprise governance. Specifically, it draws upon two key theoretical aspects – designing and building (multi-organisational) enterprise relationships and collaboration (e.g. enterprise structures and strategy) and managing (multi-organisational) enterprise relationships and collaboration (e.g. collaboration governance, enterprise transformation) (see the fourth and fifth themes in Appendix A – Table IV) to achieve the conceptual foundations and dig the gaps.

The concept of applying (multi-organisational) enterprise strategy is important because *it is widely accepted that embracing new business partnerships and collaborative arrangements can contribute to the sustainability of a business* (Achrol and Kotler, 1999). For instance, Tencati and Zsolnai (2009) state that the *enterprise* concept helps a business fit better within its (business) environment, social, and cultural contexts. Likewise Binder and Clegg (2006) claim that, "… the success of *collaborative enterprise management* (a.k.a. governance) depends on the ability of companies to intermediate their internal core competences into other participating companies' value streams and simultaneously outsource their own peripheral activities …". Similarly Li and Williams (1999) indicate that "firms should focus on their core competences and share expertise and risks with each other in order to develop inter-firm collaboration in strategic processes …" This thinking indicates that competitiveness relies on the overall performance of *all* partners in an *enterprise* rather than just one company's internal operations. This research herein focuses on the three main types of (multi-organisational) enterprises: the Vertically Integrated Enterprises (VIE), the Extended Enterprises (EE), and the Virtual Enterprises (VE) to illustrate multi-organisational enterprise management behaviour.

2.4.1 Research conducted on designing and building multi-organisational (enterprise) relationships and collaboration

In the past decades, companies under a dynamic and turbulent environment recognised that the source of their competitive strengths does not only lie in their core competences, but also in the ability to cooperate with their business partners (Gottfredson *et al*., 2005; Seifert, 2009). Therefore, companies seek to move beyond their own walls to get involved in a 'virtual value chain' (Rayport and Sviokla, 1995) to establish multi-organisational relationships and processes (Grant, 1996; Lambert, 2004; Zhao *et al*., 2008). Many scientific approaches and theories on designing and building multi-organisational relationships and collaboration have been developed correspondingly (Li and Williams, 1999; Tuusjärvi and Möller, 2009). However, more recent evidence suggests that multi-organisational (networks) are diffusing rapidly into an increasing number of fragmented sectors covering quasi firm (Luke *et al*., 1989), extraprise (Karlsson and Sköld, 2007) – this is similar to "enterprise" in the sense of EC's definition even though they are expressed in two different words, smart business network (Busquets, 2010; Dyer and Singh, 1998), (interoperability) in collaborative network (Bititci *et al*., 2004; Chituc *et al*., 2009), and supply chain collaboration (a.k.a. supply chain cooperation, supply network) (Cao and Zhang, 2011; Harland and Knight, 2001; De Leeuw and Fransoo, 2009). These applications supported by multi-organisational (networks) have also been extended from previous routine transactions (e.g. electronic ordering and invoicing) to more complex and strategically more important processes (e.g. offshore outsourcing (Tate and Ellram, 2009), distributed virtual factory (Fujii *et al*., 2000)) (Howells and Wood, 1995), which has led to the discussions about a 'network theory' and a 'chain and network science' (Sawhney and Parikh, 2001) as an emerging philosophy in OM research (Binder and Edwards, 2010; Holweg and Pil, 2008).

Specifically from a SCM perspective, recent scholarly contributions have highlighted the significance of moving beyond the buyer-supplier dyads (Hansen, 2009; Svahn and Westerlund, 2009), and shifting from triads to focus on the multi-organisational supply network (Choi and Dooley, 2009; Harland, 1996; Ramcharran, 2001) to engender integrated value chains (Manthou *et al*., 2004; Noke and Hughes, 2010). As a result, the 'multi-organisational' (or 'inter-firm') notion embedded in SCM domain can be reflected by examining supply chain integration (Forslund and Jonsson, 2009; Power, 2005), supply network (Choi and Hong, 2002; Lockett *et al*., 2011), agile supply chain (Baramichai *et al*., 2007; Yusuf *et al*., 2004), and dynamic capabilities and resource-based view of SC (Fawcett *et al*., 2012). Although Jagdev and Thoben (2001) assert that any multi-organisational (enterprise) network is composed of a series of bilateral (supply chain) relationships; as SCM still concerns more about each business activity of the 'chain' through a linear SC process rather than a holistic *enterprise* (in the sense of EC's definition) integration perspective, new levels to which the frontiers of multi-organisational collaboration types are being pushed give rise to the modern *enterprise* paradigm (Clegg and Wan, 2013) – the one still moves away from vertical integration toward virtual integration (Binder and Clegg, 2007; Hamel and Prahalad, 1994).

The author uses the European Commission's definition of an *enterprise* which is, "... *an entity including partnerships or associations that can be made up of parts of different companies*" (European Commission, 2003). This is echoed by other researchers (Browne *et al*., 1996; Chen *et al*., 2008) who stress the significance of embodying *enterprise* (management) concept – the new superior frontier of collaboration with tighter integrated partnerships against the antecedent of 'supply chain integration (a.k.a. collaboration)'. To complement the relatively small body of literature related to *enterprise* structures and strategies, as mentioned above, three predominant types (i.e. VIEs, EEs, and VEs) were theoretically reviewed in terms of their patterns, configurations, advantages and flaws.

Vertically integrated enterprises (VIE) operate as large single well-integrated multi-functional firm striving for scales of economy, they typically have bureaucratic reporting hierarchies (Lynch, 2003) which evolve as, "a response to pre-existing market power problems or as a strategic move to create or enhance market power in upstream and downstream markets" (Joskow, 2003, p. 25). A VIE will typically process ultraraw materials through to end-consumer products and services to embed a firm within an industry (Harrigan, 1985; Vallespir and Kleinhans, 2001). A classic example is the Ford Motor Company is in its 20th century heyday (Monteverde and Teece, 1982; Crandall, 1968). As a result competitiveness maybe gained through reduced transaction costs (Harrigan, 1984, 1985; Mahoney, 1992), stronger quality control, higher barriers to new entrants (Rothaermel *et al*., 2006), and rapid response to volume changes (Richardson, 1996). However, the competitive damage created by excessive (vertical) integration can be substantial, as in the examples of the U.S. automobile and steel industries in 1983. Hence, instead of building VIE, quasi-integration and joint ventures should be formed to obtain strategic flexibility. Firms could have components engineered to their tight and highly specific instructions by outsiders rather than fully own and control adjacent business units (in the vertical chain) (Harrigan, 1985), as do Japanese automobile manufacturers, for instance. In turn, some research suggests that 'make-or-buy' decisions (Anderson and Weitz, 1986; Vallespir and Kleinhans, 2001); strategic outsourcing (or global sourcing) (Chung *et al*., 2004) and alliances make further enhancements to a VIE set-up (Arya and Mittendorf, 2008). Therefore, the downside to VIEs (Argyres, 1996) is that their structure and size can inhibit engagement with other organisations; hence the rate at which changing market requirements are addressable in collaboration with other organisations is reduced. To combat the downsides of VIEs – the *extended enterprise* strategy and structure should be used instead.

The 'extended enterprise' (EE) concept, in contrast to the VIE, is defined by Davis and Spekman (2004, p. 20) as "… the entire set of collaborating companies … which bring value to the marketplace …" and by Lyman *et al.* (2009) as "… a business value network where multiple firms own and manage parts of an integrated enterprise". This allows practices such as just-in-time (JIT) supply chain logistics (Sutton, 2006), collaborative innovation (Owen *et al*., 2008), and data warehouse interoperability (Triantafillakis *et al*., 2004) to be deployed more easily across company boundaries (Childe, 1998; Jagdev and Browne, 1998). This is because an EE structure allows organisations to focus on their core business and technical activities whilst outsourcing non-core activities to other members in their extended enterprise (Stalk *et al*., 1992; Thun, 2010). Thus extended enterprises are deemed to be more agile than vertically integrated enterprises. But despite reduced cross-company boundaries (O'Neill and Sackett, 1994) even EEs cannot manage to follow very high economic turbulence and unpredictability because they operate in a partially restricted environment operated by known, trusted and willing members.

Highly turbulent and very unpredictable market behaviours are best coped with by *virtual enterprises* (VE) (Byrne and Brandt, 1993; Katzy and Dissel, 2001) rather than an EE or a VIE as virtual enterprises (VEs) are the most agile type of enterprises. VEs are best thought of as a jigsaw of operations and information systems from more than one business entity loosely governed by decentralised specific objectives which delivers value in an agile manner towards its market opportunities (Goldman *et al*., 1995; Martinez *et al*., 2001). Virtual multi-organisational relationships like these can facilitate innovative agile manufacturing (or supply chain) more easily (Cho *et al*., 1996; Sharp *et al*., 1999) and deal with dramatic dynamic market changes (Madu and Kuei, 2004) through Internet based information and communication technologies (ICTs) (Hyvonen *et al*., 2008; Jagdev *et al*., 2008; Lipnack and Stamps, 1997). This is because firms' tendencies towards temporising strategy and structure are more easily addressed. For example the book publishing business is constantly changing due to newly emerging digital technologies (e.g. Lightning Source's Internet based 'print-on-demand' (POD) publishing service is able to integrate hundreds of thousands of suppliers and buyers rapidly into a 'cost effective' deliver system; see lightningsource.com/process).

Browne and Zhang (1999) summarise that the EE and VE can be seen as two complementary (multi-organisational) *enterprise* strategies as their similarity lies in the fact that they both pursue multi-organisational partnerships in order to achieve business success in very competitive environments. The main difference is represented by the 'temporary' and 'dynamic' nature of the VE in comparison to the EE. Similarly, Jagdev and co-workers (1998; 2001) unveil that unlike EE, VE is a manifestation which is inherent in agile manufacturing, and which is made possible by heavily utilising ICT systems; therefore, EE can be considered as a special case of the VE. Moreover, as manager seek to re-engineer companies (especially the SMEs (Hanna and Walsh, 2000; Jagdev *et al*., 2008; Kaihara and Fujii, 2002)) in response to uncertain business environment, the VE tends to replace the VIE (Daniels, 1998) and the EE because virtual enterprises are more suitable as they are, "opportunistic aggregations of smaller (business) units that come together and act as though they were a larger, longer-lived enterprises" (Goranson, 1999).

In view of the foregoing part, although most research attempt to establish awareness on designing and building multi-organisational relationships and collaboration, as well as indicating its potential does lead to superior performance (Mentzer *et al*., 2008), the shortages of extant literature are still evident which can be criticised from three aspects. First, there is lack of sufficient considerations and contributions to the theory development of linking (multi-organisational) *enterprise* structures and strategies with ERP systems capabilities. For example, Trienekens and Beulens (2001) give an overview of major approaches to multi-organisational relationships (design) from the business process perspective, the organisational (governance) perspective and the business environment perspective but neglect the IS (e.g. ERP) management perspective. Similarly, vertical integration strategy is often investigated from the industrial economic and strategic management perspectives (Mahoney, 1989) rather than built upon the IT landscape. Second, despite a tendency moving from VIE to EE and on towards VE is shown above in terms of the core competences in each enterprise type, one might say that no one is the best structure or the most 'all-sided' strategy. For instance, Harrigan (1984) argue that the use of vertical integration (strategy) must change with time to encompass other arrangements by which the firm can use outsiders whilst Ray *et al.* (2009) and Rosenzweig (2009) unfold that vertical integration is rational when industry concentration is high or demand uncertainty (or variability) is low or products are low in complexity. Another example is that collaboration within the VE network may share risk, large investment, burdens and costs (Chituc *et al*., 2009; Guglar and Dunning, 1993; Penrose, 2008) even if the *consumer-response agility* and *fast access to new sources of innovation* can be achieved more easily through this type than VIE and EE paradigms. Consequently, a dynamic, contingency (practical) framework that incorporates the dimensions embodying the *enterprise* strategies and the effects of ERP capabilities (besides of core competence (Binder and Clegg, 2006)) upon them must be put forth. This has been supported by some research studies (Baramichai *et al*., 2007; Harrigan, 1985; Schroth and Schmid, 2009) – though these are still grounded at *single* firm level (or in the SCM perspective). Third, research focusing on finding the way to design and build enterprise paradigms is mostly related to manufacturing industry (O'Neill and Sackett, 1994); it is suggested that other business areas such as financial services and distribution should be regarded as examples alike when conducting multi-organisational enterprise (design) research (Browne and Zhang, 1999).

Table 2.9 summarises the comparison between vertically integrated (VIE), extended (EE) and virtual enterprises (VE) types as discussed above using key elements which both characterises and differentiates them on structural, strategic operations and IS bases. The (multi-organisational) enterprise types in Table 2.9 (along with ERP types in Table 2.8) are used as partial bases for the new contingency framework given in the Chapters 4 and 7 of this thesis.

Table 2.9 Comparisons between VIE, EE, and VE (adapted from Binder and Clegg, 2007)

Key Element	**Vertically Integrated Enterprise (VIE)**	**Extended Enterprise (EE)**	**Virtual Enterprise (VE)**
Characteristic of core competencies	Mature and well accepted Large scale of economies	Semi-mature with pilot experience Ideal for production ramp-up scenarios	Quick respond to the changing market and environment Low overheads
Strategic aims	Long term objectives	Medium-long term objectives	Short-term objectives
Partnership purposes	Long-term indefinite co-operation	Medium-long-term collaboration on variety of projects and products	Temporary team-working for single project or products
Organisation stability	Stable hierarchy and inflexible structure	Relatively stable across the product value chain	Dynamic organisation with core competences
Organisation type	Command & control unity Concern more on scales of economies	Product/service value-chain based	Frequently project or niche market based
Co-ordination of partnership	Original equipment manufacturer supervises relationship with the partners	Manufacturer or prime contractor supervises the partnership	The most strategically influential member (‘orchestrator’) supervises the co-operation
Operational challenges	Legacy system transferring approaches (e.g. big bang vs. incremental ways)	Synergistic among complementing core competencies Compatibility around partners and IS/IT	Dynamic operating and unpredictable business environment Psychological issues
Risk degree	Comparative low	Moderate	Intensely high
IS/IT facilitators	In-house development of proprietary systems with traditional ERP system for intra-integration	Advanced IS/IT ERP merged with other new functional modules (e.g. SCM, CRM, VMI)	Sophisticated Web-based technologies (e.g. SOA, cloud computing, SaaS)

2.4.2 Research conducted on managing multi-organisational (enterprise) relationships and collaboration

The competition in the new multi-organisational enterprises landscape is a major upheaval that is affecting every aspect of how multi-organisational relationships and collaboration operate and be governed. The core issues and challenges in managing them are dealing with complexity, uncertainties, flexibility-agility linkage, trust and decision making in (multi-organisational) collaboration (Chiang *et al*., 2012; Choi and Wu, 2009; Pateli and Lioukas, 2011). Numerous scholarly contributions about the governance of newly multi-organisational relationships and strategies over recent years have led to a plethora of studies with a vast array of un-unified ideas in this discipline (Clegg *et al*., 2012; Gittell and Weiss, 2004). The author therefore identified six basic (research) streams that existing literature on multi-organisational enterprise management has in common. These are (1) uncertainty (or dynamics) and risk management, (2) flexibility and agility (modularisation) management, (3) information (resources) sharing, (4) mutual trust, (5) decision making, and (6) partner (selection) management – one of these is either antecedent or consequence of the other. Specifically, while alliance like ‘enterprises’ (in the sense of EC’s definition) with the underlying supply network represents tremendous business opportunities, they also make the involved legal entities face greater uncertainties and risks (as a result of globalisation, shorter product life cycle, etc.) (Jain and Benyoucef, 2008; Kocabasoglu and Suresh, 2006). Christopher and Lee (2004) also argued that the complexity and uncertainty within supply network can increase the “chaos” (e.g. mistrust, distorted information). To cope with these challenges, one strategy is to create and enhance dynamic capability and flexibility in the (multi-organisational) network in order to increase responsiveness and rapidly meet demand fluctuations (Caridi and Cigolini, 2002; Lewis *et al*., 2010; Reuter *et al*., 2010; Soon and Udin, 2011). However, Das *et al*. (2006) indicated that by fostering interdependencies, multi-organisational integration potentially creates inflexibility and impede the re-configurability and adaptability of the whole (virtual value) chain. This can be combated through recent ‘agile’ strategy (Goldman *et al*., 1995; Wu and Barnes, 2012) or ‘modularity’ approach (Choi *et al*., 2001; Langlois, 2002; Squire *et al*., 2009). Simultaneously, other researchers (Cheng, 2011; Stevenson and Spring, 2009) asserted that flexibility and agility in the multi-organisational context can be improved by information and resource sharing (sometimes is referred to as ‘absorptive capacity’ (Arnold *et al*., 2010)) in real time; this is often driven by levels of trust (Cai *et al*., 2010; Co and Barro, 2009; Cousins and Crone, 2003) and mutual commitment in practice (Bordonaba-Juste and Cambra-Fierro, 2009; Madlberger, 2009) in order to enhance the collaborative forecasting and increase transparency (i.e. “end-to-end” visibility) within the multi-organisational setting (Poler *et al*., 2008). On the other hand, managing interdependence of multistage processes across different tasks and organisational boundaries requires (real-time) decision making (Jain and Benyoucef, 2008) – for example, how to work with each type of established partnerships (Aláez-Aller and Longás-García, 2010), how to (proactively) manage the relationships between ‘partners and partners’ (Choi and Wu, 2009; Wu *et al*., 2010), and how to accurately apply various sourcing policies (Khan and Pillania, 2008). Further, decision making about partner selection is particularly challenging and complex when viewed from the (multi-organisational) enterprise perspective because of the complexity of putting together a supply network under dynamic conditions (Wu and Barnes, 2012) (i.e. selection criteria are likely to need to change over time (Sarkis *et al*., 2007; Baker, 2008)). Moreover, other issues such as organisational size (Krishnamurthy and Yauch, 2007; Pearcy and Giunipero, 2008; Stevenson and Spring, 2009) (e.g. Bennis and O'Toole (1993) outlined that small-sized organisations tended to move towards lean, agile, and flexible strategies) and (supply chain) 'confidence' (Christopher and Lee, 2004) have to be taken into account when governing multi-organisational relationships and collaboration in order to find an efficient and sustainable managerial solution.

As noted above, albeit these research studies touch many of the critical elements on managing multi-organisational enterprise relationships and collaboration, they are broad in focus. In addition, most still grounded in supply chain (management) perspective (Cheng, 2011; Stevenson and Spring, 2009) or general multi-organisational context (O'Reilly and Finnegan, 2010) and fail to consider the nature of *enterprises*. In contrast, strategic issues about VIE management have been discussed in recent literature from different viewpoints. For example, Baines *et al*. (2011) pointed out that choosing the appropriate position and extent of vertical integration is a complex decision-making activity as it is affected by a range of factors such as contractual relationship, installed-base difference (Doğan, 2009), environmental contingencies, and knowledge acquisition (Peyrefitte *et al*., 2002). In other words, the crux of the vertical integration performance relationship involves changes to a firm's strategic core (Reve, 1990) or its center of gravity – the stage of the value added chain in which a firm's operations first began (Galbraith, 1983). However, Vallespir and Kleinhans (2001) suggested an inverse decision of reduction of the domain of activity belongs to VIE in the situation where outsourcing occurs. This has been supported by other research studies (Aláez-Aller and Longás-García, 2010; Halldorsson and Skjøtt-Larsen, 2004), and in turn, give birth to *taper integration* (Rothaermel *et al*., 2006) (and subsequent EE) along with the argument of balancing VIE and strategic outsourcing (Cousins and Crone, 2003). Furthermore, Reve (1990) and Richardson (1996) argued that the central issue on governing VIE is control (i.e. vertical agreements) rather than ownership over the assets and capabilities in the value chain to efficiently coordinate the activities and achieve the ultimate goals.

In regard to EE management, striking points that arise are to do with the matter of determining "core competencies" and finding means to nurture these. Partner selection, evaluation, and retention are other dimensions (Sutton, 2006); the competence of being able to interface with these supply chain "neighbours" is required (e.g. joint development processes creation). Similar to VIE, the boundary of the EE should be set by understanding the environmental dynamics and knowing how to co-operate within it (Boardman and Clegg, 2001). Additionally, Post *et al*. (2002), Davis and Spekman (2004), and Sutton (2006) advocated that the key to effective EE implementation is to enlarge the scope of focal firm's interactions with other *businesses* by including the relationships with other *stakeholders* while managing the risks that are inherited from the myriad inter-organisational relationships (within the EE). In contrast to EE governance, the VE management has been depicted to be more complex due to its inherent “mobility” and “re-configurability” (Grefen *et al*., 2009). The existing literature has critically examined the VE management through three major lenses – member roles, practical issues, and partner management. Firstly, functional roles (e.g. orchestrator, broker, and network-coach) must be distinguished to determine the strategic position for any legal entity (or partner) in VE (Busquets, 2010; Katzy and Dissel, 2001). But each responsibility may change depending on the VE management/collaboration mechanism. For instance, it can be managed via a ‘dominant’ approach if there is a dominant member in the VE; or it might be governed through a ‘cooperative’ approach if none of the VE members prevailing over the other (Martins *et al*., 2004). Secondly, it is important to notice that heterogeneity is a key characteristic in VE collaboration scenarios. Thus, the VE infrastructure and coordination policies are requested to be flexible and configurable (Camarinha-Matos and Pantoja-Lima, 2001). This in turn brings new challenges on how to well balance the ‘autonomous activities’ and ‘coordinated activities’ to every VE member (Gou *et al*., 2003). Thirdly, partner management in the VE becomes more complex than EE and VIE as the selection evolves to the level of partnerships which are created and dismantled to follow market movements (Sarkis *et al*., 2007). Similarly, Martins *et al*. (2004) indicated that partner selection is obviously not limited to the VE creation phase; it may actually happen frequently along it lifetime, with extensive changes to the supply chain size and geometry. Other issues such as trust and conflict, decision making (e.g. determine whether or not use the agile strategy), and knowledge sharing have also received adequate attention in the VE management literature (Panteli and Sockalingam, 2005; Weber, 2002).

As can be seen from the previous sections, a wealth of literature on specific aspects of multi-organisational (including VIE, EE, and VE) relationships and collaboration management has been fully addressed. However, with the exception of Binder and Clegg (2007), and Purchase *et al*. (2011), the above research studies have investigated multi-organisational enterprise governance without considering the *enterprise transformation* element. This is important because the highly networked inter-firm collaboration with varying partner relationships require transformation management from a holistic *enterprise* perspective – one can be challenged by articulating (multi-organisational) *enterprise* boundaries (Purchase *et al*., 2011). In other words, *each (multi-organisational) enterprise paradigm (i.e. VIEs, EEs, and VEs) cannot be perpetuated and will shift from one to another to swiftly respond to market opportunities*. Hence, Binder and Clegg (2007) attempt to further ascertain the dynamic changes of *enterprise* governance (design and management activities) through a contingency approach by focusing on the influence of prevailing core competence.

Despite these insights into multi-organisational enterprise governance in both strategic and transformational perspectives a conspicuous gap can be exposed as little attention has been given on how ERP systems (or the broader information systems) could be adopted and managed to support the inter-firm strategies and collaborative businesses besides the technical issues; and on the reciprocal effects between multi-organisational collaboration and ERP systems. Bordonaba-Juste and Cambra-Fierro's (2009) work can be a negative example which argued that, "technology is not always enough. Firm need to understand their partners and to communicate with them" when managing a collaborative supply chain – the one ignores the importance of ERP systems capabilities when doing the multi-organisational enterprise management research studies.

Research Gap 3. A vast number of scholarly contributions about the newly multi-organisational governance have led to a plethora of studies on the VIEs, EEs, and VEs relationships and collaboration management. But a practical contingency framework is needed to investigate collaborative *enterprise* governance from both information systems (ERP) management and dynamic transformational standpoints.

2.5 ERP systems and Collaborative Enterprise Governance – strategic and potential linkages

This section critically and comprehensively reviews the most relevant and latest research studies in respect to the strategic and potential linkages between ERP and multi-organisational enterprise governance. Specifically, it draws upon the key theoretical aspects of ERP and multi-organisational collaboration strategy (see the sixth theme in Appendix A – Table IV) to achieve the conceptual foundations and dig the gaps. The point of department of this research is discussed afterwards based on a set of tentative ERP-Collaborative Enterprise Governance correlations.

2.5.1 Research conducted on ERP and inter-firm collaboration strategy

The literature review presented and discussed in Sections 2.3 and 2.4 indicates that extant studies on ERP systems development have mostly focused on ERP functionality improvements rather than on how ERP systems fit with multi-organisational enterprise structures and strategy. Likewise, the relationship between multi-organisational enterprise management and ERP system types remains theoretically under-developed – these are explicitly conveyed by *research gaps 1, 2,* and *3*. However, the importance of adopting the appropriate IT (ERP) solutions to support collaborative relationships and business has been addressed over the last dozen years. For example, Choy *et al*. (2004), Haug *et al*. (2010), Pasandideh *et al*. (2010), and Perona and Saccani (2004) explored the management of customer-supplier relationships, parent-subsidiary SCs, and retailer-supplier partnerships through a set of supporting IS tools (e.g. ERP, SRM, VMI, CRM, EDI). Also, Lai *et al*. (2008) analysed how partner's IT capabilities affect the focal firm's initiatives in establishing the external collaboration. The focus of research on *linking ERP and multi-organisational enterprise governance* further shifted from the 'ERP-dyadic relationship' perspective into the realms of 'ERP-SCM' and 'ERP-eBusiness' where the e-supply chain, IS in SCI, web-based ERP for agile supply network (Akyuz and Rehan, 2009; Fawcett *et al*., 2011; Frohlich, 2002; Gunasekaran and Ngai, 2004), e-business technologies on multi-organisational collaboration, and ERP-enabled e-business change (Ash and Burn, 2003; Sanders, 2007; Smart, 2008) are covered. Despite the much publicised importance of ERP in improving the linear relationship (including the supply chain) management, this mono-theoretic approach may be less conducive to studies focusing on 'ERP and multi-organisational enterprises governance' that is actually in the sense of European Commission (2003) (*cf.* 4.4.1). Consequently, the role of inter-organisational information systems (IOIS) has drawn much research attention more recently – the one that can somewhat reflect a combination of ERP and the actual complex multi-organisational enterprise structures and strategy.

The use and benefits of IOIS were originally documented by a few authors with the primary research being conducted by Bala and Venkatesh (2007), and Chatterjee and Ravichandran (2004). They specifically either report on the guidelines of examining openness-trust and managing conflict in IOIS from a social and behavioural perspective (Ibrahim and Ribbers, 2009; Kumar and van Dissel, 1996); or discuss the influence of IOIS on business performance (Brandon-Jones and Carey, 2011; Ko *et al*., 2009) and the implementation of such integrated-enterprise systems (Ho and Lin, 2004) from a strategic management perspective. Whilst there is a substantial body of research on the IOIS design and adoption, a major problem with prior studies on this topic is that the treatment of IOIS has been done either at an aggregate level, or done inconsistently (Saeed *et al*., 2011) (e.g. knowledge management and IOS (Chengalur-Smith *et al*., 2012; Yam *et al*., 2007), process-based IOIS (Law and Ngai, 2007), IS integration in mergers and acquisitions (Henningsson and Carlsson, 2011)); limited attention has been paid to investigate the outcome that could be accrued from IOIS and inter-firm strategies alignment and integration. This is echoed by Rajaguru and Matanda (2009) who advocated that the full potential benefits of IOIS can be attained when organisations integrate their IOIS and activities with supply chain partners – the one proves that ERP systems could sometimes cover integral partners in the supply chain – yet not the whole multi-organisational enterprises. Further, there is also a lack of empirical work on the effects of IOIS and (multi-organisational) enterprises integration.

What enterprise information systems can bestow upon the multi-organisational structures and strategies is further unearthed by looking at the IT-enabled *extended enterprises* and *virtual enterprises* – two current and future prevailing multi-organisational enterprise paradigms (see Sub-section 2.4.1). In comparison to the perspective of 'ERP systems impact on cross-functionality' (Amrani *et al*., 2006), 'ERP-enabled EE' landscape raises awareness of building and developing ERP systems and supportive ICT tools that are accepted for use as enablers of communications between collaborative partners in the extended enterprise (Davis and O'Sullivan, 1998; Palacios *et al*., 2006) rather than the former approach (e.g. joint venture (Westrup and Liu, 2008)). Researchers studying ERP-EE also emphasize that an extended enterprise necessitates a solution where the enterprise system of each participating business in the (EE) value chain should be able to communicate with other such systems in order to accomplish cooperative task (Triantafillakis *et al*., 2004). On the other hand, the link between VE and IT and the impact of this alignment on business performance has been explored by Cao and Dowlatshahi (2005). Flexibility and agility are highlighted as the key characteristics when configuring new ERP system architectures to support the VE structure and strategy (Aerts *et al*., 2002). In addition, SOA concepts and cloud-based middleware technologies are suggested to be incorporated to enhance the current ERP functionalities (Ponis and Spanos, 2009; Xu, 2012). Particularly, the virtual enterprise model of business organisations is often seen as one of the best strategies for SMEs to achieve a global reach without compromising their independence and flexibility – this is especially true for short-term trading relationships amongst the SMEs (Martins *et al*., 2004). Most studies concerning the ERP-VE consequently focus on understanding the relationship between ERP and SMEs as the complex business process in VE is often enacted by a network of small to medium-sized companies. They generally throw light on the issues of ERP systems implementations and management at SMEs (Buonanno *et al*., 2005; Doom *et al*., 2010; Olsen and Sætre, 2007; Shiau *et al*., 2009; Snider *et al*., 2009), how SMEs use ERP to create a competitive advantage (Esteves, 2009; Koh and Simpson, 2005), and cloud-based ERP management at SMEs (Demirkan *et al*., 2010; Faisal, 2011; Poba-Nzaou and Raymond, 2010; Sultan, 2011).

As mentioned above, most of researches dedicated to the ERP and multi-organisational collaboration are relying on the antique *IT-business alignment* theory (Law and Ngai, 2007; Tarafdar and Qrunfleh, 2009; Thun, 2010; Vannoy and Salam, 2010), which is still far from satisfactory as they have not investigated ERP-CEG from a dynamic configuration and contingency perspective. This is an important gap in the author's understanding because companies would experience different sets of endogenous and exogenous changes and therefore require different degree of integration of ERP systems and multi-organisational enterprise strategy and practices to achieve agility. It was also identified that there was lack of knowledge and expertise in how further management can be made and arranged to enable the ERP systems to perform better on collaborative enterprise governance. Moreover, an absence of supporting tools to strategically manage transformational changes between different ERP types and different multi-organisational enterprise types was uncovered. Accordingly, these pivotal points can be addressed by a simple unifying conceptual framework with the objective of brining out pertinent contingent factors (e.g. the intensity in use of ERP systems; the extent to which different organisations are integrated; and the core competence achieved by different ERP-Collaborative Enterprise Governance approaches) and useful insights into the managerial implications. This viewpoint has been supported by a handful of extant research studies using the dynamic contingency perspective to theorise the alignment between IT (ERP) capabilities and inter-organisational relationships (Chi *et al*. 2010; Power and Singh, 2007; Rai and Tang, 2010; Tsou and Chen, 2012); as well as other papers that specifically examine how business network can be redesigned using the enterprise systems (Cao and Hoffman, 2011; Jaiswal and Kaushik, 2005).

Research Gap 4. A perennial pressing challenge in the Information Systems Management (ISM) and Operations Management (OM) disciplines is the alignment between enterprise management thinking and

ERP information systems development. Therefore a unifying conceptual providing a useable decision-making framework for ERP systems and *enterprise* co-development based on contingency and reconfiguration perspectives is needed.

2.5.2 Point of departure of this research

It can be seen that the plethora of subject titles related to the study of ERP information systems and multi-organisational relationships and collaboration might appear to discourage researchers from conducting a new research (as in Sections 2.3 and 2.4). However, the academic understanding in these two research areas is still playing ‘catch up’ with the business practice which, in the author’s opinion that is substantiated by the discussion above, has not changed over the past few years. Further, little has been written in the way of practical frameworks for business managers on governing ERP-Collaborative Enterprise approaches which is an important gap (described in Sub-section 2.5.1). On the other hand, the author is fully aware that addressing all the research issues identified above is not a realistic task for an MPhil/doctoral study; but will trigger many future research endeavours. Hence, this research study does not claim to deal with all the problems associated with ERP and strategic collaboration but claims to make a significant contribution in the areas of ISM-OM by focusing the aspect of on governing *enterprise resource planning systems and multi-organisational enterprises*.

Accordingly, instead of engaging in the general discussion of adopting ERP systems and establishing multi-organisational collaboration, this thesis is based on the assumption that “traditional manufacturing companies and service-oriented businesses are becoming increasingly dependent on external resources and should endeavour to simultaneously develop ERP systems and strategic multi-organisational (enterprise) relationships to gain sustainable competitive advantage through such action, described as the *enterprisation* of operations” (stated in Chapter 1). In this context, the aim of this study based on the identified 4 gaps in the literature is to **investigate and theorises about how different types of ERP systems fit into different multi-organisational enterprises; and develop a framework and practical guidelines on how to design and manage these ERP information systems and multi-organisational relationships in a sustainable way to grow competitive advantage through an innovative strategic and contemporary operations thinking**. Thereby, this research is embedded in the empirical context of multi-organisational collaboration supported by using ERP systems in both the manufacturing and service industries.

More specifically, this research focuses on three types of ERP systems: ERPI, ERPII and ERPIII; and three types of multi-organisational enterprise structures and strategies: the vertically integrated enterprise (VIE), the extended enterprise (EE) and the virtual enterprise (VE). The study therefore takes a dynamic contingency and configuration perspective concerned with the mechanisms through which ERP capabilities and multi-organisational relationships are created and evolve over time. The remaining challenge is to identify and structure the underpinning theories/established models that contribute to this study in ERP and multi-organisational enterprises governance; build the frameworks that will enable the explanation and establish trajectories for the developments in management practice as a result of the conceptual frameworks. However, the theory (and *a priori* frameworks) discussion in this chapter is only of introductory nature to shape the ground for a more detailed discussion of the empirical findings in the context of theoretical perspectives in Chapter 7 (after the empirical data presentation in Chapters 5 and 6).

2.6 Two *a priori* established frameworks for ERP and CEG conceptualisation

The author uses Binder and Clegg's (2006) *a priori* Collaborative Enterprise Governance (CEG) concept to help explain correlations between ERP IS and enterprise management; in particular the Dynamic Enterprise Reference Grid (DERG) which is shown in Figure 2.2. The DERG is taken as one point of departure from established frameworks in the field. The author uses the DERG because it describes each type of enterprise (in the sense of EC's definition) in detail (based on Table 2.9's definitions) and explains how changes occur based on the degree of "*engageability*" (Binder and Clegg, 2006) or attractiveness to others (note: "engageability" is derived from the longevity of a planned relationship, the availability of resources, transaction costs, asset specificity, and degree of process and IS integration – see the bullet points in Figure 2.2).

The DERG (Figure 2.2) summarises each (multi-organisational) enterprise type mentioned above (VIE, EE, VE) as well as a defunct enterprise (which is defined as an enterprise that does not operate as intended, i.e. simplex operations with limited amount of commercial active engagement and limited information systems maturity) classified by their current and future potential *engageability*. These structures are thought to be in 'dynamic equilibrium' because they are a continuum of an operations strategy manifesting itself as different structures in response to contingent factors in the business environment. Figure 2.2's solid arrows show planned changes, and broken arrows show unplanned reactions in response to changes in the business environment.

Despite its insight into *enterprisation* strategy and structure the DERG in its current form is limited as it does not explicitly consider IS strategy (e.g. ERP strategy). Thus, Galliers' (1994) *a priori* 'IS Strategy Formulation' model (ISFM) (see Figure 2.3) is used to extend the DERG as Galliers' model presents IS transformations which complements the DERG.

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Figure 2.2. Dynamic Enterprise Reference Grid (DERG) - used in Collaborative Enterprise Governance (Binder and Clegg, 2006)

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Figure 2.3. IS Strategy Formulation Model (Galliers, 1994)

Complementarity exists between these two contingency theories because Binder and Clegg's DERG does not explicitly explain IS strategy and Galliers' theory does not explicitly address *enterprisation* behaviour. Hence Galliers' model is taken as another point of departure from established concepts in the field. This is in addition to Binder and Clegg's DERG, a summary of ERP types (Table 2.8) and a summary of (multi-organisational) enterprise types (Table 2.9).

In general the above discussion shows that the DERG and ISFM cannot sufficiently explain the sustainable governance of complex correlations between ERP systems and multi-organisational relationships and collaboration. However, these two *a priori* established frameworks can be regarded as complementary tools for investigating the the research topic – designing and managing ERP systems and multi-organisational enterprises.

2.7 Chapter summary

This chapter provides the theoretical grounding and points of departure for this research study. The relevant literature on ERP systems capabilities, evolution and multi-organisational relationships and collaboration were critically reviewed from a selected list of 53 high quality journals. The scholarly review not only offers a deep understanding on ERP design and management, (multi-organisational) enterprise design and management, and potential ERP-CEG (i.e. the theoretical foundations for the research topic); but also reveals the gaps from various dimensions (Gap 1 to Gap 4). The 4 literature gaps identified above are listed below to summarise this chapter, which are also considered as the major purposes and justification of doing (a pre-study) literature review and the focus for doing the fieldwork be given in Chapterd 5 and 6.

- **GAP 1: It is suggested that scholars of designing, building and managing ERP systems should look beyond core ERP functionalities improvement and internal ERP adoption at single organisational level; and in contrast consider how ERP systems can be configured and governed to become more supportive of dynamic change in different multi-organisational enterprises contexts from a contingency viewpoint.**

- **GAP 2: Research dedicated to the next generation ERP systems development should not merely focus on technical and practitioner-based perspectives. Rather, the emphasis should be placed on investigating how the advanced information system tools can upgrade or even change the current ERP systems to form future types that are capable of fulfilling multi-organisational enterprise structures and strategy through a dynamic, contingency management approach.**

- **GAP 3: A vast number of scholarly contributions about the newly multi-organisational governance have led to a plethora of studies on the VIEs, EEs, and VEs relationships and collaboration management. But a contingency practical framework is needed to investigate collaborative enterprise governance from both information systems (ERP) management and dynamic transformational standpoints.**

- **GAP 4: A perennial pressing challenge in the Information Systems Management (ISM) and Operations Management (OM) disciplines is the alignment between (multi-organisational) enterprise management thinking and ERP information systems development. Therefore a unifying conceptual providing a useable decision-making framework for ERP systems and multi-organisational enterprise co-development based on contingency and reconfiguration perspectives is needed.**

These 4 gaps lead to the main aim of doing this research study in the form of **investigating and theorising about how different types of ERP systems fit into different multi-organisational enterprises; and developing a framework and practical guidelines on how to govern (i.e. design and manage) these ERP information systems and multi-organisational relationships in a sustainable way to grow competitive advantage through an innovative strategic and contemporary operations thinking**.

Chapter 3 – Research Methodology

As stated in Chapter 1, the topic of this research is Enterprise Resource Planning systems-enabled Collaborative Enterprise Governance. In the previous Chapter 2 it was shown that gaps in the current literature are to be found on various dimensions of ERP information systems management and collaborative enterprise governance and the correlations between them; which leads to the research aim of **investigating and theorising about the correlations between different types of ERP systems and multi-organisational enterprises; and developing a framework and practical guidelines on how to design and manage different ERP information systems typs to fit with different multi-organisational relationships in a sustainable way to grow competitive advantage**. Therefore, this research is embedded in the empirical context of multi-organisational collaboration (delivering complex products and services) supported by using different ERP systems in production and service industries.

This chapter explains the methodological conceptualisation of the underlying research study along with a discussion of the necessary 'choices' apparent at different steps of the research process. The structure of the chapter is mainly based on three fundamental levels of application of a methodological paradigm advocated by scholars such as Fitzgerald and Howcroft (1998), Khazanchi and Munkvold (2002), Lee and Lings (2008), and Morgan (1979); which can be seen as 'strategic entities' involved in the research process, "there is a connection between (i) the conceptions of reality to which social scientists adhere (i.e. ontology), (ii) the schools of thought to which they belong (i.e. epistemology), and (iii) the kinds of 'tools' which they use as a basis (i.e. methodology) …" (Morgan, 1979, p. 137).

The subsequent Section 3.1 aims at outlining the ontological paradigm which underpins the nature of this study followed by its epistemological and methodological research approaches described in Section 3.2. Section 3.3 concentrates on the particular research methodology including the selection of appropriate research methods and the related empirical research process that defines the quality of this research study as described in Section 3.4. Finally, the main aspects of this chapter are summarised in Section 3.5.

3.1 Ontological paradigm of the research

The social science research is viewed as a rich tapestry of diverse research paradigms; different research disciplines and methodologies tend to develop those distinct patterns. Given the fact that the research philosophy, in essence, is a belief regarding the way in which data and knowledge about a phenomenon should be gathered, analysed, transferred and used; the selection of research paradigms could significantly influence the discourse in the research discipline and methodology. This leads to the question of the ontological worldview of the researcher, which is closely interrelated with the epistemological preference for more qualitative or more quantitative research approaches (given in Section 3.2). For the purpose of understanding how research method within a certain field is conducted, a theoretical framework focusing on the dichotomies is illustrated in Figure 3.1; which constitutes a hierarchy where high level assumptions (e.g. ontological level and epistemological level) define the possible scope of the assumptions at lower levels (e.g. methodological level). These levels correspond to the available scheme for analysing assumptions about the nature of social science, and determining the succeeding specific research techniques (e.g. research methods, and techniques and channels for data collection).

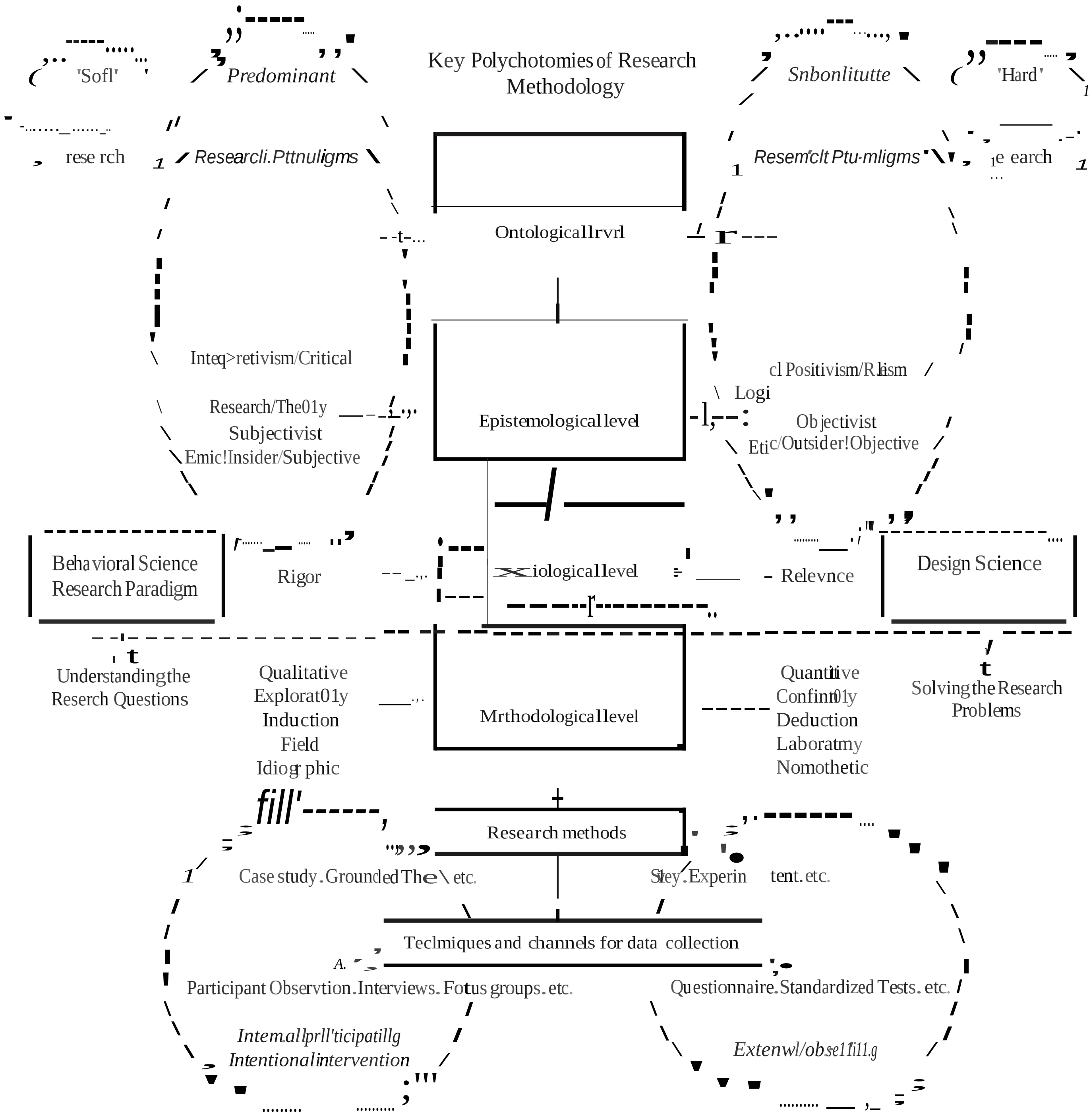

Figure 3.1. Research paradigms and related methodological dichotomies in the research philosophy (Source: adapted from Fitzgerald and Howcroft, 1998; Khazanchi and Munkvold, 2002)

There are two main ontological positions (what is believed to be true) – **objectivism** and **constructionism** often used to describe differences that influence a researcher's assumption about how social entities operate within the world (Bryman and Bell, 2007, pp: 22-23). Objectivism asserts that social phenomena and their meanings have an existence that is independent of social actors. Conversely, constructionism which has been developed by Berger *et al*. (1966) and Watzlawick (1984) stems from the view that 'reality' is not objective and exterior, but is socially constructed and given meaning by people. Whereas the traditional philosophical paradigms (e.g. constructionism vs. objectivism; interpretivism vs. positivism) reflect rather extreme positions in the philosophy of social science, i.e. there is a clear dichotomy between the two ontological perspectives; the reality of research involves a lot of compromise between the pure positions. Each investigator must decide what assumptions are appropriate for the topic of interest and then use strategies and (research) methods consistent with the selected paradigm (Crabtree and Miller, 1999a).

Truly every researcher is a specialist in a certain field of interest, therefore, will only be able to address a research problem with a certain toolbox which is subjective and influenced by the individual background and theory basis. Concerning this factor in connection with a fragmented, complex, and ambiguous world that is to be observed and investigated (e.g. information systems and operations management), there is no sense in claiming the ultimate truth of one's findings and communicate as such. It rather opens space for individual interpretations and the use of one's own toolbox and theory basis in order to make significant contributions to knowledge by reconstructing the complexity immanent in the explored problem (Delanty, 2002). This is clearly reflected in the 'constructivist' ontological paradigm whilst indicating that there is no ultimate but only contextual truth – which can be obtained by constant interpretation and reflection (Crabtree and Miller, 1999a). This is echoed by Shotter (1993) who stresses that the social phenomena and categories are not only produced through social interaction, but in a constant state of revision, e.g. the interpretations of any issues between ERP capabilities and enterprise patterns may shift over time as circumstances, objectives, and constituencies change. However, it is also necessary to accept parts of the social reality as objective, i.e. to accept the realist ontology of the social world (see Figure 3.1) because there are objective realities to be found behind the constructions of social actors (Delanty, 2002).

The social phenomena being studied in this research is how a management contingency framework can be proposed for managing ERP systems-enabled multi-organisational enterprises. Thus the embedded information systems capabilities, multi-organisational enterprise structures, and social relations should not be presumed as objectively known and unproblematic; rather, the author aims to understand how and why ERP systems development and their different functionalities support different multi-organisational enterprise paradigms through the socialisation into, interaction with, and participation in a social world; and give them a certain status and meaning. On the other hand, although managing ERP systems and multi-organisational relationships is a socially constructed phenomenon; it is still part of the greater objective reality of information systems and business managerial activities in which certain common rules and pressures apply to all participants. Considering this, the author would like to argue for a combined paradigm of constructivism (a.k.a. relativism) and objectivism (a.k.a. realism) which is termed as 'reflexive realism' or 'constructive realism' (Beck, 1979; Giere, 1985; Steele, 2007); it can be seen as an abstraction of idea of 'interpretivism' with all its implications. In terms of the ontological discussion above, the author defines it as a middle ground between an objective and subjective world view (but regards the 'constructionism' as the predominant ontological paradigm for this research study). This combination can only be achieved by taking over an active role in the research process that will inevitably affect the design of methodological process with its specific techniques for data collection, analysis, and validation (given in Section 3.3).

3.2 Epistemological and methodological paradigms of the research

Epistemology (what is known to be true) concerns the questions of what is (or should be) regarded as acceptable knowledge in a discipline (Bryman and Bell, 2007). It is interested in the nature of knowledge and the methods of inquiry (Strauss, 1987), as well as refers to the assumptions about how knowledge can be obtained (Hirschheim, 1992). When determining the appropriateness of a methodological research concept, one must trace it back to its epistemological roots that comprises four positions; two link to an objective ontology, i.e. positivism and realism, and a further two link to a subjective ontology, i.e. interpretivism and critical research/theory (see Figure 3.1). Generally, two of these four approaches have been dominant in the social sciences – positivist and interpretative paradigms (Hussey and Hussey, 1997) which are commonly, *but not exclusively*, associated with quantitative (in the positivist paradigm) and qualitative (in the interpretative paradigm) research. This also attests the fact that the relevance and value of different methodological approaches (and research methods) express and vary according to the underlying epistemological commitments (Johnson and Duberley, 2000).

As discussed in Section 3.1, the ontological paradigm is that of "constructive realism" (Giere, 1985; Steele, 2007) – a middle ground between an objective and subjective world view; whilst the constructionism is regarded as the major ontological position for this research study. Thus the author plans to adopt the interpretivism and critical research/theory as the major epistemological positions supplemented with the logical positivism and realism. In other words, the proposed methodological programme of this research predominantly grounds on the inductive paradigm with qualitative design approach; while the deductive paradigm with quantitative methods are used as the subordinate one dealing with some deficiencies of conducting the qualitative way. This indicates that *different research paradigms and related methodological approaches adopted in this study are complementary rather than conflicting at ontological, epistemological, and methodological levels*. The **key reason** is that there are little existing theories, methods, and rich insights for creating a conceptual framework on governing ERP systems and multi-organisational enterprises. As a result, the author's assumptions, beliefs, values, and interest will intervene to shape the investigations in regard to how and why different multi-organisational enterprise structures and strategies can be supported by configuring, managing, and developing different types of ERP information systems. The generated valid knowledge, meanings, and new theories arising out of the social interaction through an interpretive process will be able to examine and account for, e.g. key facilitators that influence ERP systems adoption within different multi-organisational enterprise types. In addition, causal explanations for created subject meanings such as "dynamic and reconfigurable virtual enterprises require the corresponding ERP systems to be more flexible and agile" will be constructed by the author via an interpretive way.

Qualitative and quantitative methods are two distinctive but interrelated research (design) approaches in the field of social science that actually complement each other (Auerbach and Silverstein, 2003). Whereas quantitative methods were originally developed in the natural sciences in a more positivistic domain to study natural phenomena, qualitative methods were defined as subjective approaches which include examining and reflecting on perceptions in order to gain understanding of social and human activities (Hussey and Hussey, 1997). In many researchers' (Myers, 1997; Sedmak *et al*., 2004) mind the notions of *qualitative* and *quantitative* approaches can be used interchangeably with terms like 'subjectivist' and 'objectivist' (Burrell and Morgan, 1979), 'soft' and 'hard' (Fitzgerald and Howcroft, 1998; Lincoln and Guba, 1985), and 'paradigm commensurability' (Landry and Banville, 1992). For the reasons of further argumentation and evaluation of an appropriate research approach for this study, it is important to clarify some basic differences of qualitative and quantitative research.

3.2.1 Quantitative approaches

Quantitative methods are well established and well tested approaches (Auerbach and Silverstein, 2003). The quantitative research approach can basically be described as a structured and hypothetico-deductive procedure from theory to research (see Figure 3.2 and Table 3.1). A big emphasis is therefore put on the analysis and measurement of data through statistics and experimental testing as a result of the strengths of validity and reliability. Popular techniques and methods used in a quantitative approach are, for example, structured interviewing or structured observation, (pre-testing) questionnaire surveys, and a large scope of probability sampling, which have to be made very clear and explicit in order to achieve replication, generalisability, and objectivity of the results (Bryman and Bell, 2007; Johnson and Harris, 2002).

The main concerns of quantitative research are to confirm and explain hypotheses about the phenomena, i.e. examining the causes (a.k.a. correlations), which is reflected in the idea of hypothesised dependent (effect) and hypothesised independent (cause) variables that are developed for measuring purposes leading to hypothesis-testing research (Auerbach and Silverstein, 2003; Lee and Lings, 2008). The (quantitative) data related to these variables have then to be collected and analysed, in order to (i) quantify variation, (ii) predict causal relationships, and (iii) describe characteristics of a population; as well as being further interpreted to the extent that general findings and conclusions beyond the confines of the particular context of the research can be drawn, i.e. the generation of theory (Bryman and Bell, 2007). This is indicated with the ‘feedback loop’ (see ‘quantitative research process’ in Figure 3.2).

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Figure 3.2. Outline of quantitative and qualitative research approaches (**Source:** Bryman and Bell, 2007)

3.2.2 Qualitative approaches

Qualitative methods were developed in response to the limitations faced by quantitative research; thereby often challenge the assumptions of the positivist paradigm (King, 1994). As opposed to the quantitative counterpart, the qualitative research approach seeks to explore and interpret phenomena from the perspective of the subjects being studied; whilst social phenomena are recognised to result from a blend of social, economic, political, and environmental factors that cannot be studied in isolation (Bryman, 2004), e.g. the study of ERP information systems and multi-organisational collaboration design and management are relatively new as subjects in their own right; but as social sciences are well suited to scrutiny from qualitative perspectives.

Thus, qualitative research approaches based in interpretative paradigm is particularly associated with the emphasis on process that is a less structured and more inductive procedure from empirical research to theory generation; which **starts with fairly general research questions leading to the conceptual and theoretical work** (see 'qualitative research process' in Figure 3.2) (a.k.a. hypothesis-generating research) (Auerbach and Silverstein, 2003). This is necessary because keeping the (methodological) structure simple not only raises the opportunity of genuinely capturing the perspectives of the participants but also ensures the necessary flexibility with rich, meaningful, and culturally salient explanations to the nature; which is needed for the iteration between data collection, data interpretation, and deriving conceptual (or theoretical) frameworks ('iteration loop' indicated through qualitative research process in Figure 3.2).

In comparison to the quantitative methods, the qualitative approach allows the researcher to get firsthand experience, i.e. development of analytical, conceptual, and categorical components of explanation, from the data itself, rather than from the preconceived and structured definitions constructed by the researcher (Filstead, 1971). Additionally, qualitative researchers believe that their own (individual) experience (or group norms) can be a source of knowledge about the phenomenon under investigation, which is subsumed under the term *reflexivity* (Auerbach and Silverstein, 2003). They also express a commitment to viewing events and the social world through the eyes of the people that they study, i.e. the social world must be interpreted from the perspective of the people being studied, rather than as though those subjects (e.g. ERP information systems and multi-organisational enterprise governance) were incapable of their own reflections on the social world. This implies that at the core of the research study is the need to follow an **inductive construction** of theory from observations as part of the theories and theoretical model building process; which includes the identification of a set of key *core categories* and emerging propositions (given in Chapter 6 – data presentation, analysis, and validation of empirical findings) that can be incorporated into the design and management of the new contingency framework whilst reflecting a procedure of how a dynamic conceptual model is created. Common techniques and methods used for the purpose of qualitative data collection and analysis are, for example, narrative case study, semi-/unstructured interviews, grounded theory, focus group, textual analysis, ethnography, and participant observation (Bryman and Bell, 2007).

Table 3.1 Comparisons between quantitative and qualitative research approaches

	Quantitative research design approach	Qualitative research design approach
Principal orientation to the role of theory in relation to research	Deductive; testing of theory	Inductive; generation of theory
Ontological orientation	Objectivism	Constructionism
Epistemological orientation	Natural science model, in particular positivism	Interpretivism
General framework	- Seek to confirm hypotheses about the phenomena - Instruments use more rigid style of eliciting and categorizing responses to questions	- Seek to explore phenomena - Instruments use more flexible, iterative style of eliciting and categorizing responses to questions
Analytical objectives	- To quantify variation - To predict causal relationships - To describe characteristics of a population	- To describe variation - To describe and explain relationships - To describe individual experiences and group norms
Question format	Closed-ended	Open-ended
Data format	Numerical (obtained by assigning numerical values to responses)	Textual (obtained from audiotapes, videotapes, and field notes)
Flexibility in study design	- Study design is stable from beginning to end - Participant responses do not influence or determine how and which questions researchers ask next - Study design is subject to statistical assumptions and conditions	- Some aspects of the study are flexible (e.g. additional exclusive interview questions) - Participant responses affect how and which questions researchers ask next - Study design is iterative, data collection, and research questions are adjusted according to what is learned
Strengths	- Theory testing, replicability, and generalisability	- More flexible with rich explanations and descriptions - Meaningful and culturally salient to the participant
Weaknesses	- Too objective and relying on statistical or experimental testing - Lack of capabilities for explaining the social phenomena	- Time consuming with overload data collecting and processing - Lack of reliability, credibility, and transferability
Techniques and methods for the research design	Use highly structured methods such as structured interviews, survey questionnaires, structured observation, (quantitative) content analysis, SEM, etc. via hypothetico-deductive strategy	Use semi-structured/unstructured methods such as in-depth interviews, focus groups, action research, participant observation, grounded theory, interpretive case study, etc. via inductive strategy

3.2.3 Mixed research approaches

Even if both approaches show distinctive characteristics, which put them in advantageous positions for specific research situations, there are large overlaps offering complementary and reciprocal tools for data collection and analyses (Bryman, 2004). The term ‘mixed-method approach’ is therefore used as a simple shorthand to describe a research approach that integrates qualitative and quantitative research (approaches) within a single research project (Bryman and Bell, 2007) – the one that is known as a monstrous word *qualiquantology* (Todd *et al*., 2004). The mixed research approaches are more adequate to address the complexity of social science problems (e.g. designing and managing ERP systems within the context of multi-organisational collaboration) while providing an expanded understanding of research issues than either approach (i.e. quantitative and qualitative) alone (Creswell and Plano Clark, 2007).

Greene *et al*. (1989), Hammersley (1996), and Morgan (1998) emphasise that combining quantitative and qualitative should focus on convergence, triangulation, complementarity, and facilitation. Yin (2003) further argues for a more appropriate view of the different approaches should be a pluralistic one, in which each approach can be used for all three general research purposes – exploration, description, and explanation. Although mixing methods is not mixing paradigms (Lee and Lings, 2008), multi-paradigm approaches (towards theory building) (Gioia and Pitre, 1990) can be acceptable in different stages of the same research project". This is acknowledged by various examples of mixed methods used in the extant literature (e.g. Larsson, 1993; Molina-Azorin, 2009; Risjord *et al*., 2002).

The justifications of using mixed research approaches for this research study are threefold. Firstly, triangulation enables the author to seek convergence, corroboration, and correspondence of the results through multiple methods; this implies that the findings of an investigation employing one method (e.g. grounded theory-based method) associated with one research strategy (e.g. qualitative approach) can be cross-checked against the results of using a method (e.g. questionnaire survey) associated with the other research strategy (e.g. quantitative approach). Secondly, the in-depth knowledge of social contexts acquired through qualitative research (e.g. semi-structured interviews, interpretive case study) can be used to develop, inform, and facilitate the design of survey questions for self-completion questionnaires. Finally, the confidence in the findings deriving from this research study using a qualitative research strategy can be enhanced by using a complementary quantitative way, e.g. by using interview, observational data, and survey, the author were able to combine 'the specificity and accuracy of theoretical propositions (i.e. quantitative data) with the ability to interpret idiosyncracies and complex perceptions provided by qualitative analysis. In this situation, mixed paradigms would co-exist as the compatible one to each other for sustaining the hybrid well-developed research methodology (Cavaye, 1996, p. 236).

3.3 Applied research methods

As outlined above, methodology is the guideline for obtaining knowledge, i.e. it entails the process, principles, and procedures by which the researchers approach problems and seek answers (Delanty and Strydom, 2003). In this sense the research methodological approach is central for the theoretical contribution of knowledge to the scientific discipline as well as for the application of this knowledge to practice (Van de Ven, 1989).

The methodological point of departure for the empirical work is a lack of testable theoretical propositions, which makes the approach of hypothesis testing inappropriate. This is **because insufficient explicit hypotheses exist or are too abstract to be tested in a large scale deductive manner due to the embryonic stage of theory-generating research on strategically designing and manging different types of ERP information systems within different multi-organisational collaboration contexts** (Handfield and Melnyk, 1998). Moreover, investigating and analysing the design and management aspects of ERP enabled multi-organisational relationships, as well as how different ERP systems fit into different multi-organisational enterprise structures requires attention to details of contextually rich data and the understanding of subjective experience of industrial experts; which cannot be reflected in quantifiable variables of quantitative hypothesis-testing research (Auerbach and Silverstein, 2003). Thus **such research is rather exploratory in nature which favours a more empirical and qualitative theory/theoretical framework-generating research approach instead of hypothesis testing** (Eisenhardt, 1989; Snow and Thomas, 1994). This will provide the necessary openness and flexibility to gain a sound understanding of the research topic by grasping the 'how' and 'why' of it and thereby uncovering themes which were not previously accounted for in the extant literature (Leary, 2001), i.e. a "strategy concerned with the discovery of substantive theory, not with feeding quantitative researchers" is necessary (Glaser and Strauss, 1971, p. 289).

3.3.1 Narrative case study and template analysis

Narrative (case study) research refers to any study that uses or analyses narrative materials to deeply understand and evaluate a real-life problem (e.g. how to develop ERP information systems to support multi-organisational enterprises structural transformation); data can be collected as a story or in a different manner (e.g. field notes or observations) (Lieblich *et al*. 1998). Together with its cognate qualitative approach such as interpretive case study, narrative (case study) research does not predefine dependent and independent variables, but focuses on the complexity of human sense making as the situation emerges (Kaplan and Maxwell, 1994); it attempts to understand phenomena through the meanings that people assign to them (Boland, 1985, 1991; Deetz, 1996).

Unlike many qualitative frameworks, narrative case study research offers no automatic starting or finishing point (Andrews *et al*., 2013). Also, narrative materials can be analysed along myriad dimensions, such as contents and structure, which aims at producing an understanding on the investigated phenomenon, i.e. ERP systems configuration and adoption for supporting different (multi-organisational) enterprise structures and strategies by (i) evaluating two pilot cases' multi-organisational collaborative performance using the Collaborative Enterprise Governance concept (given in Chapter 4); (ii) ascertain how different enterprise (in the sense of EC's definition) paradigms transform through the supporting ERP information systems; and (iii) how different ERP system types fit into different (multi-organisational) enterprises structures and strategies.

In order to further develop an interpretation of the empirical data across the narrative case studies, an often used analytical technique is one called Template Analysis (King, 1998; 2004) which is identified as a recent technique emerging from other more structured approaches such as Grounded Theory and Interpretative Phenomenological Analysis (IPA) (Waring and Wainwright, 2008). Template analysis is a qualitative data management analytical approach that overcomes the problem of those techniques that rely solely on coding and sorting texts into like units, thereby striping away contextual richness of individual cases (Ayres *et al*., 2003). Its principal advantage is the flexibility in use while the technique is easier to understand by the researcher working at the axiological level (see Figure 3.1). Specifically, this research study uses the 'Enterprise Matrix' (Stage One of CEG concept; given in Section 4.1) to codify and map the multi-organisational enterprise which is a *template* for primary data collection based upon template analysis technique, i.e. all the longitudinal data were collected from two pilot cases (given in Chapter 4 – two pilot case studies and the proposed tentative framework) via documentation, observation, and semi-structured interviews (as shown in Table 4.1) and then summarised and structured into the templates (i.e. the enterprise matrices), in order to explore the key characteristics of different enterprise types and their corresponding ERP system types; as well as their transformational route. Also, the template ensures that two pilot cases are treated similarly, objectively, and without prejudice. On the other hand, template analysis method is used to develop five basic *a priori* themes, in order to provide some practical guidance during the coding process, which is in line with the inductive, theoretical and *in vivo* coding philosophy of grounded theory based methodology (given in Section 6.1 in Chapter 6). Additionally, the developed codes of the Coding Master Table (as shown in Chapter 6) are deductively applied to the interview text/transcripts, which is similar to template analysis (a.k.a. thematic coding) approach.

3.3.2 Grounded Theory-based method

Since this research study aims at extending current theories on how strategic ERP systems management fit with collaborative enterprise governance through theory building/theory generation; whilst starting with two *a priori* established frameworks and relevant theoretical foundations (see Sections 2.3 – 2.6 in Chapter 2), *Grounded Theory (Glaser and Strauss, 1967; Strauss, 1987) based methodology (GTM) (rather than pure grounded theory approach) was chosen as an inductive qualitative (theory generation) approach*. **This is not contradictory to the principles of inductive grounded theory-based approach** as some researchers (Goulding, 2001; Suddaby, 2006) have claimed that **applying GTM correctly *does not* require entering the field without any prior knowledge and experience; whilst the existing conceptual frameworks or general literature can be used as a basis for open-ended (interview) research questions schedule**. Similarly, Glaser and Strauss (1968) and Urquhart and Fernández (2013) acknowledge that **it is impossible to erase all previous literature and become a *tabula rasa* when grounding and developing the theory in empirical data, i.e. grounded theory evolves from a tentative literature based to begin with**. Hence, in this research the author started with a *pre-study* literature review in the substantive area of study to define research problem domain, develop theoretical sensitivity whilst identifying current research gaps; which not only provided a context and justification for the research but also offered a basis for demonstrating the appropriateness of using GTM. This position resonated with the typical practices of those who use "Evoloved GTM" (e.g. Charmaz, 2006, 2008; Mills *et al*., 2006) instead of "Classic GTM" (Glaser and Strauss, 1967).

On other hand, this addresses the fact that today's complex and dynamic world calls for less hypothesis testing and more systematic observation to help practitioners (e.g. multi-organisational enterprise managers and information systems developers) deal with their actual problems in multi-organisational cooperation and multi-organisational enterprises-wide ERP systems development (Daniel and White, 2005). Grounded Theory based methodology has to be considered as a touchstone for scholars conducting qualitative research in social sciences (Suddaby, 2006).

Given the nature of this study, the author mainly investigates *how* and *why* questions and focuses on multi-organisational enterprises and enterprise information systems design and management in manufacturing and service-oriented business; this involves an explorative and explanatory nature that favours Grounded Theory based method because of its ability to provide depth and richness for constructing knowledge (or new explanatory concepts) and building theories of contemporary and little know phenomena. Furthermore, Locke (1996b) postulates that, "grounded theory (based method) … must *closely fit* the substantive area studied, be *understandable* to and *usable* by those in the situation studied, and be sufficiently *complex* to account for a great deal of variation in the domain examined" (p. 240).

GTM uses the basic principles of (i) questioning rather than measuring and (ii) generating hypothesis (or theory) using coding techniques (Auerbach and Silverstein, 2003), i.e. it enables the researcher to 'ground' the theoretical propositions in the empirical data given by the research participants who are the experts on the phenomenon being studied (e.g. ERP systems capabilities supporting multi-organisational collaboration); specifically, "most hypotheses and concepts not only come from the data, but are systematically worked out in relation to the data during the course of the research" (Glaser and Strauss, 1967, p. 6). Thus the GTM method is an 'envelope' with the unique ability to cultivate fruitful insights from a great variety of sources and evidence – documents, archival records, interviews, transcripts, field observations, and questionnaire answers – which enables the researcher to group the holistic and meaningful characteristics of reality and therefore understand complex social phenomena (Binder and Edwards, 2010; Glaser, 1978).

Grounded Theory based methodology is particularly appropriate when (i) research and theory are at their early, formative stage and not enough is known on the phenomenon (e.g. contingent decision-making on how to design and manage different ERP IS to fit with different multi-organisational enterprises; and *vice versa*) to state hypotheses prior to the investigation (Auerbach and Silverstein, 2003) and when (ii) the major research interest lies in the identification and categorisation of elements and the exploration of their connections within social settings (Tesch, 1990). Thus it is an exploratory research approach that allows for a contextual analysis of empirical data while facilitating theory construction from it, i.e. GTM especially stresses the importance of allowing theoretical ideas to emerge out of the empirical data (Bryman and Bell, 2007, p. 408). Hence, this research study claims to produce theoretical propositions, contentions, and theory extensions that can be developed into generalised theory and frameworks to improve the understanding of how different types of ERP information systems fit into different types of multi-organisational enterprises; and how to design and manage them in a dynamic and sustainable way. This is possible as qualitative data are, "generalisable to theoretical propositions (analytical generalisation) and not to population or universes (statistical generalisation)" (Yin, 2003, p. 10). The goal of GTM, and therefore of this study is **an analytical generalisation via the extension (and creation) of theories (and theoretical models) instead of a statistical generalisation via the enumeration of frequencies** (Yin, 2003) which Lee and Baskerville (2003) in their classification framework of generalisability introduced as the concept of 'Type ET Generalisability' – which involves *generalising from empirical statements* (i.e. descriptions) *to theoretical statements* (i.e. theories) (p. 240).

The key feature of grounded theory based methodology is a recursive, process-oriented, analytical procedure using two key operations: **constant comparison** and **theoretical sampling** which are essential to develop dense, tightly woven, and integrated theories; and are the major differences between the grounded style and other qualitative research strategies (Strauss, 1987). They deliver substantive theory related to the substantive area of research rather than a formal theory pertaining to a conceptual area (Glaser, 1994). The process of GTM normally begins with the definition of a research problem – which can be assisted by a pre-study literature review and pilot case studies – as with the case of this research; and proceeds to the collection of the relevant data and continues towards a tentative explanation of the problem via forming provisional categories and abstractions of the empirical data (involving constant comparison). Such comparison challenges the properties of the initial concepts and categories and the researcher needs to go back to redefine the propositions or to further collect and analyse data (theoretical sampling). In this process the researcher moves back and forth between inductive and deductive modes of data collection, coding, and interpretation in an iterative manner (analytical induction) until theoretical saturation is achieved which leads to a tightly woven theory that emerges from and is *grounded* in the (empirical) data; and "they should blur and intertwine continually, from the beginning of an investigation to its end" (Glaser and Strauss, 1967, p. 43). In other words, Grounded Theory based method utilises a systematic method for data analysis in order to build and corroborate the ultimate findings (e.g. theoretical propositions) that are detailed and specific to the social phenomena being studied (Eisenhardt, 1989).

By using GTM, major prejudices of qualitative research can be overcome. Firstly, the often mentioned concern of a lack of generalisability of results because of applying a qualitative and *ad hoc* method (e.g.

longitudinal case study) (Argyris, 1979; Ellram, 1996; Yin, 2003) can be compensated with the more abstract Grounded Theory-based methodological approach applying different levels of coding and categorising (e.g. open coding, axial coding, and selective coding) through the features of constant comparison and theoretical sampling that enable the generalisation of empirical results to basic theory. Secondly, the 'postponed' literature review (in addition to a pre-study literature review) embedded in the GTM strengths, i.e. tests the developed propositions and theories instantly in an iterative manner by confronting them with the relevant literature (given in Chapter 7). However, as mentioned above, **this research study does not claim to generalise results to populations (i.e. statistical generalisation); rather, it aims at generalising results to the extension (and creation) of theoretical propositions (analytical generalisation)**. Moreover, in the context of this study, the author would like to draw the readers' attention to the emphasis of using the notion 'proposition' instead of 'hypothesis' for the reason that *propositions* involve concepts, whereas hypotheses require measures and can technically be tested without understanding the 'Whys' underlying the model (Whetten, 1989, p. 491), which is not the aim of this research.

All the text relating to Grounded Theory based methodology in this chapter mainly explain the basic principles, key features, and coding paradigms; whilst the text relating to GTM in Chapter 6 presents more details/descriptions about how grounded theory based methodological approach is applied to analyse and validate empirical data in order to generate new theories/theoretical models.

3.3.3 Structured questionnaire survey

Structured questionnaire survey is a way to collect information from one or more people about the phenomenon being explored. The method is generally associated with a positivist paradigm in order to achieve systematic observation and questioning through predetermined research questions (or tentative theoretical propositions) with the intention of providing standardisation and consistency (Fink, 2005); and it is appropriate for answering *what* type of research questions (Yin, 2003), e.g. what are the critical factors that influence the design and management of ERP systems enabled multi-organisational relationships and collaboration. **Together with the grounded theory based methodological approach, the structured questionnaire survey – as the second empirical phase in this research study – was mainly used for validating the emerging findings, i.e. the theoretical propositions derived from the interviews and not for large scale hypothesis**. Thus, it was not considered imperative to obtain a statistically representative sample size.

Specifically, the structured questionnaire method used in this work can be defined as a type of "descriptive survey" aiming for 'count' (Oppenheim, 2000); which chiefly tell people "how many (what proportion of) members of a population have a certain opinion or characteristic or how often certain events occur together (that is, are associated with each other)" (Oppenheim, 2000, p. 12). Accordingly, **the questionnaire**

survey was designed based upon a set of theoretical statements as an "opinion poll" – a certain form of descriptive survey – to be a conformity check for the propositions (through two dimensions "agreement" and "importance") rather than explaining anything or showing causal relationships between one variable and another (Oppenheim, 2000) (this will be explained in detail in Chapter 6; see Section 6.2). This also reflects the basic methodological principles of using GTM for theory generation, i.e. the author *did not* engage in any form of statistical analysis; and **the validation of the theoretical propositions must not be confused with quantitative hypotheses testing**.

The text relating to questionnaire survey in this chapter mainly explain the basic principles, key features, and use procedure; whilst the text relating to questionnaire survey in Chapter 6 presents more details/descriptions about how self-administered questionnaire survey is developed based on the inducted theoretical propositions and applied to validate those tentative theoretical propositions, e.g. asking the industrial experts to assess each tentative proposition on two dimensions of perception (i.e. Agreement and Importance; as in Section 6.2) using 7-point Likert scales.

To summarise, three main reasons why Grounded Theory based methodology along with other supporting research methods (e.g. narrative pilot case study, structured questionnaire survey, and pre-study literature review) is appropriate for this research study can be identified. Firstly, the researcher can explore ERP systems enabled multi-organisational relationships and collaboration in both manufacturing and service industries in their contemporary and natural setting, understand and learn about their foundations to generate theory from practice. Secondly, this methodological approach allows answering 'how' and 'why' questions in an explorative as well as explanatory manner to understand the dynamic complexity behind the governance (i.e. design and management activities) of multi-organisational enterprises and their information systems and its influence on the sustained competitive success. Thirdly, this methodological approach is an appropriate way to research an area where little theoretical foundations exist so far by exploiting a full variety of evidence.

With the purpose of facilitating the elements of constant comparison and theoretical sampling sufficiently, ultimately leading to theoretically saturated propositions, and eventually a novel concept, the Grounded Theory based methodological research process of this study was structured in four main phases as shown in Figure 3.3: research setting and design, data collection, data coding and analysis, and data validation. Additionally, within each box of the diagram the respective chapter that deals with its subject is given to guide the reader through the structure of this thesis.

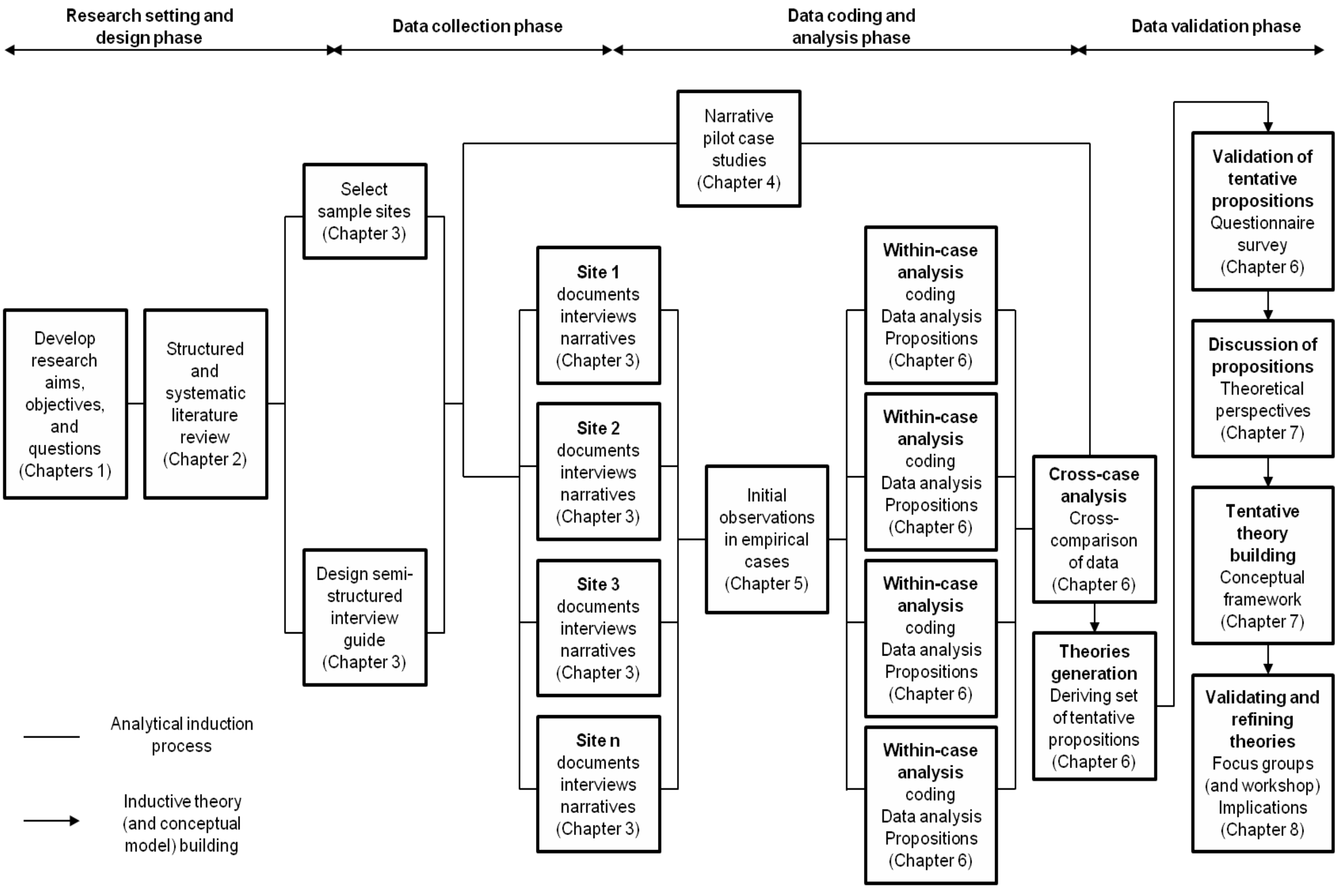


Figure 3.3. Outline of the methodological research process

The remainder of this Section 3.3 will be structured around these four phases discussing each phase and its related methodological aspects in turn in order to provide the reader with a logical and easy to follow presentation of the empirical research approach of this research study.

3.3.4 Design phase

The main aim of the research design stage is to ensure a high level of rigour of the study to avoid conclusions that the research does not actually reveal and at the same time ensure a connection to 'real' problems (Auerbach and Silverstein, 2003). In this sense Yin (2003) states that the reader should be able to follow the derivation of any evidence from the initial research question to the final conclusion of the study, as this chain of evidence will improve the reliability of the findings.

Research objectives

The first step in entering the empirical research process was to identify appropriate research objectives (these have been explained in the Introduction Chapter) which guide the empirical work. Based on the potential gaps in the extant ERP information systems and multi-organisational relationship literature that have been discussed and identified in Chapter 2, the aim of this research study is to **investigate ERP systems capabilities, multi-organisational structures and collaboration strategies, and theorise their correlations – how different types of ERP systems fit into different types of multi-organisational enterprises and *vice versa*; and develop a framework and practical guidelines on how to design and manage these ERP information systems and multi-organisational relationships in a sustainable way to grow competitive advantage**.

Accordingly, this study builds a broad understanding of ERP IS and multi-organisational relationships by exploring, describing, and explaining in detail *what* underlies successful ERP enabled collaboration in multi-organisational relationships; and *how* and *why* an appropriate governance (i.e. design and management activities) based on different types of ERP systems and different types of (multi-organisational) enterprises can facilitate the competitive success of the 'enterprisation of operations' (i.e. enterprise strategy, enterprise structure, and ERP systems use) rather than the ERP systems *per se* through a contingent perspective. In trying to achieve this general purpose, a set of specific research objectives could be identified which are based upon the research themes and gaps ascertained in the literature review chapter.

The author **adhered to the basic guidelines of inductive qualitative research, and therefore, was looking for open and unclear issues that emerged from a basic (pre-study) literature review leading to more general research concerns expressed by the research objectives** (Auerbach and Silverstein, 2003). These objectives guided the data collection and analysis process and ultimately led to the development of tentative (theoretical) propositions and the initialising of a second empirical phase in the form of a questionnaire survey to validate the emerging findings. Thus, the author followed the suggestion of Glaser and Strauss (1967) in that **substantive theory is a starting point for the formation of formal theory that is grounded in the empirical data – this also justifies why this research critically reviews relevant existing literature prior to data collection and analysis based on GTM**.

Triangulation

The second important decision which needs to be made during research design phase focuses on the selection of appropriate data collection. Triangulation entails using different techniques (or methods) for data collection (i.e. multiple data sources) and analysis to study the same phenomenon so that diverse viewpoints cast light upon a topic whilst providing validity and reliability within the research method (Hussein, 2009; Olsen, 2004). As such, it does not only enhance the quality of the research but also aids in avoiding typical and crucial mistakes in the research process (e.g. believing a principle to be true when it is not; solving a problem not worth solving) by identifying essential issues from different standpoints. This implies that triangulation forms a rich and comprehensive set of data surrounding the specific research issue, as well as capturing the contextual complexity of the research topic (Benbasat *et al*., 1987).

In this context, Denzin (1978) and Jick (1979) distinguish between 'within-method' (or 'internal') kind triangulation, i.e. uses multiple techniques within a given method to collect and interpret data; essentially involves cross-checking for internal consistency and reliability, and 'between-method', 'multi-method' (or 'external') kind triangulation, i.e. uses different data collection (and analysis) techniques to examine the same phenomenon; tests the degree of external validity. No matter which triangulation approach (or a combination of both) is chosen, the notion of triangulation indicates that, "qualitative and quantitative methods should be viewed as complementary rather than as rival camps" (Jick, 1979, p. 602); this is also consistent with the methodological paradigm of this research (i.e. mixed research approaches). Since the effectiveness of triangulation rests on the premise that the weaknesses in each single method will be compensated by the counter-balancing strengths of another (Jick, 1979, p. 604), the data collection techniques used in this research represent a mixture between qualitative and quantitative approaches in respect to their individual strengths and weaknesses (given in Section 3.2). This provides transferability, credibility (a.k.a. authenticity or dependability), and confirmability of the study (Bryman and Bell, 2007, pp: 413-414) (see Section 3.4).

Primary techniques and channels (for data collection) used in qualitative research are (participant) observation, interviewing including many sub-techniques such as focus groups, and documentary sources of data and textual analysis (see Figure 3.1 and Table 3.1), which are often referred to as the 'big three' (Cassell and Symon, 1994; Lee and Lings, 2008; Silverman, 2000). By contrast, common techniques applied in quantitative research include questionnaire survey, and forms of structured interviewing and observation (see Figure 3.1 and Table 3.1) (Bryman and Bell, 2007). Despite the qualitative and theory building nature of this research study, Grounded Theory based method – as the predominant research methodological approach – rarely has interviews as its sole form of data collection (Suddaby, 2006, p. 635). Thus a multi-method approach has to be applied which provides answers to the *what*, *how* and *why* questions on how different types of ERP systems fit to different types of (multi-organisational) enterprises and *vice versa* in both manufacturing and service-oriented industries in the UK and China. As a result, techniques used for data collection, analysis and validation in this research study involved semi-structured interviews, self-completion questionnaires, and focus groups[b]. Therefore, this research design also fulfils the requirements of sequential triangulation (Creswell, 1994) in which the results of prior empirical steps drive the planning of subsequent empirical phases.

Choosing Interviewees

The third fundamental issue of the research design in this empirical study is to decide on the sample size and sampling procedure concerned with three data collection (and analysis) techniques that will allow for the 'generalisation' of the findings into theoretical propositions and the ultimate conceptual framework.

[b] The pre-study literature review and pilot case studies are regarded as the preliminary tools for identifying theoretical gaps and the area under investigation

Grounded Theory based method *does not* think that random (or convenience) sampling is realistically possible since it aims for research participants who are experts in the experience or the phenomenon under investigation (Auerbach and Silverstein, 2003; Morse, 2010); while random (or convenience) sampling even violates the central analytic tenets of GTM philosophy (Locke, 1996). In this study the best ones included key people who have been involved in operating core business processes and the supporting ERP information systems (e.g. planners and schedulers, supply chain managers, logistics directors, client service managers, chief information officer, etc.) within the range of manufacturing and servicing industries (e.g. crane manufacture, digital printing, etc.), i.e. **people who have strategic insights and responsibilities in different inter-firm relationships and collaboration, as well as the use of ERP IS for core operational processes (practical consideration)**; accordingly, the roles and levels of organisational responsibility should not be limited to a certain scope. Random (or convenience) sampling, however, implies that the researcher has equal access to all members of a subculture (e.g. managers exist at all levels of organisations) that are then equally likely to be selected by a random sampling technique. This was definitely *not* the case in this research study where the access to experienced experts (and managers) who handle multi-organisational enterprises strategy and conduct ERP implementation as research participants was one of the major constraints.

In view of this, the author followed the rationales for choosing and studying companies which are **(i) parts of companies work with parts of other companies to deliver complex products and services (ii) the companies extensively use ERP systems to suppor their core operations and collaborative strategies and (iii) the companies heavily rely on outsourcing strategy**; and selected suitable interview participants (from these research sites) whom the author and the author’s supervisor had access to through personal contacts and asking those participants to provide further contacts (to build empirical date for GTM). This approach actually worked to a certain extent since the selected companies and their specific industries shows a somewhat interwoven structure wherein the managers (especially on higher organisational responsibility levels) are not only involved in their own supply chain relationships but also well connected with their counterparts of other companies. For instance, a general manager of a concrete manufacturer (i.e. Lanye) was norminated as interview participant via a chief executive officer from another concrete manufacturer (i.e. Wanghai). A similar approach was used for selecting a sufficient amount of suitable participants to do the questionnaire survey, i.e. original interviewees were contacted for the completion of self-completion questionnaires and further asked to forward the questionnaires to colleagues, co-workers, and business partners who are suitable knowledge people in other industrial companies (e.g. retailers, ERP systems vendors, etc.). Besides, this approach based on personal contacts was also used for the focus group sessions.

It has been suggested that in grounded theory-based research the sample size cannot be determined in advance as each research participant potentially embodies the opportunity to develop and refine theory

(Auerbach and Silverstein, 2003). According to Eisenhardt's (1991) and Stake's (1995) opinions, the researcher has to keep recruiting and interviewing suitable research participants until no new data is produced that adds new insights to theory construction or no new information is learned about the research topic; this procedure is called "theoretical sampling" (Glaser and Strauss, 1967) and ultimately determines the sample size of the study (Auerbach and Silverstein, 2003). This principle was followed throughout the interview stage of this research study which involved iterative steps in data collection and analysis in order to determine a certain level of saturation (sometimes also referred to as 'overlapping data analysis with data collection' (Eisenhardt, 1989)), i.e. the following interview became informed by analytic questions and hypotheses about data relationships drawn from previous interviews (Strauss, 1987). On the other hand, with respect to the questionnaire survey no saturation limit was applied because the larger the size of the sample, the more likely it is to provide a reliable picture of the population in which the investigated phenomenon is observable. Nevertheless, **since the questionnaire survey – the second empirical phase in this study was mainly used for validating the emerging theoretical propositions derived from the interviews and not for large scale hypothesis testing; it was not considered imperative to obtain a statistically representative sample size**. Despite this, the author aimed to generate a sample which can fully show a greater variety in participating companies and respondents than the interview sample.

Due to the limited access to research sites and participants, the actual sites from which the interview participants are to be selected were chosen based upon the (academic) rationale stated above as well as the recommendations of Pettigrew (1990) and Eisenhardt (1989) to choose cases such as extreme situations or 'polar types' in which the topic of interest was expected to be observable. Also, it is suggested that the case (research site) selection criteria should not be significantly affected by specific industry (and regional) sectors and ERP systems types; rather, the selected cases and the way that their ERP systems have been used together with functionalities required should vary by industry (and regional) sectors whilst still reflecting enough commonalities. As a result, **the companies delivering complex products and services across organisational boundaries whilst using ERP systems to support their operational strategies** were chosen; this included: print solutions provider, semi-conductor, crane, and concrete manufacturers, parcel distributor, and banking service provider, which span ERP systems-enabled manufacturing and service-oriented operations in the UK and China. In addition, **these multiple research sites represent replication that allow for the development of a rich theoretical framework and hence could potentially be more generalisable, i.e. valuable for theory building** (Eisenhardt, 1989; Yin, 2003). Also, multiple sites allow for 'cross-case' analysis which is referred to as multiple comparison groups for providing new data, suggesting new theoretical propositions, and verifying initial tentative propositions in diverse contexts (Glaser and Strauss, 1971). In short, replication is build into this research study, which can maximise transferability, authenticity, and confirmability of the research results/findings.

Interview guide

The fourth and last step to be taken within this research design phase deals with the design of an interview guide – particularly for the semi-structured interviews. In alignment with the ideal of a bias free research, although a pre-study literature review (see Chapter 2) was performed for this study, **it was only conducted to the extent that enabled the researcher to identify and suggest important topics on which the interview questions and fieldwork should focus**. Thus the author tried to avoid gaining too much *a priori* knowledge about particular concepts and models in order to let the empirical data *speak for itself* whilst overcoming the "temptation to form premature theories upon insufficient data" (Baring-Gould, 1967 cited in Van Maanen, 1979, p. 539), i.e. the researchers are inclined to theorise in advance of the facts leading to the possibility that the facts emerging from a study are twisted to influence a given theory.

Since the interviews for this research were exploratory in nature and aimed to collect a great variety of empirical data on designing and managing ERP information systems within the context of multi-organisational collaboration to facilitate theories generation; whilst considering the recommendation to conduct 'narrative interviews' (Auerbach and Silverstein, 2003), i.e. asking questions which take the participants through their history/story with the investigated phenomenon, the author developed an interview guide containing aspects on (i) the company's industrial context and business strategy, (ii) the company's value stream (e.g. supply chain description, operational processes, etc.), (iii) the basic inter-firm collaboration issues (e.g. multi-organisational enterprise structure and strategy design and management (i.e. governance)) and competence context, (iv) the use of ERP information systems for the core (multi-organisational) business processes, and (v) the basic organisational management and people issues in respect to ERP and (multi-organisational) enterprise governance (i.e. design and management activities). This also provided the interviewees with opportunities to bring up unanticipated topics since they are the experts of the studied phenomenon (Auerbach and Silverstein, 2003). Thus the interview guide did not pose a set of exclusive questions but rather a collection of topics and aspects to be discussed. At the same time, in order to avoid being deterministic in this exploratory inductive research the author had to be careful not to lead the interviewees; therefore, specific academic terms such as 'extended enterprises', 'virtual enterprises', and 'ERPII' were deliberately not used during the semi-structured interviews and in the interview guide. However, all the interviewees were mainly asked about how they (or their functional department) collaborate with other companies within a multi-organisational enterprise context rather than internal operations; as well as how they use ERP systems to support their multi-organisational enterprise structures and strategy. In most cases the interview guide was requested by the participants beforehand and was sent to them (via email) two to three weeks prior to the (face-to-face) interview to allow for sufficient time of preparation for the interviewees (see Appendix C; the interview guide).

The interview guide was tested on a small sample of three participants (the managing director and operations director of Lightning Source, and the executive manager of Zoomlion) in February 2011 (for cases in the UK) and in July 2011 (for cases in China); and critically evaluated by two researchers (the author and his primary supervisor) in terms of the its value to the investigated phenomenon and amended before being employed to other (formal) interviews in order to serve the purposes of credibility, dependability, and confirmability of the study and the (empirical) data (Bryman and Bell, 2007). It should also be noted that since the access to managers was too much a constraint to this research, these three participants were interviewed again during the formal semi-structured interview stage to obtain more valuable information/data for analysis purpose of the study.

3.3.5 Data collection phase

The first step of fieldwork comprised the basic (empirical) data collection for this research study via semi-structured interviews with key people (e.g. experts and experienced managers) from both manufacturing and service industries in the UK and China. Thereby, the main objective of the data collection phase is to create a rich context of the research objectives stated above.

Semi-structured interview

Semi-structured interview is a flexible and adaptive research technique with intention to allow new viewpoints to emerge freely, which can be modified to suit the needs of different groups of participants (King, 1994), i.e. varied personal histories of the sample group precluded the used of standardised interview schedule. This method is, however, an intermediate step in a continuous spectrum of possible interviewing characteristics ranging from structured interviews in a more quantitative domain to completely unstructured in-depth interviews in a more qualitative approach (Bryman, 2004). In this sense, semi-structured interviews leverage the strengths of both structure and unstructured interview methods; which is sometimes also referred to as ‘focused interview’ (Merton *et al*., 1956) to enable probing for more information and clarification of answers.

The researcher refers to some kind of interview guide which is a brief list of topics and questions to be covered that should be guided by collecting the necessary data for shedding light on the research topic and problem (Bryman, 2004). This allows the investigation to begin with a fairly clear focus (e.g. investigating the impact that ERP systems may have on the multi-organisational enterprise structure and strategy and *vice versa*) rather than a too general basis and thus avoids for the interview to drift into a pure conversation that lacks of rich context and an appropriate degree of comparability between different interviews (or even different cases) for dependability purposes (Bryman, 2004); while simultaneously leaving space to capture the perspectives and perceptions of the interviewees on the phenomenon in an open-ended manner by allowing sufficient opportunities for an unobstructed flow of narrations and themes; which provides more detail and insight into the explored phenomenon instead of imposing a fixed set of (interview) questions (e.g. how ERP subsystems used or shared with supply chain partners) with pre-selected answer choices onto the respondents like in structured interviews (Merton *et al*., 1956). The advantage is that individual participants will not only reveal the factors that they consciously believe to influence the research topic but also subconsciously discuss the factors that they might not be aware of (Leary, 2001).

Contact to interview participants was gained through personal contacts of the author and his primary supervisor based on the academic rationales as mentioned above. It was aimed for experts/managers who are involved in delivering complex products and services through multi-organisational (a.k.a. inter-firm) collaboration (e.g. purchasing and quality control, R&D, transportation scheduling, marketing and sales, etc. – interview participants with different roles could enhance the generalisability, transferability, and credibility of the developed theories while better inducting a comprehensive contingency framework) and the supporting ERP information systems (ERP configuration and adoption, CRM, B2B, etc.); because informant competency is likely to be higher for informants whose roles are closely associated with the investigated topic (Kumar *et al*., 1993). Although the respondents came from 8 single organisations, as mentioned before, all the interview questions were focusing on *how they collaborate with their external partners within a multi-organisational enterprise to deliver complex products and services by using different ERP systems*. Semi-structure interviews were carried out by the researcher himself and conducted face-to-face at the workplace of the interviewees in order to make participation more convenient; 26 interviews were based in the UK and thus were conducted at four companies in the UK (i.e. Lightning Source, Pinstripe, Intel, and TNT Post); the other 22 interviews were based in China, therefore, were conducted at four companies in China (i.e. Zoomlion, Lanye, Wanghai, and Metrobank). All the interviews took place between March 2011 and August 2011, lasting between 1 – 1.5 hours. Each interview was conducted with one interviewee only so that participants would not influence each other's opinions and answers. Additionally, some demographic data form of the interviewee's area with respect to work and level of organisational responsibility was obtained, basically through the exchange of business cards.

Unless disapproved by the participants, the interviews could be taped and transcribed, which is imperative for ensuring credibility, authenticity/dependability, and confirmability of the data (McCutcheon and Meredith, 1993). In this context Bryman (2004) postulates that if an interview contains open question and narrative parts, an audio recording is inevitable. It has to be noted that no single interviewee rejected the tape recording and transcription of the interviews which produced a total of 53 hours (1.1 hours on average) and over 800 pages of (validated) transcript. Depending on the interviewee's native language, the transcript was produced either in English or Chinese. Although there were huge amount of Chinese interview transcriptions; and this research project did have limited access to the resources of using several translators, all the Chinese transcripts were then translated into English and checked by a bilingual peer – this was regarded as the utilisation of parallel translation method (Usunier, 1996), in order to ensure the best match between English and Chinese versions as well as facilitating the later (data) coding, analysis, and 'live excerpts' presentation (Booth, 1961) (see Chapter 5). The transcription and translation processes also allowed an additional opportunity to reflect on the content of each interview. At a later stage these transcriptions were validated by the interview participants and a consent form was signed by them to ensure that the transcripts were true and accurate records providing credibility and confirmability (a.k.a. face validity) of the empirical data whilst enabling further amendments and improvements. With the purpose of protecting the identity of the participants, all interviews were granted anonymity, which is also a principle of the confirmability audits and member validations explained above (see Appendix D; the consent form).

It is difficult to have a large sample size when employing (qualitative) interviews as these are very time consuming. Despite this fact and the constraint in access to informants (e.g. experts and managers), empirical insights were gained through a series of 48 semi-structured interviews with a sample of 48 experts/managers in manufacturing and service-oriented businesses in the UK and China covering 8 companies, i.e. 2 printing corporation, 2 concrete manufacturers, 1 semiconductor manufacturer, 1 crane manufacturer, 1 logistics provider, and 1 commercial banking group. **This sample strictly conforms to the rationales (for selecting and studying cases) explained above and proved to be large enough for achieving theoretical saturation**. Key characteristics of the interview and background information on each of the case study sites are given in Table 3.2. Additionally, a diagram illustrating the relationships between the case companies are further provided in Figure 3.4; which demonstrates that 8 companies from the UK and China are matched cases in terms of (i) product-service continuum (a.k.a. product-based versus service-based); (ii) maturity level of advanced ERP systems use; and (iii) degree of outsourcing (e.g. Lightning Source sits in the middle of continuum between pure product and pure service; whilst relying more heavily on outsourcing strategy with higher maturity level of ERP systems use to simultaneously design and deliver complex product-service systems).

Table 3.2 Overview of the case companies and interview sample

Company	Industry sector	Number of interviewees	Role of interviewees	Management level	ERP systems (*cf.* Section 5.1)
Lightning Source (UK)	Printing manufacturer	6	Managing director	Senior	Content management system (CMS) Oracle (and PeopleSoft)
			Operations director	Senior	
			Manufacturing manager	Middle	
			Client service manager	Middle	
			IT system manager	Middle	
			Supply chain manager	Middle	
Pinstripe (UK)		5	Managing director	Senior	Print-Pack MIS systems
			Client service manager	Middle	
			Account director & sales manager	Middle	
			Production & administration manager	Middle	
			Studio manager	Middle	

Intel (UK)	Semiconductor manufacturer	6	Supply chain programme manager	Senior	SAP [ERP] systems
			Supply chain technologist	Middle	
			Finance manager	Senior	
			Logistics & manufacturing manager	Middle	
			B2B technologist	Junior	
			Supply planning & customer manager	Middle	
TNT Post (UK)	Transport and logistics service	9	Group services director	Senior	Sage [ERP] systems SAP [ERP] systems
			Head of sortation auto	Senior	
			Operations director	Senior	
			Group commercial director	Senior	
			Senior financial controller	Junior	
			IT director	Senior	
			Head of transport	Senior	
			Head of human resource	Senior	
			Operations control team manager	Middle	
Zoomlion (China)	Crane manufacturer	7	Executive manager	Senior	SAP [ERP] systems
			Chief information officer	Senior	
			Logistics manager	Middle	
			Regional marketing & sales manager	Middle	
			Regional director	Middle	
			Credit manager	Junior	
			Business sales assistant	Junior	
Lanye (China)	Concrete and mixer manufacturer	5	General manager	Senior	Alutex (and GPS) systems
			Chief information officer	Senior	
			Logistics director	Middle	
			Production manager	Senior	
			Chief executive officer	Top/Executive	
Wanghai (China)		4	Chief executive officer	Top/Executive	Three Prosper Technology
			Human resource manager	Senior	
			Inventory manager	Middle	
			Chief information officer	Senior	
Metrobank (China)	Banking	6	Chief executive officer	Top/Executive	SAP [ERP] systems
			Head of human resource	Senior	
			Compliance manager	Senior	
			Chief finance officer	Senior	
			Chief operation officer	Senior	
			Chief information officer	Senior	

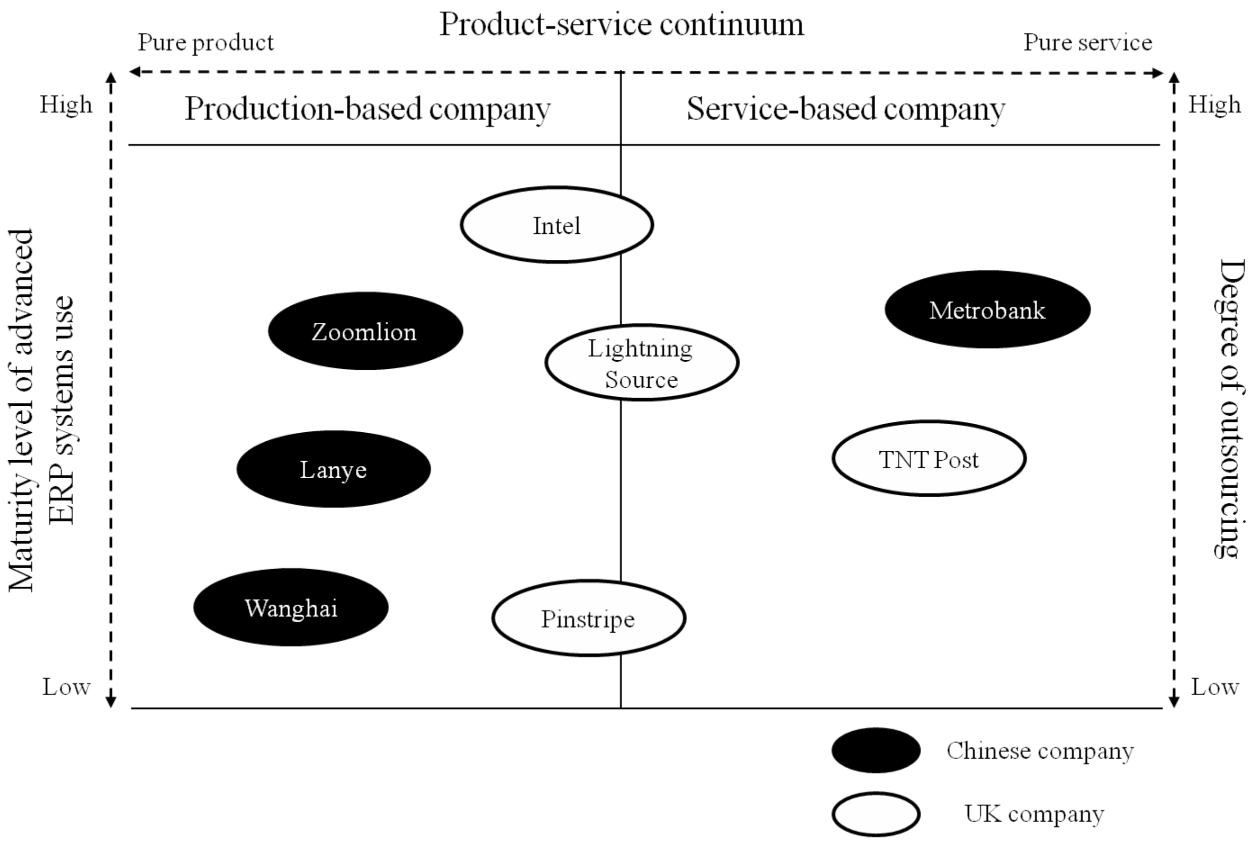


Figure 3.4. Relationships between the case companies

As can be seen from Table 3.2, in most cases the interviews were experienced middle, senior, or top managers who are involved in the issues of complex products and services delivery in multi-organisational relationships and collaboration and the ERP information systems (e.g. ERP systems end users) that enhance them; therefore, they were qualified to provide data.

Even if it is possible to capture the *how* and *why* issues in terms of the important features of different *enterprise* structures and strategy as well as their corresponding ERP systems design and management, interviews bring certain limitations with them. They can be affected by social desirability, i.e. the interviewees may provide answers which they believe the interviewer is looking for rather than giving accurate and honest answers (Leary, 2001). Nevertheless, considering the very open and direct answers of most interviewees as well as provision of sensitive information on the subject/theme, response bias seems very unlikely. Furthermore, the research aims were unknown to all the interview participants, which makes it difficult, if not impossible, for them to meet them (i.e. research objectives and answers that the author is looking for) even if anticipated correctly.

3.3.6 Data coding and analysis phase

In this research study, the coding and analysis procedure took place between March 2012 and October 2012 after spending five months (between October 2011 and February 2012) with the transcription of the conducted interviews. The main objective of data analysis is to interpret meaning from the empirical data (Silverman, 2000); in turn, enable the generation of theoretical propositions concerning the 'how' and 'why' questions of the research study thereby transforming data into findings (Patton, 2002). Thus it is obvious that the (data) analysis part of the study is particularly important which is basically true for all qualitative research approaches (Miles and Huberman, 1994). In the context of this study, the data coding and analysis phase should consist of two main parts namely intra- and inter-case analysis, in order to gain a deeper understanding of a (particular) social setting (e.g. inter-organisational ERP systems governance) (Dyer Jr. and Wilkins, 1991).

Firstly, each case (for this study interview) has to be analysed separately. The central idea is to become familiar with every single case on its own to identify unique patterns, features, and issues of different multi-organisational collaboration and different (supporting) ERP information systems before generalising patterns, features, and key issues across cases. To avoid being overwhelmed by the (empirical) data sets, the *within-case* analyses were focused around the pre-identified research objectives dealing with essential governance (i.e. design and management) issues. For example, the researcher sought to obtain the broad feedback and universal explanations on whether different inter-firm patterns and strategies can be planned for different ERP systems; and how ERP systems development strategically affect (multi-organisational) enterprises structural and strategic transformation. Secondly, general conclusions about all cases (i.e. 48 interviews) will be drawn; with cross-case techniques it is more likely to discover the novel findings that are incorporated in the data by looking at it in many different ways (Eisenhardt, 1989). In doing so, emerging findings are iteratively confronted with the cases to assess the fit with the observations, which is an important feature of the *constant comparative method* in Grounded Theory based method where observation is quickly accompanied by generating propositions, "as soon as researchers start forming provisional categories or abstraction from the data, comparison begins" (Locke, 1996b). Beyond guiding the active search for evidence, these integrated propositions immediately provide a central core of theorising which leads to the analytical framework that forms the substantive theory, i.e. it is a continuous and interrelated process of data collection, (theoretical) proposition generation, empirical testing, and theory revision (Glaser and Strauss, 1971). This process of continuous 'theorising', which is termed 'theoretical sampling', is driven by the constantly evolving and underlying theories and goes on simultaneously as working through the within- and cross-case analysis.

Since it is difficult to identify patterns and develop sensitive categories (or themes) within the data intuitively, GTM uses theoretical coding as its structured coding paradigm to facilitate the development of conceptual complexity and density in the resulting theories (Glaser and Strauss, 1967). Strauss and Corbin (1998) state that, "coding is viewed as a process through which data is fractured, conceptualised, and integrated to develop and form the new theories" (p. 3); thus they complement a hierarchical structure of coding levels to ensure conceptual density involving *open coding*, *axial coding*, and *selective coding*.

During the relatively unrestricted and unprejudiced *open coding* (the process of deduction) of empirical indicators provisional codes and categories are identified that explain relevant empirical data (Locke, 2001), which is one of the key issues of constant comparison. During subsequent *axial coding* (reconstruct the open codes and classify them into various categories or dimensions) relationships of the developed categories are identified and data explaining their interrelation is extracted which then enables the refinement of any category (or sub-category) that needs further development.; it revolves around the 'axis' of one category at a time, hence the term (Strauss, 1987). *Selective coding* (discover the core category) involves a systematic approach towards the development of core categories or abstract themes which explain all other categories, sub-categories, and hence the data; whilst refining the proposed relationships between categories (Strauss and Corbin, 1990, 1998). The core categories are the basis for generalised theory through narratives and theoretical propositions and guide further theoretical sampling and (empirical) data collection to ultimately reach theoretical saturation.

The coding was done using QSR NVivo 9.2 software tool; NVivo is a Computer Assisted Qualitative Data Analysis Software (CAQDAS) designed as a toolkit to aid researchers in managing and organising qualitative data that is not easily reduced to numbers (Patton, 2002). NVivo enables researchers to deal with rich, complex, and text-based data and its detailed analysis including sophisticated methods such as Grounded Theory (based approach) or conceptual modeling (Richards, 2002). Based on formal logic and offering Boolean searching it can be seen as a form of theory-building software. NVivo is also capable of dealing with data that has been transcribed in a language other than English, which was particularly useful for this research study as some interviews and transcripts were in China[c]. Moreover, NVivo NVivo 9.2 is a relatively easy programme to learn and use; thus as soon as the basic concepts and functions of the software, such as sources, nodes, sets, memos, attributes, coding, searching, developing graphical models, etc. were understood by the author by running dummy projects, the data coding and analysis processes took place.

Ideally, each interview transcript should be coded by a second coder providing inter-rater reliability of the interview analysis (Bauer, 2000). Bearing in mind the amount of transcribed pages (i.e. over 800 pages) this kind of full inter-rater assessment was difficult to achieve because of time and resources constraints. As a result, with the purpose of conducting the coding process in English while improving the reliability of the (data) coding and analysis, all the Chinese transcripts were translated into English and checked using bilingual speakers and the results were compared leading to minor changes in the translation until mutually agreed on; thereby the examples (i.e. excerpts) taken from the (Chinese) interview transcripts could be used to represent the codes in the Coding Master Table (examples are given in Chapter 6) in a more reliable way. This procedure was also used for the questionnaire survey (see Sub-section 3.3.7).

[c] Even if all the Chinese transcripts were translated into English

The author would like to argue that this methodological approach (to data analysis and interpretation) seems sufficient for the purpose of this thesis as this research study also contains a second empirical stage consisting of 'objective' validation of the coding (in the form of a set of derived (tentative) theoretical propositions from the interviews) in a questionnaire survey (given in Section 6.2 in Chapter 6).

3.3.7 Data validation phase

The aim of doing qualitative research is to develop transferable theories or theoretical frameworks, i.e. that the abstract patterns described by the emerging theories and its core categories are applicable to other research samples (Auerbach and Silverstein, 2003). However, one of the biggest problems faced by grounded theory (based) researchers is how to represent the main findings to an external audience without losing provenance. Hence, theoretical concepts (e.g. propositions and models) are not just discovered but also verified because their provisional character is validated with new data and coding controlled by the emerging theory (Glaser, 1978; Strauss, 1994). This implies that the inductive procedure of qualitative interviewing cannot be wholly satisfactory *per se* and has to be supplemented by a validation exercise in order to unfold its full value to the research. Thus the second empirical phase of this research focused on data validation of the tentative propositions via a questionnaire survey (and focus group) for the empirical quantification of the qualitative data, in order to validate the usability of the novel concept. This validation steps strengthen the transferability, authenticity/dependability, and confirmability of the data *before* a conceptual framework is produced.

Semi-completion questionnaires

Questionnaires, especially self-completion or self-administered questionnaires are one of the main instruments in social survey design where the respondent completes the questionnaire on his or her own (Bryman, 2004). Although it is generally considered that the most prominent form of the self-completion questionnaire is the postal questionnaire; in an era of increasing online communication the online survey software along with email is also gaining ground.

Because there is no interviewer to facilitate the administration of the self-completion questionnaire, it has to be especially easy to follow and answer, e.g. fewer open questions or an easy-to-follow design (Bryman, 2004; Bryman and Bell, 2007). The main advantage is a quick and easy administration, i.e. it is especially advantageous for targeting large samples that are geographically dispersed at the same time (Bryman, 2004) (as with the case of this research). This way, it is possible to reach a critical mass of respondents with relatively low resources which leads to a statistically representative sample that facilitates transferability and generalisability of the obtained results. Furthermore, interviewer effects, such as the described response bias of interviews, can be eliminated leading to more objectivity and thus dependability and transferability of the data. Finally, a self-completion questionnaire (through the online survey tool) offers more convenience to the respondents because they can complete it when they want, where they want, and at the speed they want (Bryman, 2004).

In respect to the design method of questionnaire survey, it has been emphasised that the layout should be easy on the eye while facilitating the answering of the questions rather than employing tactics to make the questionnaire appear shorter. Following this advice as well as the basic principles of designing 'descriptive survey' (Oppenheim, 2000), the author developed a questionnaire as Microsoft Word document (i.e. postal questionnaire) for part conservative Chinese participants; whilst using online survey software named 'QuestionPro' for all the UK ones and the rest of Chinese participants. **Both types of questionnaire comprised 29 statements (tentative theoretical propositions based on interview data) serving as closed 'questions'** (see Appendix E; the questionnaire survey), i.e. the questionnaire was designed as an 'opinion poll' (Oppenheim, 2000) and structured upon 29 theoretical propositions in order to **validate them rather than explore new findings; whilst the 29 statements were inducted by the author instead of directly suggested by the interviewees, therefore, should not raise any concerns about the validity of the findings (and confidence in findings)** (please refer to Sekaran and Bougie's (2010, pp. 378-381) work which was similar to the method used by this study). Only one open 'question' was applied to arouse further comments/opinions on the theoretical propositions; and each statement was numbered and emphasised by a box followed by a box (in the case of postal questionnaire) or 'multiple choice single select' question type (in the case of online survey) highlighting the measurement scales leading to a non cramped presentation of four statements per page (via the postal questionnaire) or three-page questionnaire (via the online survey). Each respondent was asked to rank their perception of the tentative propositions on two dimensions "agreement", i.e. whether they agreed or disagreed with the proposition; and "importance", i.e. the importance of the proposition for daily business activities using 7-point Likert scales. In addition, some demographic data such as working experience, industrial background, and responsibility level, etc. was obtained to enable the comparability of the data. To improve the clarity, clear instructions and explanations on the provided measures and scales were given.

In order to increase the credibility and confirmability of the data, the questionnaire survey (design) was pilot-tested with two respondents (two academic members that were not involved in the interviews) at the beginning of January 2013. Issues that were evaluated during the pilot test included duration for processing, clarity of instructions and statements, general appearance, and the appropriateness of the measures and scales. The time for completion of the questionnaire was 10 minutes on average. The layout, instructions, measures and scales were considered clear and understandable so no amendments were made. Concerning the statements (i.e. tentative theoretical propositions) some were considered unclear or too theoretical and thus had to be re-phrased into more practical, concise, and understandable statements. Moreover, since the focus of this research study covers both the UK and Chinese cases, the questionnaire was also translated from English into Chinese and checked by a bilingual peer (using parallel translation method (Usunier, 1996)) to increase the credibility and veracity of survey results from the Chinese respondents.

Apartment from the postal surveys, the questionnaires were sent out as an email involving greetings, instructions, and the embedded questionnaire survey link to contacts of the author in the middle of January 2013 after the pilot-tests were completed; the respondents were asked to reply the email with one simple word ‘done’ to help the researcher better track and manage the responses. There are three reasons for using this survey technique: (i) the readability and easiness for completion was valued higher, especially because the survey was targeting managers and industrial experts; (ii) the convenience for the respondents is higher since they were able to save their changes in the questionnaire (using QuestionPro tool) and could come back to finish it at a later stage (i.e. more flexible); (iii) nowadays, most people is used to receiving, processing, and sending emails containing attached (or embedded) survey link.

In addition, a combination of convenience and snowball sampling methods was used as the questionnaire was mainly sent to the interview participants from the first empirical data collection stage with the kind of request for forwarding it to further contacts. However, with the purpose of gaining a larger sample size the author also contacted other practitioners in various industries via the use of personal contacts of the author (i.e. by tapping into the author’s personal resources); and 8 additional companies were contacted, which covered one fibre producer, one consulting services firm, and two ERP vendors in the UK as well as one e-commerce retailer, one governmental organisation, one construction firm, and one educational institution in China. The contacts were selected by the researcher based on their job positions which had to be at the interface of inter-firm collaboration (e.g. purchasing, R&D, production & manufacturing, logistics, etc.) and ERP design and project implementation (e.g. ERP system vendors, ERP project members, information management, etc.). This way, another 90 potential (survey) respondents could be contacted.

The response rate is an important issue because it determines the representativeness of the achieved sample (Bryman, 2004). It has been argued that for samples which are not selected on the basis of a probability sampling method, the response rate is less of an issue meaning that a low response rate is less significant because the sample is not considered representative of the population (Bryman, 2004; Bryman and Bell, 2007). Nevertheless, in the context of this study, a combination of convenience and snowball sampling was applied which (i) made the determination of an overall response rate impossible and (ii) increased the representativeness of the sample through the snowballing effect even if not every potential respondent of the population had the same chance to be selected (convenience aspect). Furthermore, **the questionnaire survey was mainly used for validating purposes rather than large scale hypothesis-testing for generalising results to the population**; this together with original interviews is an acceptable part of using GTM. Specifically, certain leverages were applied to improve the number of valid responses. Firstly, the email with embedded survey link was given a title “your expert help is needed for 10 minutes in top business school research" to avoid being neglected by the respondents (i.e. increase the response rate). Secondly, a cover letter explaining the reasons and background of the research as well as the importance of participation and assuring confidentiality was included at the very beginning of the questionnaire (for both the postal and online questionnaire survey); which is suggested by Bryman (2004). Thirdly, individuals who have not replied to the surveys until the end of January (2 weeks after first email/mailing) were followed up by a second (on 29th January 2013) and third (on 1st March 2013) reminding email/mailing. Fourthly, for incomplete questionnaires respondents were contacted and kindly asked to fill in the missing gaps. Finally, all participants of the questionnaire survey were offered to receive a summary of the survey results in the form of excel spreadsheet.

Until the end of March (around 11 weeks survey period) 116 valid response questionnaires were received through snowballing via the interview partners and the use of personal contacts of the author; which included respondents that were involved in the semi-structured interviews as well as respondents that have not been involved in the study before with an average of 8.63 years working experience in both manufacturing and service industries. It should be emphasised that **the sample size is large enough as the purpose of grounded theory-based methodology is to generate and suggest theories *not* to prove them statistically**. An overview of the demographics of the questionnaire survey sample is given in Table 3.3.

Table 3.3 Basic characteristics of the questionnaire survey sample

Company role	**Responses**		**Functional experience**[d]	**Responses**		**Management level**	**Responses**	
	Number	**%**		**Number**	**%**		**Number**	**%**
Printing manufacturer	10	8.6	Purchasing	20	10.0	Clerk	16	13.8
Semiconductor manufacturer	7	6.0	Research & Design	20	10.0	Junior management	26	22.4
Transport and logistics service provider	10	8.6	Quality assurance	31	15.4	Middle management	45	38.8
Crane manufacturer	22	19.0	Production & Manufacturing	31	15.4	Senior management	18	15.5
Concrete and mixer manufacturer	25	21.6	Logistics	19	9.5	Top/executive management	6	5.2
Banking	11	9.5	Marketing & Sales	31	15.4	Other	5	4.3
Fibre producer	1	0.9	Inventory management	17	8.5			
Consulting services	1	0.9	Strategy & Directorship	22	10.9			

[d] The number of responses for functional (department) experience is greater than the total number of respondents (116) because some respondents had working experience of more than one function. The questionnaire allowed multiple entries by the respondents

E-commerce	8	6.9	Other[e]	10	5.0			
Governmental sector	6	5.2						
Construction Co.	8	6.9						
Education	2	1.7						
ERP vendor	5	4.3						
	Σ = 116	**100**		**Σ = 201**	**100**		**Σ = 116**	**100**

The questionnaire survey reached a far greater spread and variety in contributing companies (16 in total) than the 8 original companies of the semi-structured interviews which increases the representativeness of the sample to the population, i.e. the manufacturing and servicing industries in the UK and China. Most respondents were experienced in functions such as quality assurance, production & manufacturing, marketing& sales, and strategy & directorship (see Table 3.3); particularly those responsibility areas that are involved in different multi-organisational relationships and collaboration, as well as the use of the corresponding ERP information systems. Similar to the interview participants, most respondents occupy management positions (61.2% junior and middle management; 20.7% senior and top/executive management) and hence are experienced sufficiently to provide a qualified evaluation and assessment of the statements (i.e. tentative theoretical propositions).

The questionnaire survey method has limitations. One of the major problems with questionnaires is the difficulty in asking many questions which could lead to 'respondent fatigue' (Bryman, 2004, p. 135) very easily. Since the interviews revealed very complex data leading to a long list of tentative propositions, it was desirable to include 29 statements in the questionnaire which the author refrained from not only because of the pilot-test reviews. Additionally, the researcher can never be sure who actually answered the questionnaire and what sort of intrusion and influence the respondents might have faced; this risk was minimised in this research study with the fact that answering the questionnaire required a certain strategic or operative experience on the investigated phenomenon of enterprise resource planning systems enabled multi-organisational collaboration governance (i.e. design and management activities) in both manufacturing and service industries in the UK and China.

Focus group and (industrial) workshop

The focus group is a form of group interview that involves several participants to explore a specific topic relatively in depth (Bryman, 2004). In social sciences it proved particularly useful for exploratory research but also for following the analysis of a large-scale quantitative survey to facilitate the interpretation of the results in a confirmatory sense (Stewart and Shamdasani, 1990). In this research study, the focus group (or workshop) method was used moderately (since the semi-completion questionnaire survey was considered

[e] This includes client service, finance, information management, HR, ERP researcher, ERP project team, and legal compliance

as the main technique for data validation) to validate the tentative theories and the resulting conceptual framework instead of analysing empirical data.

The focus group (or industrial workshop) generally applied within qualitative research shares its ideas with the focused interview in the sense that both aim for selecting and questioning people who are industrial experts on the explored research topic (e.g. ERP systems capabilities supporting multi-organisational collaboration) (Merton *et al*., 1956). Nevertheless, as opposed to individual interviews the focus group (or workshop) method exerts more challenge onto the interviews due to having more control in an open discourse debate. This might lead to a more realistic account for what the involved participants really think as there is more stimulus to surface issues that concern them (Bryman, 2004); which could increase the credibility and dependability of the results based on a form of internal triangulation.

Within the focus group the developed theoretical propositions/concepts and models were presented to the participants for validation, which *acted as some sort of confirmability audit for the results of this research study*. The focus group was conducted with practitioners of the concrete & mixer manufacturing and banking industries in February and March 2013 lasting about two hours respectively. Participants were obtained through personal contacts of the author (mainly from the previous empirical phases such as interviews), again leading a convenience sample. For reasons of accessibility to participants and difficulties in arranging the focus group, only two groups (from China) could be recruited.

Although Morgan (1998) suggests a typical (focus) group size of six to ten members, he remembers smaller (focus) groups when participants are likely to have a lot to say on the research topic. This was the case for the conducted focus group with managers that are all involved in ERP systems enabled multi-organisational enterprise collaboration in their daily operative business activities (e.g. production, finance, logistics, ERP systems use), which justifies the number of five participants. An overview of the focus group sample is given in Table 3.4.

The session started with an introduction that explained the aims, background and outcomes of the research. During the session, several topics including ERP systems use/upgrade supporting multi-organisational enterprise relationships and collaboration, as well as company's value stream (that were related to the research questions) were discussed in addition to the validation of 29 tentative theoretical propositions and theoretical models. This allowed the discussion to flow freely, on the one hand, but also intervened to uncover important issues of the investigated phenomenon, on the other hand. Both discussions were taped and transcribed to facilitate the data analysis process. However, since the focus group was basically applied to **validate the developed conceptual framework (along with 29 tentative theoretical propositions) in the sense of grounded theory based theoretical sampling rather than collecting substantially new empirical data**, the author was less interested in the process of socially or collectively constructing meaning but more on the practical implications of the developed propositions and framework during the analysis.

Table 3.4 Basic characteristics of the focus group sample

Company role	Position of participant	Management level	Interview participation	Questionnaire participation
Concrete and mixer manufacturer	Chief executive officer	Senior	Yes	Yes
	Logistics director	Middle	No	Yes
	Production manager	Senior	No	Yes
	Chief information officer	Middle	Yes	Yes
	Financial director	Middle	No	Yes
Banking	Chief executive officer	Senior	Yes	Yes
	Compliance manager	Middle	Yes	Yes
	Chief finance officer	Senior	Yes	Yes
	Chief operation officer	Senior	Yes	Yes
	Chief information officer	Middle	Yes	Yes

Although the focus group method allows participants' perspective to be revealed in ways that are different from individual interviews (Bryman, 2004), it has some limitations. The obtained data are complex and difficult to analyse, and therefore, were *only* used for fine tuning the developed theory (i.e. tentative propositions and theoretical models) based on the semi-structured interviews and the questionnaire survey. Furthermore, the focus group is very focused on a special setting and might not be representative if it does not show regular activities, which leads to the conclusion that **the focus group as part of the triangulated research design of this research study can *only* be seen as a complementary and data validating source**.

3.4 Quality of this research

Research designs need to be *objective* and *universally applicable* which corresponds with the quality concepts of reliability and validity (for objectivity) as well as generalisability (for universality). Ellram (1996) and Yin (2003) outline four standard tests to establish the quality of any empirical research design: (i) construct validity by establishing (or identifying) the correct operational measures (for the concepts being studied), (ii) internal validity by establishing a causal relationship, i.e. correctly mapping the phenomenon under investigation, (iii) external validity by establishing the domain to which a study's findings can be generalised, ideally to situations as they can be found in reality, and (iv) reliability by demonstrating that the operation or results of a study can be repeated or reproduced by a different researcher or the same research on different occasions.

The concept of trustworthiness

However, when measuring the quality of the research design careful attention has to be paid to the nature of the basic research (methodological) approach, i.e. a distinction has to be made between qualitative and quantitative research projects when looking at the quality of their design (Halldórsson and Aastrup, 2003). Since reliability and validity as quality criteria mainly stem from a quantitative and positivistic domain and have proven difficult for qualitative researchers (Kirk and Miller, 1986) alternative criteria for determining the quality of the qualitative approach underlying this study need to be considered as well. A framework of trustworthiness proposed by Lincoln and Guba (1985) presents four parallel criteria which are more consistent with the qualitative research paradigm: *credibility*, *transferability*, *dependability* and *confirmability*; and this has been echoed by other researchers (Auerbach and Silverstein, 2003; Smith and Deemer, 2000).

Similar to internal validity, *credibility* is determined by establishing causal relationships in the data while focusing more on the match between the respondent's constructions of the phenomenon and the researcher's representation of it (Kirk and Miller, 1986). The second dimension – *transferability*, is more concerned with a contextualisation of the findings and their transferability to other contexts, i.e. it is measured by the extension of theoretical constructs beyond a particular sample, rather than *generalisation* like external validity (Auerbach and Silverstein, 2003); in the context of this study, **generalisation implies a generalisation to theoretical propositions (i.e. analytic generalisation) instead of a generalisation about a sample to its population (i.e. statistical generalisation)**. The third parallel quality dimension – *dependability* refers to the stability of the research process, i.e. the stability of the data and its explanations over time. Compared to reliability, *dependability* is not as strict on the condition of the stability and for this reason introduces the concept of trackability or transparency, i.e. the (empirical) data, the questions, and the theories underlying the interpretations must be documented for the purpose of reproducing understanding (Auerbach and Silverstein, 2003). In respect to the final criterion – *confirmability*, the objectivity of the researcher in the naturalistic paradigm implies the demonstration on how findings can be based on and confirmed through the data itself rather than the researcher's bias, i.e. conclusion, interpretations, and recommendations must be able to be traced back to their sources in the (empirical) data (Lincoln and Guba, 1985).

Trustworthiness of this research

In the context of this research study the concern of validity, reliability, and generalisability; as well as the corresponding qualitative quality measures of trustworthiness are addressed in several ways. It should be clear from the philosophical discussion above that the study does not claim to reflect any extreme ontological and epistemological position and thus both ways of measuring the research quality (i.e. qualitative and quantitative criteria) are considered in a complementary (methodological) manner.

The issue of *external validity* or *transferability* is considered and dealt with during the design stage of the research when deciding on data collection techniques. In this research study, the transferability is increased by studying multiple '(research) sites' and involving various participants which enable the analysis of comparative results and the verification of patterns through a *within-case analysis* (search for (conceptual) patterns and meaning) on the one hand; and a *cross-case analysis* (replication) on the other hand. This is supported through a quantitative validation of initial qualitative findings and the final concept via a questionnaire based survey (and focus group); which leads to a multi-method triangulation.

The aspect of *reliability* or *dependability* is addressed by adopting an auditing approach which entails (i) the creation of a protocol and database in order to keep record of all phases of the empirical research in an accessible way and (ii) the review through auditors to establish whether proper procedures have been followed throughout the research study, e.g. using industrial practitioners/experts and academic peers for the validation of the codification of the interview data (i.e. inter-rater reliability) as well as performing 'forward and back translations' of the questionnaire survey, which was designed in English and Chinese by the researcher himself (Litwin, 2003). However, transcripts and memos do not just increase reliability but are also useful for analytic reflection which leads to a process of implicit coding, i.e. thinking systematically about the (empirical) data in accordance with its basic analytic categories (Glaser and Strauss, 1971); and this is also useful for establishing internal validity and credibility.

The issue of *internal validity* or *credibility* is handled by multiple iterations and follow-ups during the phase of data analysis by applying the coding techniques and the comparative method of Ground Theory. In doing so it is possible to make proper inferences from the data by considering alternative explanations and relationships of the emerging (e.g. core/sub) categories. Furthermore, an important technique to ensure credibility of the results of the study is to submit the findings to the participating respondents of the research study to make sure that the research has correctly interpreted their perspectives on the investigated phenomena; this is often referred to as 'respondent validation' or 'member validation' (Bryman, 2004) and has been applied in this study, e.g. via the approval of the interview (and focus group) transcripts through the respective interviewees (see Appendix D; the consent form).

Given the possible lower precision of qualitative methods due to the information richness of qualitative data (Auerbach and Silverstein, 2003) multi-method triangulation was one of the most important means for increasing *construct validity* or *confirmability* of the research study along with some kind of confirmability audits. Specifically, triangulation was not only used to examine the phenomenon from different perspectives with different data collection, analysis, and validation techniques such as pre-study literature review, pilot case studies, interviews, questionnaire, and focus group, but also to enrich the understanding by allowing for new and deeper insights. The second important component of confirmability was confirmability audits for the clarification of participant's intended meaning (Bauer, 2000) which works similar to the respondent validation mentioned above; key informants reviewed the overall reports and theoretical narratives by verifying the facts for accuracy (e.g. interview transcript approval). Similarly, the questionnaire surveys were evaluated by a few respondents in a pilot test. In the sense of multi-method triangulation, this questionnaire survey then functioned as an abstract form of quantitative confirmability audit for validating the tentative (theoretical) propositions inducted from the qualitative interviews, and therefore, facilitating the *reliability* of the coding.

3.5 Chapter summary

The major aim of this research study is to **investigate and theorise about how different types of ERP systems fit into different types of multi-organisational enterprises, and *vice versa*; and develop a framework and practical guidelines on how to govern (i.e. design and manage) these ERP information systems and inter-firm relationships in a sustainable way to grow competitive advantage through an innovative strategic and contemporary operations thinking**.

In this context, Ground Theory-based method accompanied by pre-study literature review and narrative case studies was identified as a suitable research methodological approach that facilitates the analytical nature (i.e. what, why, and how questions) of the study by extending the extant literature on ERP systems and complex product/service delivery in multi-organisational enterprises via theory-generation (as in Section 3.3). The author embedded the method in the philosophical paradigm of ‘constructive realism’ (but regards the ‘constructionism’ as the predominant ontological paradigm for this research study) (as in Section 3.1), i.e. a compromise between extreme empiricism and complete relativism; and argued for a mixed method approach (a.k.a. triangulation) employing qualitative and quantitative methods (grounded at interpretative and positivist epistemology) which ensures credibility, transferability, dependability, and confirmability of the research design and the data (as in Sections 3.2 and 3.4). The resulting structure of the triangulated research design within the GTM together with a pre-study literature review (given in Chapter 2) and pilot (narrative) case studies (given in Chapter 4) is illustrated in the Figure 3.5.

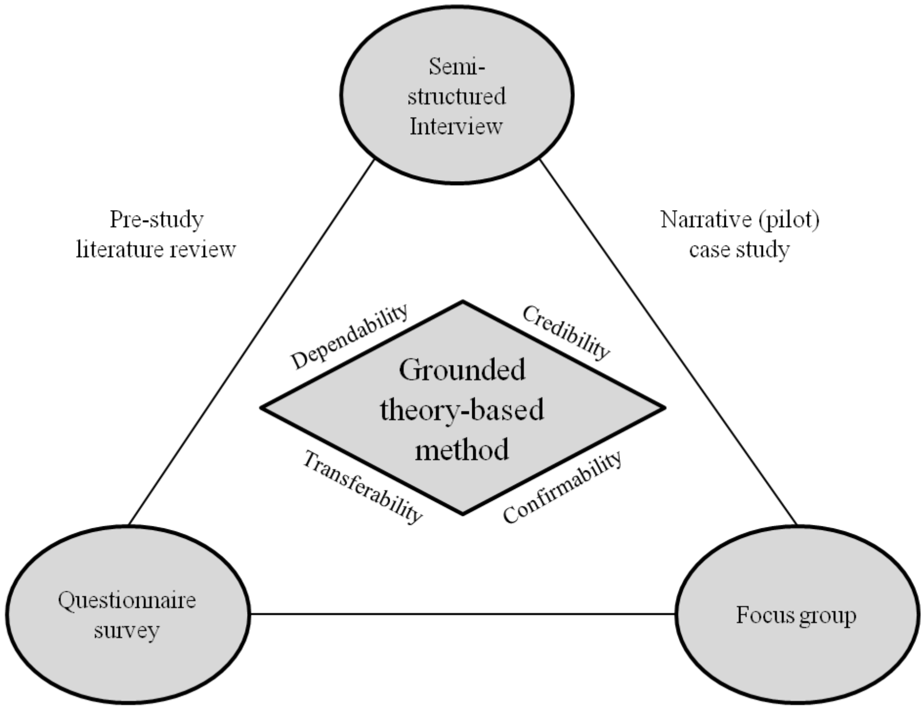


Figure 3.5. Structure of the triangulated research design within the grounded theory-based method

During the *design phase* research objectives were specified, data collection techniques and sample sites were selected, and an (semi-structured) interview guide was constructed. *Data collection phase* in the field was deployed through a set of 48 semi-structured interviews with managers and industrial experts in both manufacturing and service-oriented industries in the UK and China; a sample of 48 suitable participants who were taken through their experience with the investigated research topic using ‘narrative interviews’ was obtained. *Data coding and analysis phase* was performed by applying the key operations of grounded theory based method including constant comparison and theoretical sampling; a hierarchy of coding levels (i.e. open, axial, and selective coding) was used to achieve the stage of theory building (see Chapter 6). During the final stage of *data validation* the inducted tentative propositions were validated via a questionnaire survey (116 valid responses) assessing their *agreement* and *importance* for the explored research topic (see Chapter 6), in order to develop a comprehensive conceptual framework based on theoretical and empirical perspectives (see Chapter 7). This framework together with 29 propositions was also discussed with practitioners in a focus group (or workshop) to evaluate the applicability of the new conceptual framework.

Chapter 4 – Two Pilot Case Studies and the Proposed Tentative Framework

In this chapter, the Collaborative Enterprise Governance methodological concept (see Figure 4.1) along with template analysis technique was used to build two empirical **pilot case studies** in order to explore significant and potential relationships between ERP systems and multi-organisational enterprise paradigms, which initially uncovers the potential transformational routes between different ERP types and different multi-organisational enterprise types; and in turn proposes the tentative contingency framework as a "straw man". This chapter together with 'a pre-study literature review' in Chapter 2 properly **justifies the importance of doing this research topic from both empirical and academic viewpoints, on the one hand, and increases focus, i.e. identifies the gaps and areas under investigation and narrows down the scope for doing the fieldwork based upon Grounded Theory-based method (see Chapters 5 and 6), on the other hand**.

4.1 Collaborative Enterprise Governance model

The Collaborative Enterprise Governance (CEG) concept, as shown in Figure 4.1, was used to build empirical pilot case studies (i.e. Zoomlion and Lanye) because it considers a multi-organisational *enterprise* to be made up of parts of different companies delivering complex products and services; where **each part is built around highly specific competencies** (e.g. physical resources and intangible knowledge) integrated with other less specific capabilities (e.g. processes and IS) (Binder and Clegg, 2007); thus making it suitable to investigate ERP and multi-organisational *enterprise* management trends.

The CEG concept uses tools that fall into four stages. Stage 1 uses the 'Enterprise Matrix' to codify and map the (multi-organisational) enterprise which is a template for data collection based upon King's (King, 2004) Template Analysis technique. Stage 2 uses theories discussed in Chapter 2 (i.e. (multi-organisational) enterprise theory, ERP and IS strategy) to analyse, codify and define the enterprise and ERP type being investigated (see Tables 2.8 and 2.9). Stage 3 uses the Dynamic Enterprise Reference Grid (DERG) (as shown in Figures 2.2 and 2.3) to forecast where the multi-organisational enterprise structure might be heading, and Stage 4 assesses the options for change (i.e. IS and multi-organisational enterprise strategies). CEG is cyclical, so therefore, the final stage re-initiates Stage 1 as change is assumed to be perpetual.

The CEG concept was applied to investigate how the multi-organisational enterprise structure transforms from one type to another in a deductive manner; whilst the author proactively exploring how the cases use ERP systems to support the corresponding from in a preliminary manner. Thus the *potential* relationships and transformational routes between different ERP types and different multi-organisational enterprise types could be *initially* uncovered to a certain extent – this explains why they are *pilot*. Also, it should be emphasised that the pilot case study *only* aims at justifying the importance of doing this research and narrowing down the scope (or increasing the focus) for conducting the fieldwork based upon grounded theory-based methodological approach (i.e. intial observations of the cases, data coding and analysis; see Chapters 5 and 6); and cannot be regarded as a part of GTM use – this explains why the two pilot case studies in Chapter 4 comes before Chapters 5 and 6.

Figure 4.1. The Collaborative Enterprise Governance (CEG) concept (Binder and Clegg, 2007)

The CEG concept was applied to two Chinese manufacturing companies – Zoomlion and Lanye – both over a two year period; **these companies were carefully selected as they were known to be innovative and were adopting a strategy to grow quickly through their use of ERP systems and close collaboration with other organisations** (a.k.a. the *enterprisation of operations*). Zoomlion and Lanye interviewees were chosen because they were or had been actively involved in strategic operational and IS changes. The details of two pilot case studies (e.g. (multi-organisational) enterprise matrices, reflection on knowledge, use of the DERG and strategic options) are given in this section which illustrates two possible paths through the DERG in response to specific management decisions made at Zoomlion and Lanye.

CEG stage 1: Mapping pilot cases' enterprise

Longitudinal data were collected from Zoomlion and Lanye employees between 2009-2011 via documentation, observation, and semi-structured interviews as defined in Table 4.1 to explore the key characteristics of ERP (as in Table 2.8) and multi-organisational enterprises (as in Table 2.9). All the data were then summarised and structured into a template as per Template Analysis (King, 2004); CEG refers to these templates as the enterprise matrices. Data were collected over a two-year time period to enable a longitudinal study to be conducted to show the dynamic changes in strategy, structure, and IS.

Table 4.1 Details of interviewees from Zoomlion and Lanye

Pilot cases	Roles of interviewee	Reason for selection – major enterprise management and IS events discussable	No. and average length of interviews	Interview period
Zoomlion	Chief executive officer	Business strategy with IS/IT implementation	3 x 1.5 hrs	2009-2011
	Chief information officer	Information systems infrastructure; ERP project adoption and management	3 x 2 hrs	2009-2011
	IT/IS and ERP project manager	Explore technical and managerial issues related to ERP systems implementation; ERP vendors and IS/IT partners; chronology of ERP systems development	3 x 2 hrs	2009-2011
	IS/IT and ERP project team/department	Explore people issues related to ERP systems implementation	3 x 1.5 hrs	2009
	Production line and supply chain manager	Operational business processes; relationships with suppliers and customers	2 x 1.5 hrs	2009
	Executive manager	Business strategy and development; human resource management	2 x 1.5 hrs	2011
	Logistics manager	Inventory management; upstream control of supply chain; transportation control	2 x 2 hrs	2011
	Marketing and sales manager	Marketing and product development	2 x 1.5 hrs	2011
Lanye	General manager	Strategic inter-firm collaboration strategies	2 x 2 hrs	2009-2011
	Chief information officer	Information systems infrastructure; ERP project adoption and management	2 x 1.5 hrs	2009-2011
	Logistics director	Explore ERP capabilities supporting logistics (e.g. transportation control); cooperation with downstream partners	2 x 1.5 hrs	2011
	Production manager	Manufacturing operations processes; relationships with supply network partners	2 x 1.5 hrs	2009-2011
	Chief executive officer	Business strategy, ERP systems design and management; inter-firm collaboration	2 x 1.5 hrs	2011
	IS/IT and ERP project team/department	Explore technical, managerial, and people issues related to ERP systems adoption	2 x 1.5 hrs	2009-2011
	ERP vendor	ERP systems configuration; business processes reengineering	2 x 1.5 hrs	2011

From Zoomlion's data it was possible to produce two enterprise matrices at different time periods showing different dynamic transitions (see Section 4.2). Similarly, another two enterprise matrices at different time periods showing different dynamic transitions could be produced based on Lanye's data (see Section 4.3).

CEG stage 2: Reflect on knowledge to determine the type of enterprise

Through the process of building and validating four enterprise matrices (each pilot case study produced two) Zoomlion and Lanye's enterprises were analysed, typified against (multi-organisational) enterprise types (defined in Table 2.9) and transitions past, current and planned investigated. Two transitions in Zoomlion became apparent; these were (i) a move from a defunct enterprise into a vertically integrated enterprise, followed by (ii) a move from a vertically integrated enterprise into an extended enterprise. Also, two transitions in Lanye became apparent; there were (i) a move from a defunct enterprise into a vertically integrated enterprise, followed by (ii) a move from a vertically integrated enterprise into a virtual enterprise – as discussed in the pilot case studies.

CEG stage 3: Use the DERG to forecast where the (multi-organisational) enterprise may be heading

Multi-organisational enterprise transitions over time were analysed using multiple matrices in a longitudinal study allowing a plotted. The DERGs of Zoomlion and Lanye are shown later in the pilot case studies; each one shows two past transitions (from Time 1 to Time 2, and from Time 2 to Time 3) and a potential future transition (from Time 3 to Time 4).

CEG stage 4: Assess options and make change

From analyses done in CEG stages 3 and 4 a strategic vision for Zoomlion and Lanye's enterprisation of operations can be seen, as both companies plan to become a sustainable and agile (multi-organisational) enterprises, through more effective interactivity of operations, IS and structural strategic thinking with their suppliers, customers, and third-party trading partners.

4.2 Zoomlion case study using CEG

Zoomlion was founded as the Heavy Industry Science & Technology Development Company Ltd. in 1992. Initially Zoomlion was a hi-tech public company producing cranes and other machines for the manufacturing and construction fields, with nearly 20,000 employees spread across many different separate businesses. At present, Zoomlion's production line serves China and the Western World, and the company has also now become a multi-national manufacturer of consumer products, with a market capitalisation of nearly $1BN USD in 2010. Zoomlion has achieved rapid development by building up a knowledge-based learning enterprise; and producing quality innovative products with enhanced services delivered to end-users. Zoomlion's case is now discussed in detail with respect to Galliers's IS Strategy Formulation Model (given in Figure 2.2) and Binder and Clegg's Collaborative Enterprise Governance (CEG) (given in Figure 2.1). It focuses on the manufacture of cranes.

4.2.1 Shifting from a Defunct Enterprise (T1) into a Vertically Integrated Enterprise (T2)

Zoomlion was founded within a high-tech academic institution and could initially be considered as a 'defunct enterprise' because it was isolated and without any directly profitable activity (at 'Time1' – T1 –

circa 1992). During its transformation from academe into a commercial manufacturing enterprise the management team realised that electronic IS must replace the present inefficient physical data flows used in its processes, which caused delays and added unnecessary cost. Thus, IT applications were adopted gradually but with limited initial impact. In parallel, Zoomlion merged with other peer companies that supplied logistic and ancillary products/services in order to decrease cost of sales and increase product differentiation. This was achieved through vertical integration (VI) with some of its competitors in the same industry creating a larger scope and scale of economy, which in turn decreased competitive rivalry and strengthened Zoomlion's bargaining power with its suppliers and customers.

As per CEG stage 1, an enterprise matrix was used to capture structured data and map Zoomlion's operations and determine its (multi-orgnisational) enterprise structure *circa* 1999 (at T2); this is shown in the Enterprise Matrix in Table 4.2 revealing Zoomlion's value stream (a.k.a. a chain of cross-company value adding activities) for cranes, its (multi-organisational) enterprise members, and what each member does in every stage of the value stream.

Table 4.2 Enterprise Matrix for Zoomlion – transforming from Defunct Enterprise (T1) into VIE (T2)

Collaborative activities: Crane design & deliver T1→T2		**Value stream** **Process start** →			**Process end**
Value Member Classification		Crane design	Crane realization	Crane delivery	In-service
High Involvement ↑	Prime contractor (Zoomlion)	• Invite vendors • Assess the vendors capabilities • Sign the contracts	• Monitor and manage the production line	• Deliver the final products to the clients and consumers	• Customer services management • Offer relevant services after sales
	Operations and Marketing (Acquisitions Powermole, Hunan Machine Tool, CIFA, etc.)	• Deal with customer requests • Forward & backward integration	• Place orders to the suppliers • Sales planning • Inventory management	• Outbound logistics • Customer orders withdraw	
Value members	Design, purchasing, and manufacturing (in-house)	• Concept design • Craft R&D	• Raw materials procurement (plan) • Manufacture the final products		
	Sales and distribution (in-house)		• Materials distribution • Suppler relationship management (upstream)	• Logistics and transportation	
	Financial Control (in-house)			• Payments and invoices • Work with other functional divisions	
↓ **Low involvement**	Business promotion and sales after-service provider (in-house)				• Manage relations with customers • Call center • After-services (feedback, maintain, revisit, etc.)

As shown in Table 4.2 (3rd line down), Zoomlion is a prime contractor (at T2) and was in an influential position by being able to issue primary contracts, control production and influence product development and distribution of the cranes. The operations department worked with merged and acquired firms (e.g. Powermole and CIFA) through backward and forward integration to process customer orders, place orders on suppliers and manage outbound logistics (Table 4.2; 4th line down). New cranes were designed by the R&D division, raw materials were planned to be purchased by the logistics department and delivered to warehousing and manufacturing. The financial department, cooperating with other functional branches focused on payments and invoices of all transactions. Zoomlion also established a 'call centre' for managing customer relationships better (Table 4.2; 5th, 6th, 7th, and 8th lines down).

Zoomlion's rapid change also meant that a number of incumbent information systems had become isolated and outdated. To improve the situation Zoomlion launched a single integrated ERP system to revamp its outdated IS assets and in doing so embrace multi-organisational *enterprise* management concepts more widely. During implementation, the new ERP system enabled Zoomlion to dramatically re-design its business processes focusing on high-value internal departments and greater integrative potential with its external customers and suppliers. Thus by T2, a vertically integrated enterprise (VIE) and management aspirations to become even more enterprise conscious were observed.

4.2.2 Shifting from a Vertically Integrated Enterprise (T2) into an Extended Enterprise (T3)

Despite rapid growth Zoomlion was also experiencing unpredictable market behavior and worked hard to imbibe new IS assets into the enterprise. For its next strategic developments establishing a stronger enterprise-conscious (in the sense of EC's definition) IS strategy was imperative in order to increase multi-organisational communication and efficiency. For this purpose, the management team sourced and allocated new members into their extending (multi-organisational) enterprise structure which further enhanced Zoomlion's revised enterprise-wide vision and mission (see Table 4.3 representing T3, *circa* 2003). The marked change from previous strategy was that the (multi-organisational) enterprise members were considered to be *within* Zoomlion's re-engineered enterprise boundaries and provided *essential* core capabilities connected through *shared* information systems and processes. Now Zoomlion's (multi-organisational) *enterprise* more closely represented an *extended enterprise* rather than a vertically integrated one.

Specifically at T3 (as in Table 4.3) Zoomlion worked with CIFA who offered advanced technologies and skilled knowledgeable people to assist with crane design and logistics in *Western countries* (Table 4.3; 4th line down). Chassis and hydraulic components were also provided by Mercedes Benz, KHI, and Rexroth respectively for crane realisation through medium-long term collaboration (Table 4.3; 5th, 6th, 7th, and 8th lines down). Direct communications between Zoomlion and suppliers (e.g. HNNFE and KHI), vendees (e.g. Lanye), clients and third-parties were achieved via ERP systems offered by SAP (managed by consulting company IBM) along with other core systems (e.g. Product Life Management (PLM) and Manufacturing Execution System (MES) supported by Siemens) (Table 4.3; 9th, 10th, 11th, and 12th lines down). All these activities were core to Zoomlion's operations. The financial division also was now become enterprise-conscious and increasingly concerned with external business links, rather than just focusing on back-office transactions as before (Table 4.3; 13th line down). All of these are characteristics of an EE rather than a VIE which had preceded.

Table 4.3 Enterprise Matrix for Zoomlion – transforming from VIE (T2) into EE (T3)

Collaborative activities: Crane design & deliver T2→T3			**Value stream** **Process start** →			**Process end**
Value Member Classification			Crane design	Crane realization	Crane delivery	In-service
High Involvement	Prime contractor (Zoomlion)		• Invite vendors • Assess the vendors capabilities • Sign the contracts	• Monitor and manage the production line	• Deliver the final products to the clients and consumers	• Customer services management • Offer relevant services after sales
↑	Strategic joint partners	CIFA (internal)	• Provide advanced technologies for designing the crane	• Offer new machines • Offer new skilled and knowledgeable people	• Act as the third-party logistics in Europe	
		Mercedes Benz		• Provide chassis		
		KHI		• Provide hydraulic components		
		Rexroth				
		Electrom-ech		• Make tower crane	• Logistics in India	• Sales and service to the Indian market
	Design-make-deliver (e.g. CIFA, Electromech)		• Concept design • Craft R&D • Design the accessories	• Manufacture crane • Combine the advanced technology and manufacturing expertise	• Deliver components for making the final products • Logistics and transportation	
Value members	Suppliers and vendees (e.g. HNNFE, Mercedes Benz, Rexroth, KHI, Lanye)			• Provide raw materials in real time • Collaborate with Zoomlion via SAP ERP systems	• Ship to end-users • Develop marketing strategies	
	IT/IS partners	IBM		• Consulting company for ERP adoption, application, and management	• Consulting company for ERP adoption, application, and management	
		SAP		• Provide ERP systems	• Provide ERP systems	
		Siemens		• Provide PLM, and MES systems	• Provide PLM, and MES systems	
↓	Financial Control (Zoomlion does for whole value chain)			• Payments and invoices	• Payments and invoices • Work with other functional divisions	
Low involvement	Business promotion and sales after-service provider (Zoomlion does for whole value chain)				• Customer/clients services	• Manage relations with customers • Call center & CRM • After-services (feedback, maintain, revisit, etc.)

4.2.3 Shifting from an Extended Enterprise (T3) towards a Virtual Enterprise (T4)

The asset specificity of Zoomlion's highly integrated ERP system, whilst now enhancing internal process efficiency, was also beginning to hinder its proactivity towards future dramatic changes in the business environment as it was entrenching the *status quo*. Moreover, the company increasingly needed to consider its private sector suppliers and consumers critical to enterprise performance. Hence, at T3, Zoomlion could be now thought of as an *extended enterprise*, with medium degrees of multi-organisational integration, with moderately lean and agile resources (e.g. more efficient process design and stock management policies) and wider embryonic alliances forming with other companies intending to further innovate its products, processes, and people practices.

At this point Zoomlion has constantly maturing SCM and CRM ERP functionalities which are increasingly linked with other organisations' operations; which drives Zoomlion towards a future *virtual enterprise* concept (at T4). Consequently this should enable Zoomlion to more deeply and effectively tap into its wider (multi-organisational) enterprise's resources via increased functional scope and scalability in the key elements relating to ERP systems and collaborative enterprise governance (as defined in Tables 2.8 and 2.9 respectively in Chapter 2). In this scenario, at T4, Zoomlion is approaching the use of ERPIII type information systems and the *virtual enterprise* strategy, operations, and structure.

4.2.4 Summarising Zoomlion's Transitions using the Dynamic Enterprise Reference Grid (DERG)

Figure 4.2 summarises the transformational route experienced by Zoomlion as it shifted from a defunct enterprise (at T1) with limited IT usage, into a vertically integrated enterprise (at T2) using a traditional ERP system. Subsequently, the multi-organisational enterprise operations strategy evolved the VIE (at T2) to an EE (at T3) as the enterprise resource planning system developed from traditional ERP(I) into an ERPII system, which in turn assisted the company to gain more competitive advantage through strategic outsourcing and mutual partnerships. Finally to improve its virtual co-operations and interoperability Zoomlion is currently (*circa* 2011) developing VE concepts to accompany the adoption of future ERPIII type systems (i.e. a move from T3 towards T4) to enhance the *enterprisation* of their operations (with respect to effect enterprise strategy, enterprise structures, and ERP systems use). Specifically, "the number of different types of (multi-organisational) enterprise engagements for any one company is closely aligned with the number and sophistication level of their core competencies" embedded in enterprise matrices, which is known as "engage-ability" (Binder and Clegg, 2007, p. 421), i.e. "the value placed on its enterprise modules by other enterprise members and the capability to deploy them" (Clegg *et al*., 2012, p. 7); the engage-ability can be measured and significantly affected by four competence attricutes (i.e. transferability, attractiveness, maturity, and uniqueness; see Binder and Clegg's (2007) work and Subsection 6.6.1). Additionally, this initially suggests that different types of ERP systems (or functional modules) for any one company participating in the multi-organistaional enterprises is closely aligned with the capabilities supporting the targeted (multi-organisational) enterprise structure and strategy and the feasibility of deploying their functionalities within the collaborative activities of the enterprise (see Table 6.1). This is referred to as “enterprise supporting ERP capability”. Further explanations can be found in Chapters 6 and 7.

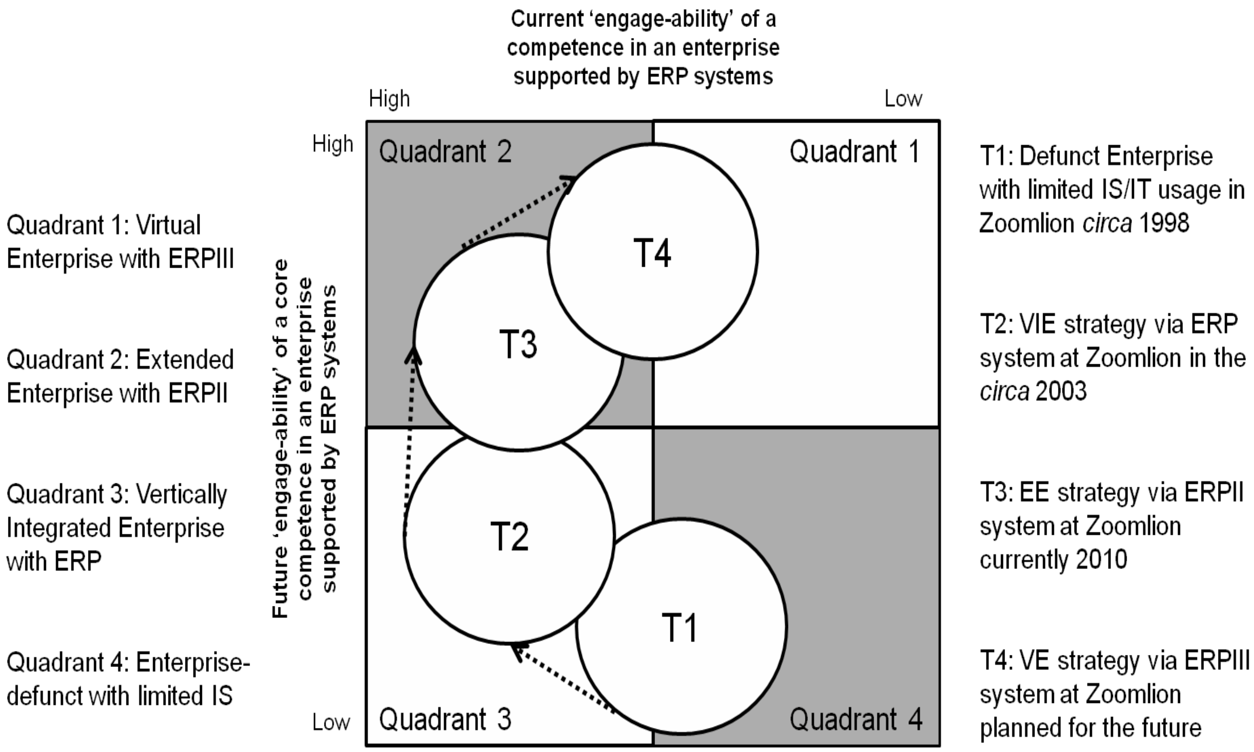


Figure 4.2. The Dynamic Enterprise Reference Grid (DERG) showing the transformational route of Zoomlion (1st pilot case study)

4.3 Lanye case study using CEG

Lanye was founded as the quarrying factory in 1975. Its headquarters is in Nanjing and its main manufacturing plant is located in mainland China. Initially, Lanye was a supplier offering concrete and building materials for the manufacturing and construction fields, with nearly 2,000 employees. Presently, Lanye has become a multinational company with a market capitalisation of $250 MN USD; and it has extended its supply chain activities from intra-company boundary focusing on in-house manufacturing into other valued members while targeting different industrial campaigns along with its ERP information systems development. Lanye’s case is also discussed in detail with respect to Galliers’s IS Strategy Formulation Model and Binder and Clegg’s Collaborative Enterprise Governance. It focuses on the manufacture of concrete and mixer.

4.3.1 Shifting from a Defunct Enterprise (T1) into a Vertically Integrated Enterprise (T2)

The precursor of Lanye was a quarrying factory and concrete manufacturer and could be viewed as a ‘defunct enterprise’ due to its simplex operations with limited amount of commercial active engagement (at

'Time 1' – T1 – *circa* 1975). However, information technologies were initially applied with limited computer efficiency due to Lanye's transaction-specific assets. With the impetus derived from self-development and economic scale growth, the senior management decided to bring in a set of advanced technical information tools such Computer-Aided Design (CAD) and Office Automation (OA) to improve its traditional physical business processes. Meanwhile, Lanye adopted mergers and acquisitions (M&A) strategies for pursuing vertical integration (VI) covering its production, marketing, and logistics, which resulted in added-value creation, external industrial expansion, and increased product portfolios differentiation.

As per CEG stage 1, the Enterprise Matrix was used to capture structured data and map Lanye's operations and determine its (multi-organisational) enterprise structure *circa* 2004 (at T2); this is shown in the Enterprise Matrix in Table 4.4 demonstrating Lanye's value stream (a.k.a. a chain of cross-company value adding activities) for concrete and mixer, its (multi-organisational) enterprise members, and what each member does in every stage of the value stream.

Table 4.4 Enterprise Matrix for Lanye – transforming from Defunct Enterprise (T1) into VIE (T2)

Collaborative activities: Concrete and mixer design & deliver T1→T2		**Process start**	**Value stream** →			**Process end**
Value Member Classification		Concrete and mixer design	Ultra-raw materials supply	Concrete and mixer realization	Concrete and mixer delivery	In-service
High Involvement ↑	Prime contractor (Lanye)	• Invite the vendors • Evaluate the vendors' capabilities • Sign the contracts	• Find suppliers • Assess the quality of raw materials • Sign the contracts	• Manage and control the production line and raw material sources (i.e. supply chain upstream)	• Deliver the final products to the clients and consumers • Schedule and control the transportation	• Customer services management • Offer relevant after-sales services
	Operations and Marketing (Acquisitions Jiuding Mining & Quarry Company, Jinjiang Cement Company, etc.)	• Deal with customer requests • M&As strategy	• Backward integration • Explore new sources	• Place orders to the suppliers • Sales planning • Inventory management	• Inbound and Outbound logistics • Customer orders withdraw	
Value members	Purchasing, design and manufacturing (in-house)	• Concept design • 'Matching Ratio' design • Product R&D	• Purchase ultra-raw materials (e.g. pebble, yellow sand, etc.)	• Raw materials procurement (plan) • Manufacture the final products		
	Sales and distribution (in-house)			• Materials distribution • Suppler relationship management (particularly for the upstream)	• Logistics and transportation	
	Financial Control (in-house)				• Payments and invoices • Work with other functional divisions	
↓ **Low involvement**	Business promotion and sales after-service provider (in-house)					• Manage relations with customers • Call center • After-services (feedback, revisit, etc.)

As shown in Table 4.4 (3rd line down), being a prime contractor placed Lanye in an influential position that is able to issue primary contracts, monitor the ultra-raw materials, control production and supply chain upstream activities, and manage product distribution of the concrete and mixer. The operations and marketing departments worked with merged and acquired firms (e.g. Jiuding Mining & Quarry Company and Jinjiang Cement Company) through backward and forward integration to process customer orders, place orders on suppliers, and manage the inventory and inbound & outbound logistics (Table 4.4; 4th line down). New concrete and mixer with a set of certain 'matching ratio' were designed by the R&D division. Ultra-raw materials were planned to be purchased by the sales and distribution departments, which would then be delivered to warehousing and manufacturing according to the transportation scheduling (Table 4.4; 5th and 6th lines down). The financial department, cooperating with other functional branches focused on payments and invoices of all transactions. Lanye also manage customer relationships via a 'call centre' and other after-sale services (Table 4.4; 7th and 8th lines down).

After merged some competitors operating in the same industry through the 'stock acquisitions strategy', Lanye's organisational structure shifted into a larger-sized manufacturing firm; which triggered increased business growth with more complexity. This rapid change combined with incumbent isolated systems and culture differentiation stemming from the M&A strategy and processes required Lanye to start-up its ERP project to facilitate the real integration of internal operational processes while embracing the enterprise concept (in the sense of EC's definition). During implementation, the new ERP system enabled Lanye to achieve the high degree of intra-integration across different functional units and promote the organisational structure re-engineering, and have the potential to collaborate better with the external partners. Therefore a vertically integrated enterprise (VIE) is depicted by T2 with management aspirations to become a more virtual one.

4.3.2 Shifting from a Vertically Integrated Enterprise (T2) into a Virtual Enterprise (T3)

During the post-vertical integrated enterprise operations, the top managers could not clearly determine the responsibilities of all value members involved in the VIEs; and suitable and effective collaborative relationship structures were not fully established to integrate dispersed legal entities. As a result, the communication between employees, suppliers, customers, and other stakeholders were not adequate. These endogenous factors forced Lanye to re-conform and streamline its business processes and IS assets. Simultaneously, exogenous factors such as the obsolescence of ERP through rapid changes in technology, supply network integration challenges, and transporting costs jack-up occurred unexpectedly; which demanded the next strategic developments by establishing new (multi-organisational) enterprise-level IS strategy in order to increase the efficiency of inter-operability. For this purpose, the management team sourced and allocated new members into their new virtual network-enabled enterprise which further enhanced Lanye's revised multi-organisational enterprise-wide vision and mission (e.g. achieving the agile manufacturing with quick responses to the dynamic marketing demands) (see Table 4.5 representing T3, *circa* 2008). The marked change from previous strategy was that the enterprise members were considered to be *within* Lanye's re-engineered (multi-organisational) enterprise boundaries and provided *essential* core capabilities connected through *virtual and flexible* IT networked infrastructure and processes. Now Lanye's *enterprise* more closely represented a *virtual enterprise* rather than a vertically integrated one.

Specifically at T3 (as in Table 4.5) Lanye worked with Jinjiang and Zhuo Qi who offered ultra-raw materials and facilities for manufacturing the concrete and mixer (Table 4.5; 4th line down). Fine ore, coal ash and other ancillary agentia were offered by Mei Bao, Su Yan Electric Power Station, Construction and Science Institution, and JNXYT Ltd. for the concrete and mixer realisation through medium-short term collaboration (Table 4.5; 5th, 6th, 7th, and 8th lines down). Cooperative tasks (e.g. technology R&D) in short-term projects were fulfilled by Lanye and strategic partners (e.g. Chinese Construction Ltd.) within a virtual network (Table 4.5; 9th and 10th lines down). Direct communications between Lanye and suppliers (e.g. Zoomlion and Jinjiang), vendees, and third-parties (e.g. Southeast University) were achieved via ERP systems provided by Alutex (also the consulting company) along with GPS systems and Virtual Private Network (VPN) supported by Lanye's own IT department (Table 4.5; 11th, 12th, 13th, and 14th lines down). All these activities were core to Lanye's operations. The financial division also was now become enterprise-conscious (in the sense of EC's definition) and increasingly concerned with external business links, rather than just focusing on back-office transactions as before (Table 4.5; 15th line down). All of these are characteristics of a VE rather than a VIE which had preceded.

Table 4.5 Enterprise Matrix for Lanye -transforming from VIE (T2) into VE (T3)

Collaborative activities: Concrete and mixer design & deliver T2->T3			Value stream Process start					Process end
Value Member Classification			Concrete and n1L"\er design	Ultra-raw materials supply	Concrete and mixer realization	Concrete and mL'I:er deliYery	In-senice	Collaborati,-e project (where product/sen·ice to be used)
High InYolvement	Ptime contractor (Lanye)		• Invite the vendors • Evaluate the vendors' capabilities - Sign tl1e contracts	• Find suppliers - Assess the quality of raw materials • Sign tl1e contracts	• Manage and control tl1e productionline and raw matedal somces (i.e. supply chain upstream)	• Deliver tl1e final products to tl1e clients and consumers • Schedule and control tl1e transpotl ation	- Customer services management • Offer reJe,·ant after-sales services	• OIIer finished concrete • Teclmology supervision
	Strategic collaborative Partners (medimn-shotitenu collaboration)	Jinjiang and ZhuoQi (intemal)		• Providestive and 42.-• concrete • Offer new pattenJS of building materials	• Provide raw materials • Provide major equipments and facilities			
		Mei Baa		• Supply ultra-materials	• Provide fine ore	• Deliver for warehousing and manufactming		
		Constmction and Science ltJStitution		• Supply ultra-raw matetials	• Provide ancillary agentia	• Delivered by the 3rd party trading prutners		
		Su Yan Elect.lic Power Station		• Supply ultra-raw materials	• Provide coal ash	• Deliver tor warehousing and manufacturing		
		JNXYTLtd.			• Provide advanced 52 5* concrete • Provide building stones			
Value members	Strategic project partners (short-teml collaboration)	Chinese C011SU1!C-tionLtd.	• Teclmology research and development		• Product quality management • Production control • Hmnan resource mgt.			• Bid the project • Project execution • Materials testing - Sign the contracts
		Nanjing Govenunent			• OperatiotJS control			• Issue and scheme tl1e project
	Design-make-deliver (e.g. Southeast University. Lanye's 0\\11traJJSpottation)		• Concept design • Craft R&D • R&D centre		• Manufactme concrete and mixer • Combine the advanced teclmology a11d manufacturing expertise	• Deliver components for making the final products • Logistics and traJJSpottation		• Empilical research • Green teclmology aJld manufacturing
	Suppliers and vendees (e.g. JilJjiaJJg, Zhuo Qi, Zoomlion)			• Explore a11d yield ulb-a-raw materials • Supply chain upstream	• Provide raw materials in real time • Provide crane • Collaborate with Lanye via ERP & GPS systems	• Ship to the manufactming plaJJts • Develop marketing strategies • Provide crane		
	IT/IS partners	Alntex			• Consulting company for ERP adoptiotL application, and management • IS mgt. (e.g. inventmy and materials mgt.)	• Consulting company for ERP adoption. application,a11d management • IS mgt. in logistics a11d transpottation	• Payhents and invoices	
		LaJJye IT deparbnent		• ERP&GPS c01mection \\itllin tl1e Yirtnal context	• Provide GPS systenJS • Provide Viltual Private Network (VPN)	• Provide GPS systenJS • Control tl1e logistics	• ProvideGPS systems	
	FillaJJcial Control (Mostly Lanye does for whole value chain)			• Payments and invoices	• Payments and invoices	• Payl nents a1ld invoices • \Vork with other legal entities		
Low involvement	Business promotion and sales after-service provider (Mostly Lanye does for whole value chain)					• Customer clients services	• Manage relations "ith customers • Call center • After-services (feedback, revisit etc)	• After-sales services • Post-implementation audit

4.3.3 Shifting from a Virtual Enterprise (T3) towards an Extended Enterprise (T4)

The new integrated ERP systems incorporated with GPS and VPN applications had increased the efficiency, flexibility, and agility of Lanye's production, logistics, sales, and dispatch monitoring at lower cost; and improved the business performance across the new enterprise boundaries. Hence, at T3, Lanye could now be thought of as a *virtual enterprise*, with high degrees of inter-firm integration and agile resources (e.g. continuously monitor market demand and quickly modify business models). However, the company increasingly needed to consider a more stable multi-organisational structure and long-term relationship with industrial collaborators, in order to reduce the risks emerging from dynamic operating and unpredictable business environment. At this point, Lanye intends to use the componentised ERP systems instead of web-based technologies for joint venture partnerships; which drives Lanye towards a future *extended enterprise* concept (at T4). Consequently this should enable Lanye to achieve a more stable multi-organisational enterprise structure and medium-long term collaboration on variety of projects and collaborative products via increased functional scope and scalability in the key elements relating to ERP systems and collaborative enterprise governance (as defined in Tables 2.8 and 2.9 respectively in Chapter 2). In this scenario, at T4, Lanye would be advised to use ERPII type information systems and the *extended enterprise* strategy, operations, and structure.

4.3.4 Summarising Lanye's Transitions using the Dynamic Enterprise Reference Grid (DERG)

Figure 4.3 summarises the transformational route experienced by Lanye as it shifted from a defunct enterprise (at T1) with limited IT usage, into a vertically integrated enterprise (at T2) using a traditional ERP system. Subsequently, the multi-organisational enterprise operations strategy evolved the VIE (at T2) to a VE (at T3) as the enterprise resource planning system developed from traditional ERP(I) into an ERPIII system, which in turn assisted the company to gain more competitive advantage through agile manufacturing and dynamic partnerships. Finally to achieve a more stable and medium-long term co-operations and interoperability Lanye is currently (*circa* 2011) developing EE concepts to accompany the adoption of future ERPII type systems (i.e. a move from T3 towards T4) to enhance the *enterprisation* of their operations.

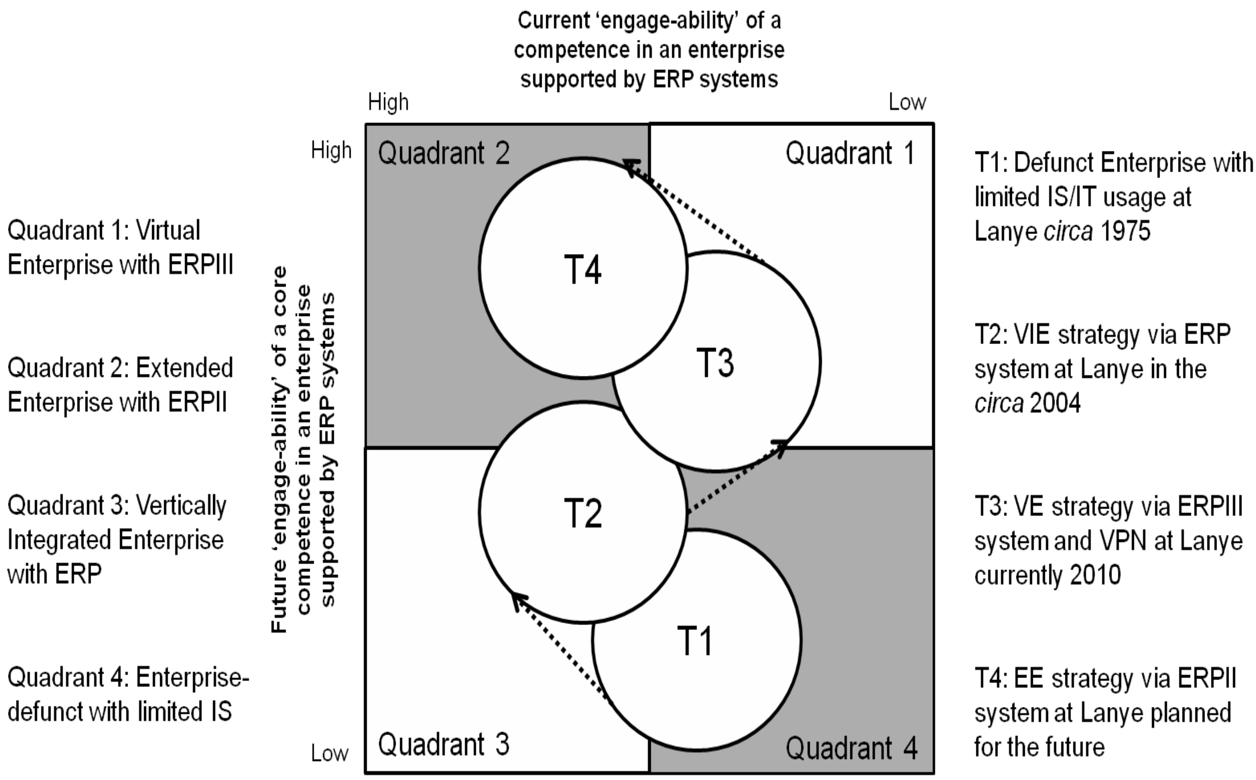


Figure 4.3. The Dynamic Enterprise Reference Grid (DERG) showing the transformational route of Lanye (2nd pilot case study)

4.4 The tentative contingency framework illustrations

The two pilot case studies using the CEG concept (along with IS Strategy Formulation Model) have demonstrated how companies design, manage, and develop different ERP information systems to support the corresponding (multi-organisational) *enterprise* structures and strategy. A new tentative contingency framework (as shown by Figure 4.4) in this chapter is a proposed '**straw man**' conceptual model which *only* reveals (i) the *potential* relationships (and transformational routes) between different ERP types and different multi-organisational enterprise types (to further identify the areas under investigation and narrow down the scope for doing the fieldwork based upon GTM) and (ii) the fact that different *enterprise* (in the sense of EC's definition) types *do not* result from different strategies, but are actually part of the same overall business objective focused on multi-organisational cooperation (delivering complex products and services). However, at different times and circumstances in its lifecycle the firms may require preferable (multi-organisational) *enterprise* forms with corresponding ERP information systems to satisfy their operational requirements. Further details about this novel concept testing and development, e.g. associated contingency factors, a cyclical transformation amongst one another (i.e. how ERP system types change between quadrants in adaption to changes of multi-organisational *enterprise* structures and strategy), and the final version of the contingency framework will be provided and illustrated in Chapters 5, 6 and 7.

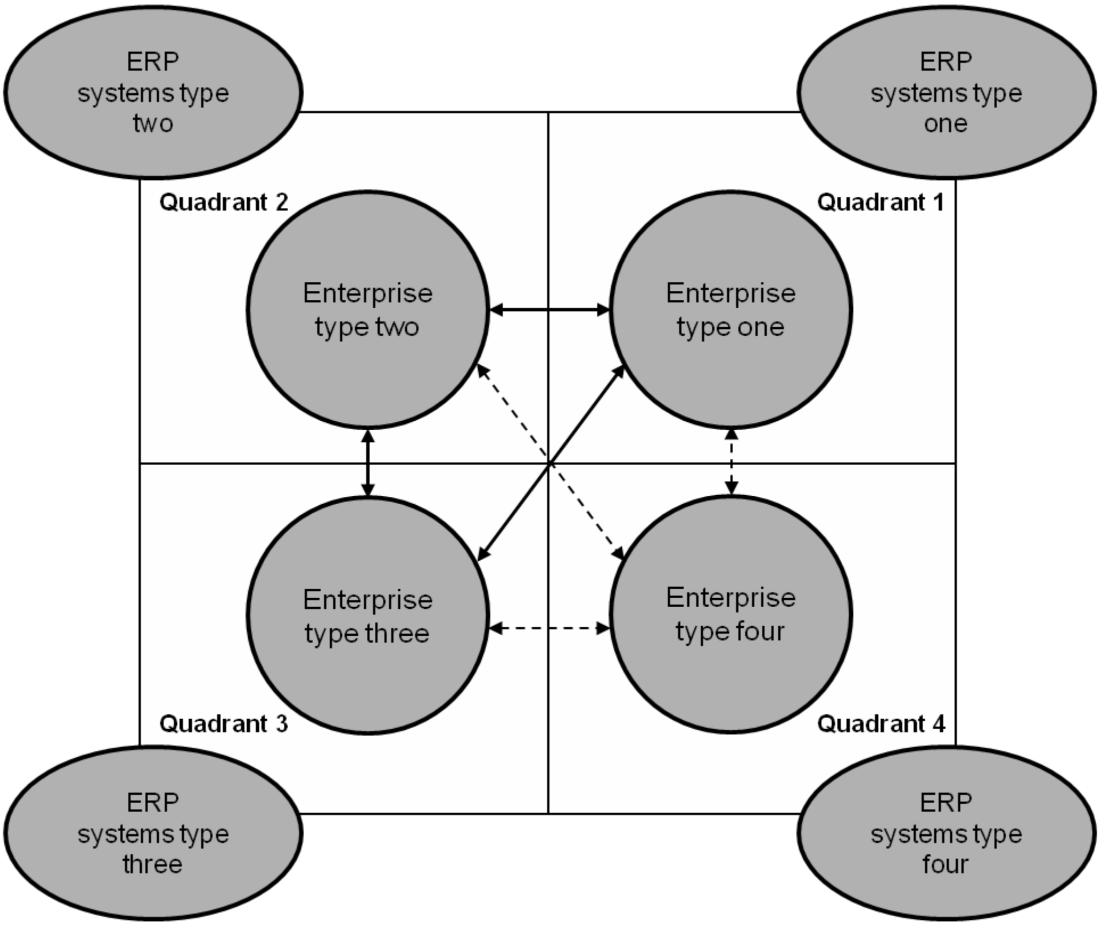


Figure 4.4. The new tentative contingency framework

4.5 Chapter summary

This chapter *initially* discusses and explains the correlations between different ERP system types and different multi-organisational *enterprise* structures and strategy, as well as their dynamic transformation; which proposes a tentative conceptual model that can *partially* fill in the gap in current literature between ERP information systems and the management of multi-organisational enterprises as it has potential to provide a practical contingency framework for IS and (multi-organisational) *enterprise* managers striving towards sustainable competitive advantage through what the author coins in this thesis as the "enterprisation of operations". However, the findings at this stage *only* demonstrate a set of postulates based upon two pilot case studies by using the CEG concept; rather than new theories (or theoretical model) generations supported by massive empirical data. Accordingly, Chapters 5, 6 and 7 will substantiate that these pairings (e.g. enterprise type two-ERP systems type two) can be correlated theoretically and empirically, and that the final version of this new contingency framework can be a useful strategic tool for operations and information systems strategists.

Chapter 5 – Initial Observations in Empirical Cases

Pilot narrative case studies presented in Chapter 4 explored the potential relationships between ERP systems and multi-organisational enterprise strategy; which justifies the importance of undertaking this research topic as well as an increasing focus for doing the fieldwork based upon GTM (see Figure 4.4 the tentative framework). In turn, this chapter presents initial observations from 6 further cases (along with 2 pilot cases) based on empirical data; newly collected data which differs from that used in the two pliot cases in Chapter 4. Thus turning a previously narrative case studies into a grounded theory based methodology using data coding (see Chapter 6). Spcifically, the intial observations in 8 empirical cases are presented in terms of case background, the nature of the complex product-service systems, multi-organisational collaboration, ERP systems functionalities. In Section 5.2 the main aspects are summarised.

5.1 Initial observations in 8 cases

As put forth by Glaser and Strauss (1967), grounded theory development should start with observation, and the theory can be built *only* after initial observations. This has been echoed by researchers (Halaweh, 2012; Laws and McLeod, 2004; Palaniswamy and Frank, 2000) who claim that the combined "case study/grounded theory (based methodological)" approach allows flexibility within the research site, and produces a rich harvest of fine grained research data that illuminates the research topic. Thus instead of coding and analysing data straightway, the initial observations in 8 cases are described at first; which can also facilitate the data coding within each case, and further theoretical and practical discussion (given in Chapters 6 and 7).

To explore potential correlations between ERP systems and multi-organisational management, this study used 8 cases (2 in the pilot study and 6 more in the futher grounded theory based study) which were multi-national manufacturers and service companies. These were chosen as they were known to be innovative companies with strategies to grow quickly through their use of ERP systems and close collaboration with other companies (to deliver complex products and services). Specifically, the early observations will cover five main aspects which are (i) case background, (ii) the nature of the complex product-service systems, (iii) multi-organisational collaboration strategies and strategic repositioning, (iv) collaborators, (v) ERP systems capabilities, and (vi) the effects on business performance.

5.1.1 Lightning Source: Print-on-demand book printer

Lightning Source (LS) was established in 1997 and has become a leading company in providing a comprehensive suite of print-on-demand (POD) and distribution services to the book publishing industry. LS offer a book printing service that can be from batch sizes of one upwards to 1000's. It is a print-on-demand service with advanced technologies enabling highly customised products and services that can be delivered profitably.

LS can be viewed as a servitised manufacturing company in printing industry characterised by increasingly 'demand-driven' e-marketplace; where establishing multi-organisational relationships is crucial to increase the company's flexibility and agility while shortening lead times. Therefore, LS decided to concentrate on its core competencies (e.g. high-quality services, speed, and lean manufacturing) and extended its activities into other value members (e.g. publisher and channel distributors) in its global supply chain through an extended multi-organisational integration strategy to cope with industrial changes and create new meta-competitive advantages.

Oracle Content Management Systems (CMS) were initially installed as the main ERP platforms to support rapid data exchange and knowledge sharing, as well as stretching the information management capability. Ancillary systems such as PeopleSoft (actually part of the Oracle portfolio) and Pollux were also used for human resource (HR) management and electronic book storage, which allowed interruption and human error in the data flow between systems. LS realised that incumbent ERP systems were only interfaced rather than properly integrated, which was not suited to its extended multi-organisational collaboration strategy. Thus the company improved the traditional ERP type systems towards an ERPII system by rolling out e-commerce portals that could facilitate a fully integrated system-to-system linkage between LS and its collaborators which was conceived to be a fully integrated 'order and request system'. This information system architecture was based the Oracle 'Online Store' Internet applications and further integrated with an e-procurement system.

To further this development more the senior management team decided to extend the capabilities of their ERP systems by holding book titles in its digital library with e-backup and providing an e-reader interface; thus enhanced LS's core competencies to include a virtual book warehouse. Also, the POD strategy enabled LS to establish more temporary and in-depth relationships with many publishers, authors, raw materials, machinery suppliers, and channel distributors. Thus the LS collaborative operations are tending towards a virtual multi-organisational integration concept as co-dependent value members of an *enterprise* implement the same business strategy with clearly defined responsibilities which make contributions to the overall product-service being delivered to the book buyers. Supporting we-based ERP systems are regarded as flexible and relatively low cost systems which can support timely communication, increased transparency, and cross-company decision-making which is akin to the ERPIII type system.

As seen from above, Lightning Source is considered as a cross-sectional case that can best reflect the ERPII/ERPIII systems design and management, and the extended/virtual enterprise strategies design and management. Table 5.1 summarises the initial observations at Lightning Source.

Table 5.1 Initial observation at Lightning Source

Case Background	Lightning Source was established in 1997
The Nature of the Complex Product Service Systems	Supplying print-on-demand (POD) services for the printing industry
Multi-Organisational Collaboration Strategies	Strategic alliances
	Repositioning from the extended enterprise strategy to the virtual enterprise strategy
Collaborators	Authors and publishers (e.g. Oxford University Press)
	Raw materials suppliers (e.g. Juson)
	Machinery and information systems suppliers (e.g. Oracle)
	Channel distributors and retailers (e.g. Amazon)
	University (e.g. Cranfield)
ERP Systems Capabilities	Oracle CMS supported data exchange and content management
	PeopleSoft and Pollux supported HR and electronic book storage
	ERPII enabled a fully integrated 'order and request system'
	ERPII supported client services and customer interface management
	ERPII was based on the Oracle 'online store' Internet applications
	Web-based ERPIII realized the competence of 'virtual book warehouse'
Effects on Business Performance	Using the extended enterprise strategy to cope with industrial changes, increase flexibility and agility, and create new competitive advantages
	Oracle ERPI supported knowledge sharing with strategic partners
	ERPII facilitated a fully integrated system-to-system linkage between Lightning Source and its collaborative partners
	Enhance Lightning Source's core competences (e.g. holding e-book titles)
	POD enabled LS to establish more temporary and in-depth relationships with other coalition members and thus move towards the virtual enterprise strategy
	Web-based ERP supported timely communication, increases transparency, and cross-company decision-making

5.1.2 Pinstripe: End-to-end print solution provider

Pinstripe was founded in 1998 and has become a leading UK midlands-based printing company with around 27 employees. As a sophisticated end-to-end print solution provider, Pinstripe offers a complete range of in-house creative, production and print services to deal with any complex print management or print related problem.

Pinstripe is viewed as a traditional small and medium-sized manufacturing company in litho and digital printing industry characterised by huge pressure on price and 'cost-effective'. Initially Pinstripe did not realize the importance of evolving virtual business models through tight coupling with suppliers and customers; therefore had to cut down in size for cost saving and consequently become less dominated in its industry. To combat this Pinstripe set about working on a variety of legal "framework agreements" with different collaborators (e.g. universities, city council, and local firms) and sitting on the British Printing Industries Federation (BPIF). These inter-organisational relationships and collaboration not only assisted

Pinstripe's operations in some particular processes such as sales and marketing but also guided the way that Pinstripe has moved into the virtually integrated business.

Small and medium-sized businesses by their very nature lack resources, which effectively raises a barrier to ERP information systems adoption. Thus Pinstripe originally implemented a Management Information System (MIS) which was in the form for print-pack rather than a full package of big ERP systems. Data processing was heavily relying on the excel-based spreadsheets and emails, which was very cumbersome. In order to offer a complete service and differentiate itself from peers in a more value-oriented way, as well as better focusing on multi-organisational alliances (e.g. artwork design), Pinstripe upgraded the MIS to ERPII systems through two steps. Firstly, a production-based project information system called "Flammation" was adopted for online ordering, tracking jobs and storing customer files; which allowed Pinstripe to capture order data that were connected into its internal ERP systems, and enabled an effective inventory management. Secondly, electronic data interchange (EDI) was applied where Pinstripe could exchange electronic information with its trusted partners, in order to form more stable, medium-to-long term multi-organisational relationships and collaboration (i.e. the extended enterprise paradigm).

As seen from above, Pinstripe is considered as a cross-sectional case that can best reflect the ERPII systems design and management, and the extended enterprise strategies design and management; whilst has potential to describe the ERPIII-VE profile. Table 5.2 summarises the initial observations at Pinstripe.

Table 5.2 Initial observation at Pinstripe

Case Background	Pinstripe was established in 1998; small and medium-sized enterprise
The Nature of the Complex Product Service Systems	Litho and digital printing industries; supplying end-to-end printing solution
Multi-Organisational Collaboration Strategies	Strategic alliances (e.g. framework agreements and BPIF); outsourcing
	Repositioning from the virtual enterprise strategy to the extended enterprise strategy
Collaborators	Local business (e.g. Bare Restaurants, Lloyds TSB and Centro)
	Raw materials suppliers (e.g. artwork designer)
	Government (e.g. city council)
	Logistics (e.g. outsourcing carriers)
	Information systems suppliers (e.g. Print-Pack)
	University (e.g. Aston University and Birmingham University)
ERP Systems Capabilities	Management Information System (MIS) supported print and pack operations
	Excel-based spreadsheets were used for data processing
	ERPII enabled an e-commerce strategy
	Production-based Flammation systems facilitated the online ordering, jobs tracking and customer information management
	Electronic data interchange supported electronic information exchange with partners
Effects on Business Performance	"Framework agreements" and BPIF assisted Pinstripe's operations in sales and marketing; and guided the way of moving towards the virtual enterprise
	MIS reasonably improved the daily operational efficiency
	ERPII (Flammation) systems enabled an effective inventory management and customer relationship management
	EDI facilitated real time information exchange between Pinstripe and its partners
	EDI consolidated the extended enterprise paradigm that could differentiated Pinstripe from its peers in a more value-oriented way

5.1.3 Intel: Semi-conductor manufacturer

Intel was formed in 1968 as a global semiconductor chip manufacturer headquartered in the US with around 100, 000 employees across the world. It is a household name and its semiconductor processors go inside many different industrial and consumer devices.

Because of the large-scales of economy associated with semi-conductor production the initial structure of Intel was a vertically integrated enterprise supported by a traditional 'Star' ERP systems. In 1996 the Star ERP systems were upgraded to SAP R/3 ERP systems which however, did not have all the necessary capabilities required to meet Intel's business and so Intel tried to fit their business processes around the technology rather than change the technology to fit the business processes. Simultaneously, their industrial products changed very rapidly and there was more uncertainty around customer demand than ever before; this compelled Intel to work with other companies more closely – involving their suppliers, original equipment manufacturers (OEMs), original design manufacturers (ODMs), and even former competitors to achieve a more agile extended multi-organisational relationships and collaboration. For this purpose, business-to-business connections were established with customers and other cooperators to make strategic market forecasts and manage and control suppliers better. This e-integration was developed on RosettaNet electronic data interchange (EDI) connections, which was then subsequently replaced by current SAP i6 ERPII systems covering a wider set of functionalities (e.g. SCM, CRM, EDW and DSS) whilst their structure and strategy tended towards an extended enterprise. In doing so, Intel could offer customers surety of supply to customers, more flexibility and responsiveness.

As Intel's multi-organisational relationships became more complex all companies in their virtual value chain needed to focus on developing the very best business core competencies, processes and products, and sell products and services through electronic markets. Thus the virtual enterprise concept was adopted as a strategic repositioning to give flexibility and dynamism for customers and *enterprise* members. Information systems can achieve this via true ERP-to-ERP communication and integration between Intel and its customers, suppliers, and third-parties. Alternatively, the newly emerging cloud-based ERPIII type systems had been taken on board by B2B technologist and senior management in the future.

As seen from above, Intel is considered as a cross-sectional case that can best reflect three types of ERP systems design and management, and three types of (multi-organisational) enterprise strategies design and management. Table 5.3 summarises the initial observations at Intel.

Table 5.3 Initial observation at Intel

Case Background	Intel was established in 1968
The Nature of the Complex Product Service Systems	Global semiconductor chip manufacturer
Multi-Organisational Collaboration Strategies	Outsourcing; business-to-business connections
	Repositioning from the vertically integrated enterprise strategy to the extended enterprise strategy and on towards the virtual enterprise strategy
Collaborators	Upstream suppliers (e.g. McAfee, raw silicon and wafers providers)
	OEM and ODM (e.g. Mytech and Foxconn)
	Former competitors (e.g. TIA, AMD and ARM)
	Customers (e.g. HP, Dell and Acer)
	Information systems suppliers (e.g. SAP)
	Third-parties (e.g. DHL)
ERP Systems Capabilities	Star ERP and SAP R/3 systems supported vertically integrated operational structure
	RosettaNet EDI enabled the B2B connections
	SAP i6 ERPII systems realized a fully integrated extended inter-organisational collaboration by offering SCM, CRM, EDW and DSS functional modules
	Cloud-based ERPIII systems would be used for achieving the virtual enterprise concept
Effects on Business Performance	Using the extended enterprise strategy to cope with industrial changes and more uncertainty around customer demand
	RosettaNet EDI assisted B2B integration to make strategic market forecasts and manage and control suppliers better
	By using the SAP i6 systems Intel could offer customers surety of supply and more responsiveness through an extended enterprise strategy
	ERPII enabled true ERP-to-ERP communication and integration to give flexibility and dynamism for Intel’s customers and value members
	Cloud-based ERPIII systems could be used to achieve the virtual enterprise concept

5.1.4 TNT Post: Global parcel distributor

TNT Post was established in the UK in early 2003 and has become the UK’s second largest postal provider handling business post logistics for UK and international postage. TNT Post is part of PostNL, which has its headquarters in the Netherlands and aim to be the industry leader in developing innovative and customer-oriented services.

TNT Post is viewed as a purely service-oriented company challenged by industrial competition and market share in providing high level of the services and quality and balancing them with cost. Complex logistics network consisted of various prime streams running heavy mail volumes also required TNT Post to set up a whole virtual value chain to reconcile its regional and national business, integrate data flow, and offer a complete solution to the customers. Therefore TNT Post started to collaborate with its supply chain partners more closely and flexibly through a virtual enterprise concept. In respect to the upstream supply chain integration, TNT Post worked with a number of different mailing houses who produced the mails for the clients; and put some kits (e.g. sortation machines) in the mailing house site to integrate the "production-collection" information flow, which in turn achieved higher operational efficiency and cost-effectiveness. In the downstream sector, each assigned TNT Post depot would truck the mails (or parcels) to Royal Mail "Inward Mailing Center" (IMC) across a transportation network before the final mail delivery. Outsourcing logistics strategy was occasionally used for the purpose of obtaining the vehicle optimisation routine or enhancing the transportation capacity.

Initially a lot of TNT Post operational data run on excel spreadsheets which were limited in volume of information and were not always practical. Thus the senior management team decided to launch a set of 'best of breed' ERP modules to support various functional units. For example, Sage ERP was used as a regional finance system. Northgate was applied as a fully integrated payroll HR system. TruckStops was adopted as a transport planning system. However, these disparate systems could not allow TNT Post to sweep up all the information automatically, centrally and accurately in order to produce standard reports and make better strategic decisions. As a result, SAP system was implemented as the dominated ERP platform to integrate and streamline the information flow between different small systems. The SAP ERP was further developed by adding CRM and EDI modules and web portals to handle more dynamic information across the virtual enterprise collaboration, which can also be regarded as a development from traditional ERP to ERPII and onwards ERPIII type systems.

As seen from above, TNT Post is considered as a cross-sectional case that can best reflect three types of ERP systems design and management, and the extended/virtual enterprise strategies design and management. Table 5.4 summarises the initial observations at TNT Post.

Table 5.4 Initial observation at TNT Post

Case Background	TNT Post was established in the UK in early 2003; the UK's second largest postal provider
The Nature of the Complex Product Service Systems	Business post logistics for UK and international postage
Multi-Organisational Collaboration Strategies	Applying the extended and virtual enterprise strategies
	Outsourcing logistics strategy was used occasionally
Collaborators	Mailing houses (e.g. Aral Donnelly and Communisis)
	Customers (e.g. BT, Santander and Centric)
	Downstream supply chain partners (e.g. Royal Mail)
	Customers (e.g. HP, Dell and Acer)
	Information systems suppliers (e.g. Sage and SAP)
	Third-parties (e.g. MapMechanics)
ERP Systems Capabilities	Excel spreadsheets was initially used
	Sage ERP system was used as a regional finance system
	Diver system was applied for all of the national invoicing
	Northgate was applied as a fully integrated payroll HR system
	TruckStops was adopted as a transport planning system
	EMD was used as an "expense on-demand" system
	SAP ERP systems supported internal resource integration and optimization, and proactive decision-making
	SAP ERPII (ERPIII) systems realized a fully integrated virtual inter-organisational collaboration by offering CRM and EDI functional modules combined with web portals
Effects on Business Performance	Using the virtual enterprise strategy to reconcile regional and national business, integrate data flow, and offer a complete solution to the customers
	Higher operational efficiency and cost-effectiveness had been achieved
	A set of 'best of breed' ERP modules supported various functional units
	By using the SAP ERP systems TNT Post could sweep up all the information automatically, centrally and accurately to produce standard reports
	Dynamic information across the virtual enterprise collaboration could be handled by adopting ERPII (ERPIII) systems

5.1.5 Zoomlion: A multinational crane manufacturer

Zoomlion was founded as the Heavy Industry Science & Technology Development Company Ltd. producing cranes and other machines for the manufacturing and construction fields in 1992. Its headquarters are in Changsha and its main manufacturing plant is located in mainland China. Zoomlion has its own international sales network, management systems for technical development, manufacturing processes and logistics.

Initially Zoomlion was a high-tech academic institution without any directly profitable activity. During its transformation from academe into a commercial manufacturing company Zoomlion merged with other peer companies that supplied logistic and ancillary products/services in order to decrease cost and increase product differentiation. Meanwhile, Kingdee ERP system was initially launched for financial management; which was subsequently replaced by a single integrated SAP ERP system that unified disparate functional systems and in doing so Zoomlion embraced *enterprise* management concepts (in the sense of EC's definition) more widely. The new SAP ERP systems also enabled Zoomlion to dramatically redesign its business processes to focus on greater integrative potential with its external partners, in order to increase multi-organisational communication and efficiency. Such collaborative paradigm could be thought of as an extended enterprise, with medium degrees of multi-organisational integration, with moderately lean and agile resources and new embryonic alliances forming with other companies intending to develop similarly.

Zoomlion had constantly maturing Business Intelligence (BI), SCM and CRM ERP functionalities (a.k.a. ERPII) which made them increasingly linked with other organisations' operations and drove them towards a virtual enterprise concept. Such future developments should enable Zoomlion to tap more deeply into its wider (multi-organisational) enterprise resources more effectively and enable the company to maximise its collaborative dynamic responsiveness through increased functional scope and scalability in the key elements relating to ERP systems and collaborative enterprise concepts. In this scenario, Zoomlion could approach the use of ERPIII type information systems and the virtual enterprise paradigm.

As seen from above, Zoomlion is considered as a cross-sectional case that can best reflect three types of ERP systems design and management, and three types of (multi-organisational) enterprise strategies design and management. Table 5.5 summarises the initial observations at Zoomlion.

Table 5.5 Initial observation at Zoomlion

Case Background	Zoomlion was established in 1992
The Nature of the Complex Product Service Systems	Cranes and other machines for the manufacturing and construction fields
Multi-Organisational Collaboration Strategies	Mergers and Acquisitions (M&As) strategies
	Joint venture
	Repositioning from the vertically integrated enterprise strategy to the extended enterprise strategy and on towards the virtual enterprise strategy
Collaborators	Strategic joint partners (e.g. KHI and Rexroth)
	Research and Design (R&D) partners (e.g. CIFA)
	Logistics partners (e.g. Electromech)
	Raw materials suppliers (e.g. Mercedes Benz and Hnnfe)
	Information systems suppliers (e.g. SAP and Siemens)
	Vendees (e.g. Lanye)
	Third-parties (e.g. IBM)
ERP Systems Capabilities	Kingdee ERP system was initially launched for financial management
	SAP ERP system unified disparate functional systems and enabled Zoomlion to focus on greater integrative potential with its external partners
	Product life cycle (PLC) system was used for managing product (e.g. craft) R&D
	Manufacturing execution system (MES) was committed to organise, control and examine the production processes
	ERPII systems realized a fully integrated extended inter-organisational collaboration by offering BI, SCM and CRM functional modules
	CRM systems was particularly applied to look after the customer interface
Effects on Business Performance	M&A strategy decreased operational cost and increased product differentiation
	SAP ERP systems along with the VIE strategy triggered dramatic business process reengineering in order to increase inter-organisational communication and efficiency
	PLM and MES systems improved the operational performance and streamlined the information flow
	ERPII (ERPIII) systems and EE strategy enabled Zoomlion to maximize its collaborative dynamic responsiveness through increased functional scope and scalability
	Virtual inter-organisational collaboration can be approached by using ERPIII type systems

5.1.6 Lanye: Local concrete manufacturer

The precursor of Lanye – the Heavy Industry Company – was a quarrying factory and concrete manufacturer established in 1975. Its initial architecture could be viewed as a ‘defunct enterprise’ due to its simplex operations with limited amount of commercial active engagement and limited information systems maturity.

After merging with some competitors in the same industry Lanye shifted to a larger scale of economy with more complexity and speedier business growth. This rapid change combined with incumbent isolated systems and cultural differentiation stemming from the numerous mergers and acquisitions (M&A) required Lanye to integrate its internal operations processes and IS and embrace the multi-organisational collaboration concept. During implementation, the Alutex ERP systems enabled Lanye to achieve a high degree of internal integration across different core functional units and have the potential to collaborate better with the external partners. Hence, this saw a vertically integrated enterprise develop from an existing 'defunct enterprise' along with aspirations to become a more extended and virtual.

Numerous serial M&A gave scale and scope of economies for Lanye but they still lacked agility because VIE-ERP was operational and transactional in nature; so more flexibility had to be built into its strategy and structure. Thus, a new integrated ERP system – PushSoft merged with GPS and a virtual private network (VPN) was adopted to increase the efficiency and flexibility of Lanye's production, logistics, sales and customer service at lower cost; and improve business performance across the multi-organisational boundaries. Moreover, Lanye realized that its strategic cooperative partners were now critical to its entire enterprise strategy. Such collaborative paradigm could be thought of as a virtual enterprise with high degrees of multi-organisational integration and agile resources.

However, Lanye's new enterprise strategy would be driven towards an extended enterprise structure rather than remain as a virtual one in order to achieve a more stable multi-organisational structure and medium-long term relationship with other industrial collaborators. Consequently, Lanye could be advised to use the ERPII type information systems instead of web-based ERPIII technologies.

As seen from above, Lanye is considered as a cross-sectional case that can best reflect three types of ERP systems design and management, and three types of (multi-organisational) enterprise strategies design and management. Table 5.6 summarises the initial observations at Lanye.

Table 5.6 Initial observation at Lanye

Case Background	Lanye was established in 1975
The Nature of the Complex Product Service Systems	Quarrying factory and concrete manufacturer
Multi-Organisational Collaboration Strategies	Mergers and Acquisitions (M&As) strategies
	Repositioning from the vertically integrated enterprise strategy to the virtual enterprise strategy and on towards the extended enterprise strategy
Collaborators	Strategic joint partners (e.g. Jinjiang and Zhuo Qi)
	Project partners (e.g. Chinese Construction Ltd. and Nanjing government)
	R&D cooperators (e.g. Southeast University)
	Suppliers (e.g. Mei Bao and Zoomlion)
	Information systems suppliers (e.g. Alutex)
	Logistics partners (e.g. Suyan electric power station)
ERP Systems Capabilities	Alutex ERP systems initially supported key internal operations
	PushSoft ERP systems merged with GPS supported production, logistics, sales and customer service; and enabled inter-organisational collaboration
	Web-based ERP-VPN solutions realized the virtual enterprise strategy
Effects on Business Performance	Lanye shifted to a larger scale of economy with more complexity and speedier business growth by merging with industrial peers
	Alutex ERP systems enabled Lanye to achieve a high degree of internal integration across different core functional units
	PushSoft ERP systems increased the efficiency and flexibility of Lanye's operations
	Web-based ERP technologies and VPN improved Lanye's business performance across the virtual inter-organisational boundaries with agile resources
	ERPII systems would be adopted for achieving a more stable inter-organisational structure and collaboration

5.1.7 Wanghai: A multinational concrete manufacturer

Wanghai was originally founded as a servitised manufacturing company processing and recycling slag into value-added products for the logistics, opto-electronics and commercial real estate industries in 1999. It subsequently became a key player in the construction industry to offer concrete in order to practice a 'circular economy' strategy. It headquartered in mainland China with around 5, 000 employees and has its own multinational procurement and sales network, management systems for technical development, manufacturing processes and logistics.

After extending the industrial chain from slag processor into concrete manufacturer Wanghai was able to utilise and control its ultra-raw materials and upstream logistics more effectively and flexibly through its own docks. This innate resource superiority along with the industry-specific context (e.g. extensive economic model) and the "diversification strategy" determined that Wanghai should vertically integrate its business processes to enhance market power. Simultaneously, the senior management team decided to launch Yonyou ERP systems covering finance, production, HR and inventory management functional modules (a.k.a. traditional ERPI systems) to automate data transfer, reduce (inventory) cost and cycle time, enable sales forecast, and achieve an in-house operational integration with seamless information. Additionally, ancillary tools such as Radio Frequency Identification (RFID) technologies and Office Automatic (OA) systems were applied to facilitate data analysis and inter-functional communications.

To further approach the lean manufacturing strategies (e.g. just-in-time (JIT), dashboard management, and cell manufacturing), as well as better coping with uncertainty around customer demand Wanghai set about moderately merging with upstream and downstream supply chain partners. For instance, it established medium-long term relationships with trusted ‘bulk raw materials’ suppliers and short-term relationships with accessories suppliers; whilst the procurement cost and potential risks would be assessed in advance. Joint ventures were also set up with distributors to lower transaction costs and increase market share. These multi-organisational collaborations not only guided Wanghai to move into an extended enterprise paradigm but also compelled the company to upgrade the traditional ERP type systems towards an ERPII system by rolling out e-commerce platforms (e.g. Alibaba) that could facilitate an integrated model for online transaction between Wanghai and its collaborators. On the other hand, with the purpose of optimising the precast-concrete production workflow a new ERP system designed by Three-Prosper Technology Company was adopted, which enabled a dramatic operations processes redesign covering material management, concrete fabrication, sales, quality assurance, and lorry dispatching control; and improved business performance across the multi-organisational borders.

As seen from above, Wanghai is considered as a cross-sectional case that can best reflect the ERP/ERPII systems design and management, and the vertically integrated/extended enterprise strategies design and management. Table 5.7 summarises the initial observations at Wanghai.

Table 5.7 Initial observation at Wanghai

Case Background	Wanghai was established in 1999; a multinational corporation
The Nature of the Complex Product Service Systems	Concrete manufacturer and slag processor
Multi-Organisational Collaboration Strategies	Mergers and Acquisitions (M&As) strategies
	Outsourcing; e-commerce; joint ventures
	Repositioning from the vertically integrated enterprise strategy to the extended enterprise strategy
Collaborators	Bulk raw materials suppliers (e.g. Jiangsu Shagang Group Co., Ltd)
	Accessories suppliers (e.g. electromotor manufacturer)
	Distributors (e.g. Baosteel and Masteel)
	e-business platform suppliers (e.g. Alibaba)
	Information systems suppliers (e.g. Yonyou and Three-Prosper Technology)
ERP Systems Capabilities	Yonyou ERP systems supported finance, production, HR and inventory management
	RFID and OA systems were applied to facilitate data analysis and inter-functional communications
	ERPII systems merged with e-commerce platform facilitated an online transaction between Wanghai and its collaborators
	Three-Prosper Technology ERP systems were adopted to improve material management, concrete fabrication, sales, quality assurance, lorry dispatching control and extended enterprise collaboration
Effects on Business Performance	Using the vertically integrate enterprise strategy to enhance market power
	Yonyou ERP systems enabled Wanghai to automate data transfer, reduce (inventory) cost and cycle time, enhance sales forecast and achieve an in-house operational integration with seamless information
	By using the extended enterprise strategy Wanghai could cope with uncertainties around customer demand, lower transaction costs and risks, increase market share, and better approach the lean manufacturing strategies
	Three-Prosper Technology ERPII systems optimised Wanghai's production workflow and improved its business performance across the inter-organisational borders

5.1.8 Metrobank: An international commercial banking group

Metrobank (Metropolitan Bank and Trust Corporation) was founded in 1962 and has since become the premier universal bank among the foremost financial institution in the Philippines; it offers a full range of banking and other financial products and services. Metrobank headquartered in Manila and currently spans a consolidated network over more than 800 branches, subsidiaries and representative offices around the world.

Similar to TNT Post, Metrobank is viewed as a large service-oriented company seeking to achieve lean management and provide humanised services with distinctive quality. This required 'checks and balances' between different functional departments covering sales and marketing (i.e. front office), compliance, HR, client service (i.e. middle office), and risk management (i.e. back office) through a vertically integrated mechanism. Therefore, the senior management decided to launch SAP ERP systems for banking solutions consisted of financials, human capital management, analytics, and self-services functional modules. These features helped Metrobank monitor all financial accounting transactions in real time via streamlined business processes; make more accurate decisions to capitalize on value-added opportunities; and provide personalised data and tools that employees can access anywhere at any time, in order to reduce time and effort. As a result, greater cost control, customer-centric, and higher operational efficiency and flexibility were realised via the VIE-ERP strategic paradigm.

Constantly meeting diversified customer needs, tougher competition, and rapid industrial changes put new pressures on Metrobank's operations. Thus the company extended the sphere of its business into non-banking sectors such as education, consultation, and tourism by setting up multi-organisational collaboration and outsourcing to stretch the product portfolio and create 'combo' services, which in turn increased the competitive advantage. However, these collaborative strategies only touched upon non-core activities to protect confidential information and prevent customer-churn. Meanwhile, the company would collaborate with approved bonding companies and appraisal institutions to lower the risks. On the other hand, Metrobank endeavored to be more responsive to dynamic market conditions; whilst new legal and regulatory requirements demanded greater transparency and more accurate and timely information. Accordingly, the traditional SAP ERP systems were upgraded to ERPII systems (e.g. CRM and inter-bank systems linkages) and on towards the ERPIII NetWeaver infrastructure. Such future development should not only enable Metrobank to be equipped with collaborative capabilities into the extended and virtual enterprise management but also deliver a uniform technical architecture for integrating ERP systems and other original applications (e.g. trading capital systems, online banking and deposit insurance systems).

As seen from above, Metrobank is considered as a cross-sectional case that can best reflect three types of ERP systems design and management, and three types of (multi-organisational) enterprise strategies design and management. Table 5.8 summarises the initial observations at Metrobank.

Table 5.8 Initial observation at Metrobank

Case Background	Metrobank was established in 1962; an international commercial banking group
The Nature of the Complex Product Service Systems	Offering financial products/services
Multi-Organisational Collaboration Strategies	Outsourcing; strategic alliances
	Repositioning from the vertically integrated enterprise strategy to the extended enterprise strategy and on towards the virtual enterprise strategy
Collaborators	Non-banking industrial partners (e.g. consulting company and tourist agencies)
	Peripheral business suppliers (e.g. Japan Bank for International Cooperation)
	Bonding companies and appraisal institutions (e.g. Cuervo Appraisers Inc.)
	Information systems suppliers (e.g. SAP)
ERP Systems Capabilities	SAP ERP banking solutions supported financials, human capital management, analytics, operations and self-services
	CRM system was used for client services management
	ERPII systems facilitated inter-bank collaboration and EE/VE strategies
	SAP NetWeaver improved integration between ERP systems and other corporate apps
Effects on Business Performance	Using the vertically integrate enterprise strategy to achieve lean management and 'checks and balances' between different functional units
	SAP ERP helped Metrobank monitor all financial accounting transaction in real time through streamlined business processes, more accurate decision-making and personalised data accesses
	Greater cost control, customer-centric, and higher operational efficiency and flexibility were realised via the VIE-ERP strategic paradigm
	Using the extended and virtual enterprise paradigms to stretch the product portfolios, create 'combo' services and lower risks
	ERPII and SAP NetWeaver (ERPIII) increased information transparency and accuracy; and enabled Metrobank to be more responsive to dynamic business environment

5.2 Chapter summary

This chapter presents initial observations in 8 empirical cases in terms of (i) case background, (ii) the nature of the complex product-service systems, (iii) multi-organisational collaboration strategies and strategic repositioning, (iv) collaborators, (v) ERP systems capabilities, and (vi) the effects on business performance; which serves as a prior study of the grounded theory based methodological approach. The aim of this chapter is to facilitate the data coding and analysis (within each case), and further theoretical and practical discussion (as shown in Chapters 6 and 7); as well as demonstrating that a combined "case observation/grounded theory based" methodological approach can produce a rich harvest of fine grained research data illuminating the research topic.

Chapter 6 – Data Presentation, Analysis, and Validation of Empirical Findings

As outlined in Chapter 3, the methodological approach of this research consists of several phases to be consistent with the key operations of empirical study – particularly the Grounded Theory based Methodology (GTM) through constant comparison and theoretical sampling. This chapter reports on the use of these pivotal operations and provides information on the theoretical coding processes to enable the reader to evaluate the research based on a full and detailed methodological report of the coding and the resultant category creation (Locke, 1996b; Suddaby, 2006).

The aim of this chapter is to achieve a rich understanding on governing (i.e. designing and managing) enterprise resource planning systems capabilities and multi-organisational enterprise structures and strategy based on the presentation and analysis of the collected empirical data, and the validation of empirical findings. In Section 6.1 the data analysis procedure including coding and theory-generating will be described covering all GTM related aspects from theoretical foundation to empirical application and results in the forms of theoretical narratives and tentative propositions. In Section 6.2 the validation of these tentative propositions is demonstrated and discussed before the key points of this chapter are summarised in the final Section 6.3.

6.1 Data coding and analysis

The central idea of coding through grounded theory based methodology (GTM) is to move from raw text to research concerns (i.e. research objectives) and draw a connection between them in a structured step by step approach (Auerbach and Silverstein, 2003, p. 35). An overview of the different levels of understanding in Grounded Theory and how it is used in this research study is shown in Table 6.1.

Table 6.1 Levels of understanding in Grounded Theory applied to this research study (adapted from Auerbach and Silverstein, 2003)

Levels of understanding	In this research study	Abstraction level
Research concern	Research objectives and aims	High
Theoretical narrative	Propositions and theoretical narratives	↑
Theoretical constructs	Core categories (a.k.a. abstract themes)	
Themes	Categories, sub-categories and concepts	
Repeating ideas	Codes (a.k.a. free nodes)	
Relevant text	Thematic units (based on *a priori* themes)	
Raw text	Interview transcripts, observations and other forms of appropriate data	Low

"The coding strategy is the analytical process of breaking down interviews, observations and other forms of appropriate data into distinct units of meaning which are labelled to generate concepts ... into higher order categories, or one underlying core category, which suggests an emergent theory" (Goulding, 2002, pp. 74-75).

"The coding method is a procedure for organising the text of the transcripts and discovering patterns within that organisational structure" (Auerbach and Silverstein, 2003, p. 31).

Consequently, the empirical process stages applied during the coding and data analysis phase of this research study are identified as:

Stage 1: Development of key template categories based on research objectives and gaps in the literature

Stage 2: Computerised textual codification and analysis of interviews using the QSR NVivo 9.2 software (open coding)

Stage 3: Clustering of codes into coherent categories (axial coding)

Stage 4: Development of a Coding Master Table (selective coding)

Stage 5: Formation of theoretical narratives and tentative propositions (writing the theory)

Although these stages are presented in a chronological sequence, the coding procedure is not a linear approach from Stage 1 to Stage 5 but involves iterations between these stages and steps as the researcher becomes more familiar with the data (i.e. constant comparison) (Glaser and Strauss, 1967; Locke, 2001). Additionally, some details regarding the (GTM) coding techniques (e.g. NVivo 9.2, post-its, index cards) are presented throughout Sections 6.1 and 6.2; which should be regarded as the explanations of data analysis process rather than general description of research methods, in order to better demonstrate and explain the data analysis and validation of this research study.

6.1.1 Stage 1: Development of key template categories based on research objectives and gaps in the literature

Both GT (or GTM) originators (Glaser, 1978; Strauss, 1987) explicitly warn against creating and trying to work with too many conceptual categories, whether substantive, theoretical, or core. Thus in order to avoid being overwhelmed by the large amount of data and information and to facilitate the open coding process of the data set (i.e. 48 interviews) involving over 800 pages of transcript, the author decided to develop some basic and abstract *a priori* themes – an idea borrowed from the approach of thematic coding and template analysis (Crabtree and Miller, 1999b; King, 1994). This would provide some practical guidance during the coding process while still allows for enough flexibility to produce insightful interpretations of the text (King, 1998). Specifically *a theme* refers to a pattern in the data that researcher has identified as important to the interpretation; in other words, it is a way in which segments of text with similar meaning tend to be grouped together (King, 1998; Miles and Huberman, 1994). It can basically be derived either inductively (i.e. during the coding and data analysis process) or deductively (i.e. based on theoretical considerations drawn from existing literature) (Bauer, 2000). In this research study, the derivation of *a priori* themes was grounded in the general research objectives and outlined in Chapter 1 (given in Section 1.3), and the 4 gaps identified through the critical pre-study literature review in Chapter 2. This also indicates that existing literature cannot be neglected when applying grounded theory based method (Suddaby, 2006) because it is usually necessary to start the generation of a grounded formal theory from a substantive existing ones (Glaser and Strauss, 1967, p. 79).

The overall aim of this research is exploring, understanding and theorising about how different ERP information systems capabilities fit with different multi-organisational enterprise structures and strategies, which in turn drew forth the development of five basic themes related to ERP-CEG governance:

(i) **Inter-firm relationship status quo:** identification of current issues and practices associated with multi-organisational collaboration and enterprise information systems development
(ii) **Inter-firm relationship structure design:** identification of issues related to the creation of multi-organisational relationships and collaboration, and their design paradigm
(iii) **Inter-firm relationship management:** identification of issues related to the management of multi-organisational relationships and collaboration, and their collaborative activities
(iv) **Information systems design:** identification of issues related to the configuration of ERP systems and their features within the context of multi-organisational collaboration
(v) **Information systems management:** identification of issues related to the management of ERP systems within the context of multi-organisational collaboration

Instead of developing a full model in the form of a tightly defined and largely predetermined list of *a priori* constructed codes (as in template analysis (King, 1998)), this study used a more flexible approach and hence limited to the five basic themes identified above in order to in line with the inductive, theoretical and *in vivo* coding philosophy of grounded theory (based methodology) (Glaser and Strauss, 1967; Strauss and Corbin, 1998). Furthermore, the template categories were not directly derived from the literature but based on general research objectives and gaps in the literature (see Chapters 1 and 2). Therefore, the philosophical underpinning of this research study remains within the domain of inductive grounded reasoning.

6.1.2 Stage 2: Computerised textual codification and analysis of interviews (open coding)

Open coding is the process in which data are initially conceptualised and analysed in an unprejudiced way (Locke, 1996b; Strauss and Corbin, 1990, p. 61). Charmaz (2006) observed that openness of initial coding could help the researchers to think and allow new ideas to emerge; these emerging codes and categories are then considered as the basic building blocks of a grounded theory based methodology (i.e. theory is the description of relationships between patterns (a.k.a. abstract themes) found in the data (Auerbach and Silverstein, 2003). Meanwhile, the open coding process is also influenced by experiential data in the forms of the researchers' knowledge of the relevant literature which prevents from too literal and immersion in the empirical material and helps thinking in terms of more abstract concepts (Strauss, 1987).

Before the actual coding procedure to be conducted, the author read through all transcripts of interviews to be familiar with the data (King, 1994).[f] During this process a qualitative template analysis guided by the *a priori* developed basic themes of Stage 1 was deployed where the initial template categories were applied in order to analyse the text but were themselves revised in the light of ongoing research. According to various scholars (Auerbach and Silverstein, 2003; Crabtree and Miller, 1999b; Goulding, 2002, p. 76; King, 1994, 1998) this includes a set of key elements that can be specified as making, unifying, sampling and recording relevant data (e.g. key words or phrases) which connect the informant's account to the experience under investigation.

Firstly, it was necessary to make a decision on what constitutes data (i.e. sources). In this research study, each interview (transcription) represented one datum. Secondly, the text needs to be segmented or divided into separate thematic units referring to relevant passages (or references) of the text that express a distinct idea related to the research topic. In this study, each interview text was initially divided into units with different meaning as belonging to or representing examples of some more general phenomenon (Spiggle, 1994, p. 493) guided by the template categories developed above. Each time a new idea or an early concept was identified in the text, a new thematic unit began. This was accomplished during the reading by quickly and roughly highlighting relevant text passages in yellow, and adding individual comments in the forms of short memos and annotations in red for the relevant words, phrases or passage of any length (using *new comment* and *footnote* tabs in Microsoft Word).[g] At the later stage of coding (in NVivo 9.2) this initial filtering process proved to be very helpful as some useful text units were pre-selected already and the comments provided support in relating the interview text to the research objectives reflected by the *a priori* developed template categories; thus simply making the text more manageable. Two examples of anonymous interview transcript are shown in Text Box 6.1 where the relevant texts are presented in **bold** (originally yellow) and the individual comments are presented in *italics* (originally red).

[f] This step is suggested even if all the interviews were transcribed by the author only
g This can be reinforced by using *memo link* and *new annotation* tabs in NVivo 9.2

Example (1)
Interviewer: Do you use any distribution channels for the book delivery or you will choose to ship them to the book buyers directly from Lightning Source?

Informant: **Some customers such as Amazon have faster and more efficient shipping methods than we do; so we would not do Consumer Direct Fulfilment (CDF) for them. But for other customers who do not have a faster distribution network it is better for them to let us do it; and we distribute it straight off the end of our line until direct to the end consumers.** *Multi-organisational relationship structure design is affected by the core competences required in contributing to the value chain.* So that is quite important because we know the speed brings the volume.

Example (2)
Interviewer: What are the motives of integrating the operational processes with your customers? How does business-to-business (B2B) work for Intel?

Informant: Well, you know there are a couple of things. On the B2B's base because that is really about business to business **so we have to make out sales more agile and more responsive; and you need to get timely information from customers through the enterprise systems. So we reengineer our process to be more flexible we touched internally and be more responsive externally to customers.** *Multi-organisational collaboration could increase the flexibility and agility with more responsiveness; multi-organisational collaboration requires an internal business processes reengineering.* **We need to get information from them and be able to respond automatically by removing the manual data entry. Most of this job is about how can we set up connections between customer, supplier, and third-parties' ERP systems; and link them to our ERP systems so we can get real time information that reduces lead-time but also reduces manual intervention and manual work.** *Multi-organisational collaboration can be supported through ERP-to-ERP integration with real time information, and lead-time and manual work reduction.* This is also one of our challenges if Intel wants to get into the new markets.

Text Box 6.1. Two examples pre-selection of relevant texts in thematic units (Source: Author)

Thirdly, it is suggested to mainly use the relevant text or subgroups for further coding, especially if the set of data unit is overwhelmingly big. However, the risk missing out valuable data and content as basis for understanding the research topic was considered higher than the additional work effort. To cope with this other strategies such as constant comparisons and iterative examination was used to ensure conceptual development and density (Oliver *et al.*, 2005; Strauss, 1987). In other words, in retrospect useful and value-added codes would emerge from text passages that have not been pre-selected; whilst some pre-selected passages did not prove useful in providing value-added codes. Nevertheless, the pre-selection and organisation of the text in thematic units provided a good guidance and assisted in speeding up the coding process to a great extent. Finally, each thematic unit included must be coded and recorded in order to indicate its description.

The data coding was completed using the QSR NVivo 9.2 software (as defined in Chapter 3). At the beginning, a new project named "ERP and CEG (DERG-ERP) – coding" was created in NVivo. Afterwards, subfolders such as documentation, interviews and literature articles were created under *internals* folder in *sources*; the transcripts of all 48 interviews were then imported into the *interviews* subfolder (using *external data – documents* tab in NVivo 9.2); this together with other official documents and relevant archives created a full document database that was managed (i.e. viewed, edited and explored) via NVivo's *sources browser*. Importantly, all the information in the transcripts (especially the highlighted relevant text in yellow colour and the individual comments in red colour) was maintained. Each interview was labelled with certain characteristics such as company type and address, interview date and duration, and job title of interviewee using NVivo's *properties* feature which helped the author when referring to demographical characteristics of the data. An overview of the document database of this study is given in Figure 6.1 which details the name and the number of nodes (i.e. codes) and references (i.e. passages) for each of the 48 (interview) documents, as well as when it was created and/or modified and who created and/or modified it.

Repeating ideas are the beginning building blocks from which a theoretical narrative will be eventually assembled (Auerbach and Silverstein, 2003, p. 55). Thus the author read through the raw text line by line (with a primary focus on the pre-selected and highlighted relevant text) to search for words, phrases, sentences and even whole passages (a.k.a. incidents (Charmaz, 2006)) that expressed the same idea or meaning (a.k.a. repeating ideas). These are referred to as codes or nodes (i.e. coded data that were related to the investigated research topic. According to the two-stage analysis process outlined in Chapter 3 (involving intra- and inter-case analysis), at this point codes (i.e. repeating ideas) were identified or developed in each transcript separately, which were then combined into a composite list for the entire research sample. This strictly sticks to the hierarchical coding approach (Corbin and Strauss, 1990) by setting and applying three types of codes in NVivo: free nodes (coded but not categorised codes), tree nodes (codes in a hierarchical mode, mostly categorised), and case nodes (codes allocated to different cases)[h]. Similar to the *sources browser* codes were managed via the NVivo's *nodes browser*. In NVivo codes can either be developed *a priori* using the *nodes browser* to create free, tree or case nodes or *in vivo* based on the text (i.e. interview transcripts).

h Case nodes can be applied by using *node classifications* in NVivo 9.2

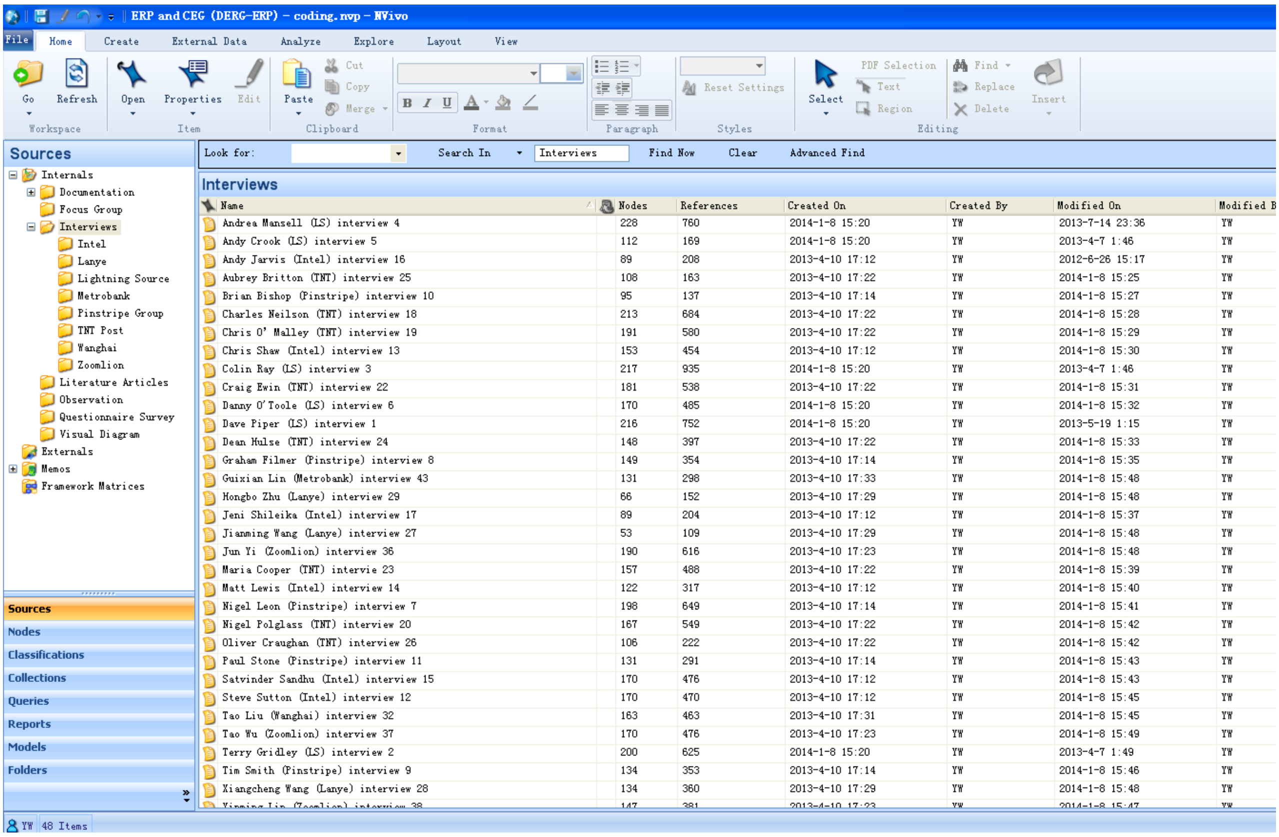


Figure 6.1. Document database (i.e. sources) of this study in NVivo 9.2

The latter coding approach applied in this study was using 'speed coding' via the NVivo *auto code* or *range code* (a context menu that allows for quick, easy and automatic *in vivo* coding or un-coding of selected text passages). During the coding process, the relevant text expressing a valuable idea (a single word, a phrase or even a whole paragraph) was highlighted and then a title for a new node was entered into the node field of the coder via *nodes* in NVivo 9.2 (if it was a new idea) or an existing node title was selected from the list of created free nodes in the coder via *nodes* in NVivo 9.2 (if it was an existing coded idea). Additionally, as the selected cases (or research participants) came from a variety of industries (e.g. printing, logistics and banking) in the UK and China; it was better to firstly code each transcript based on different companies and allocate the corresponding free nodes[i] into different subfolders (with company names) rather than directly code all interview transcripts into one list of free nodes. This also facilitated the intra-case coding (data analysis), further theoretical and practical discussion while preventing the risk of missing out unique and valuable ideas (e.g. industry-specific context) – particularly when using *code sources at existing nodes* in NVivo 9.2. A coding example of one interview using the *nodes* (coder) in NVivo is shown in Figure 6.2.

i These free nodes would be regrouped and upgraded at stage 3 using *sets* in NVivo 9.2

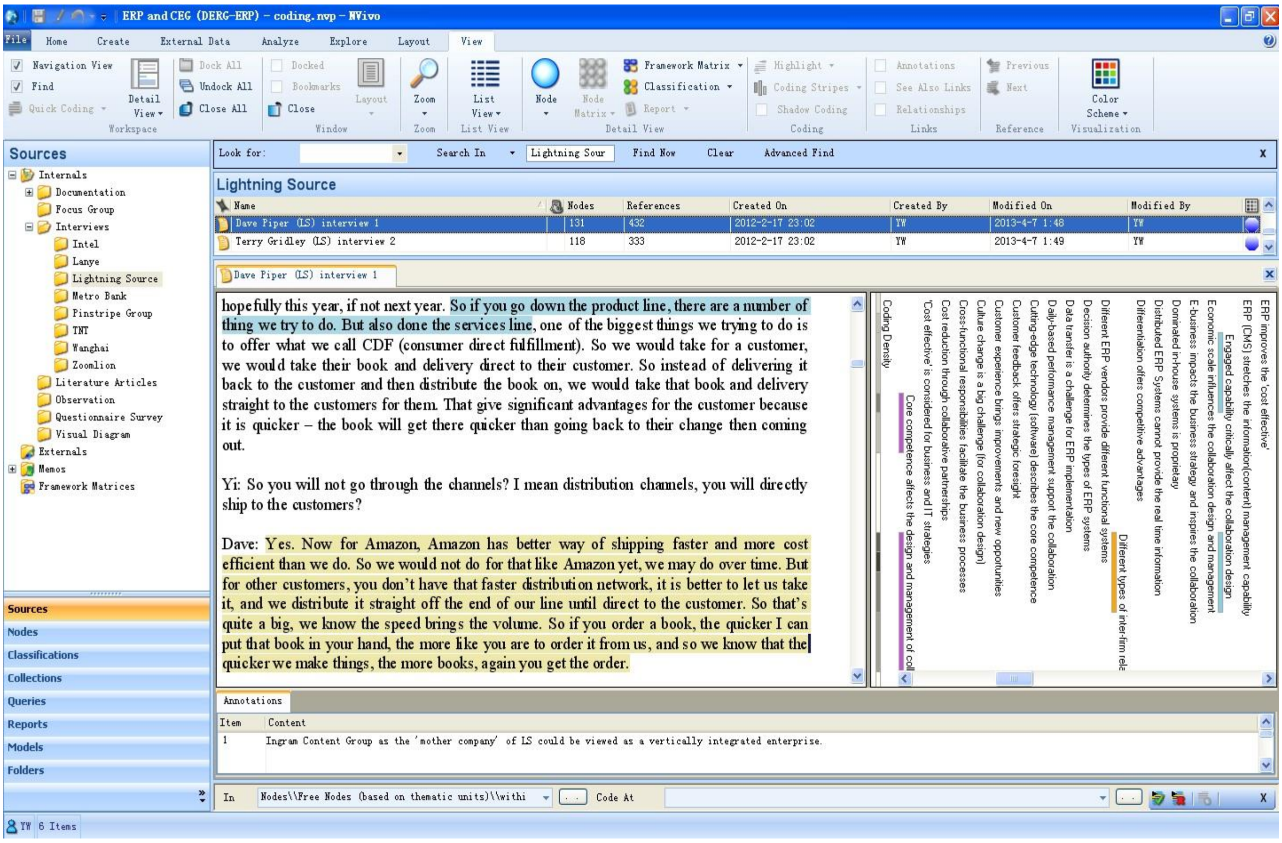


Figure 6.2. Coding of interview text passages using NVivo 9.2's coder (*nodes*)

As far as it was practicable, the interviews were coded only within the remit of the description within them (guided by the *a priori* template categories developed in Stage 1 above) and without conscious and explicit reference to specific bodies of literature but with reliance on the subjective experience and the knowledge of the author (Dey, 1999). Furthermore, each code (free node) was briefly described to reflect the idea it was expressing which help in selecting and allocating text passages with same ideas to the respective codes; thereby speeding up the overall coding process. However, the code titles and descriptions changed several times during the progression of the coding as new and more evocative quotes were encountered through the constant comparison.

This dynamic process was managed via NVivo's coder (*nodes*) with minimal effort. At the beginning of this data open coding and analysis process all the codes were in free node format since the relationships (or connections) between them were still blurry; and this led to a total of 1367 (initial) provisional codes of the entire sample of 48 interviews, which were assigned to their corresponding *node locations* (i.e. case units) in the forms of composite lists. One of the examples – Lightning Source is shown in the *nodes browser* in Figure 6.3 which illustrates an extract of the full list of 251 codes (a.k.a. items) in alphabetical order (see the *name* column), its details (i.e. name, sources (the number of interview transcripts that have been coded), references (the number of passages that have been coded), date & time and user(s) of creation and/or modification (right hand columns), and an example of a description for the code 'ERP systems have to be flexible' (see the *node properties* window at the bottom).

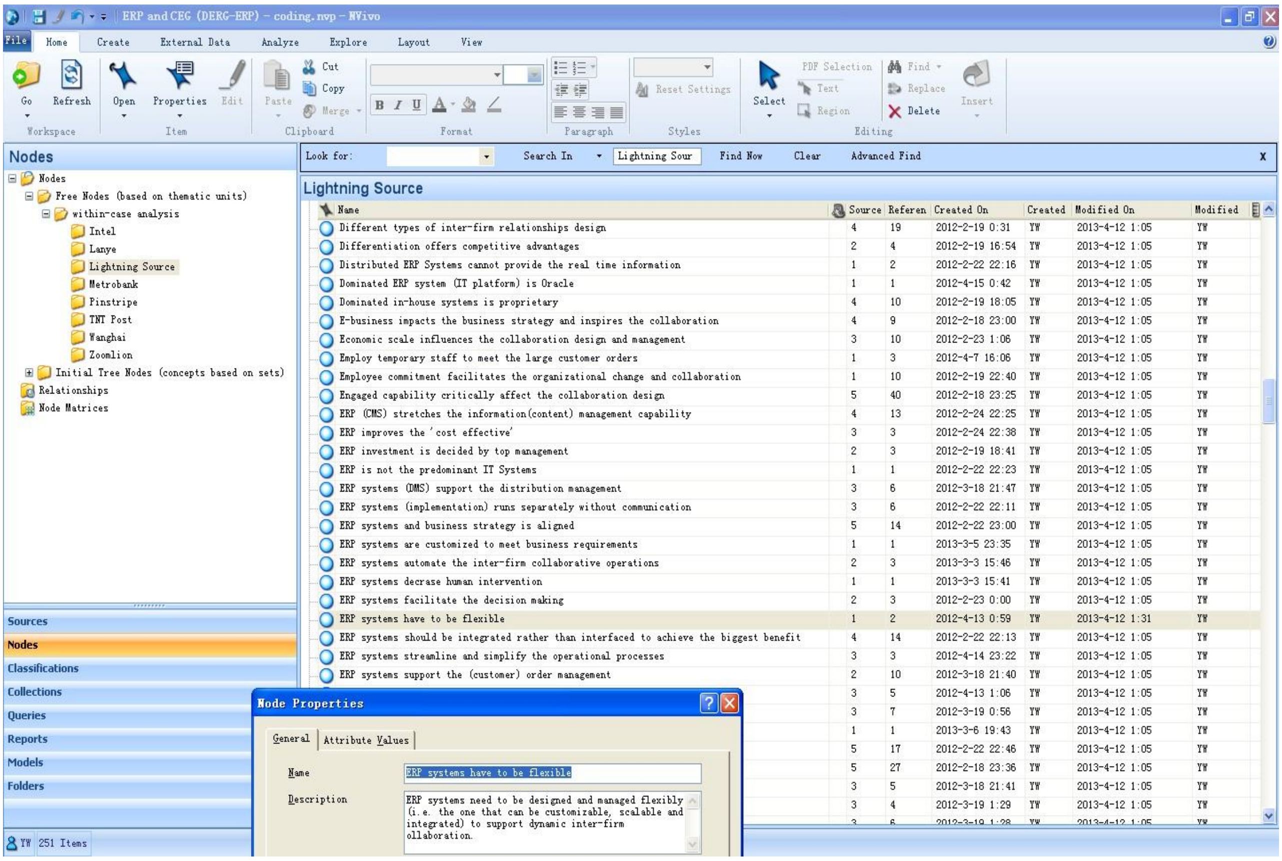


Figure 6.3. Extract of code list and details after open coding using NVivo 9.2 (within-case analysis example: Lightning Source)

It should be mentioned that the author did not only rely on this electronic coding method using the NVivo software but also applied a manual method using post-its or index cards (Crabtree and Miller, 1999b, p. 168) in order to combine the best features of each approach. Because the overview of the codes (i.e. free nods) in the *nodes browser* (an example shown as a list (see Figure 6.3)) at this point was not considered very clear and supportive for their further analysis, the author used post-its (and index cards) to visually organise the codes on a big flipchart; each code was represented by one post-it. This way made it very easy for grouping, clustering, and organising codes which was proved to be useful during further analysis and categorising (see Sub-section 6.1.3). Although NVivo 9.2 offers functional features such as creating node links or matrices, visually charting node coding, or developing graphical models (which were used by the author but not excessively), from the author's subjective point of view it does not provide sufficient *a priori* support in the most difficult abstraction process from individual codes to sub-categories, categories, core categories and formal theories in a good visual way; and therefore should be combined with the manual post-it or index card methods (a.k.a. code manuals).

6.1.3 Stage 3: Clustering of open codes into coherent categories (axial coding)

This stage involved two sub-steps: (i) the initial 1367 free nodes (i.e. repeating ideas) were analysed and reorganised into larger groups that expressed a higher commonality, called *concepts* (an upgraded version of free nodes which was still relatively open and free), and (ii) the *concepts* that emerged in an opening coding approach were condensed, aggregated and clustered into coherent sub-categories and analytical categories that shared the same meaning at a more abstract level (axial coding).[j]

Concepts were collected and built using *(node) sets* via the NVivo's *collections browser*, which were made up of all related sources (e.g. free nodes, diagrams[k] and documents). Thus the *sets* functionality can be used to regroup the initial free nodes derived from each single case studies (i.e. intra-case open coding), and integrate them into one composite list. Finally 158 concepts were developed based on 1367 individual codes, which are shown in the *collections (sets) browser* in Figure 6.4. It presents the name of concepts (left hand column) and the details of a selected item from the concepts (in this case the concept 'ERP systems support inter-firm relationship management') (right hand columns) which involve the name of free nodes belonging to this concept, the location of each individual code, when it was created and modified and by whom. In light of these 158 *concepts*, the initial 1367 free nodes were refined into 158 codes[l] which are illustrated in the *nodes browser* in Figure 6.5. Similar to Figure 6.3 above the details (e.g. name, sources, and references) of the purified 158 codes are given in the right hand columns.

The next step is to establish the relations between the individual codes obtained during the open coding in terms of causal conditions, context, etc. (Strauss and Corbin, 1990, p. 96). By making comparisons of codes the researcher is forced into confronting similarities, differences, and degrees of consistency of meaning among them which generates a uniformity resulting in a category (Shannak and Aldhmour, 2009; Strauss, 1987). Glaser and Strauss (1967, p. 106) therefore suggest a basic, defining rule for the constant comparison: "while coding an incident for a category, to compare it with the previous incidents in the same and different groups coded in the same category".

j Axial coding is the appreciation of concepts in terms of their dynamic interrelationships
k The author also mapped the (inter-organisational) business processes of each case
l These were also viewed as the initial tree nodes

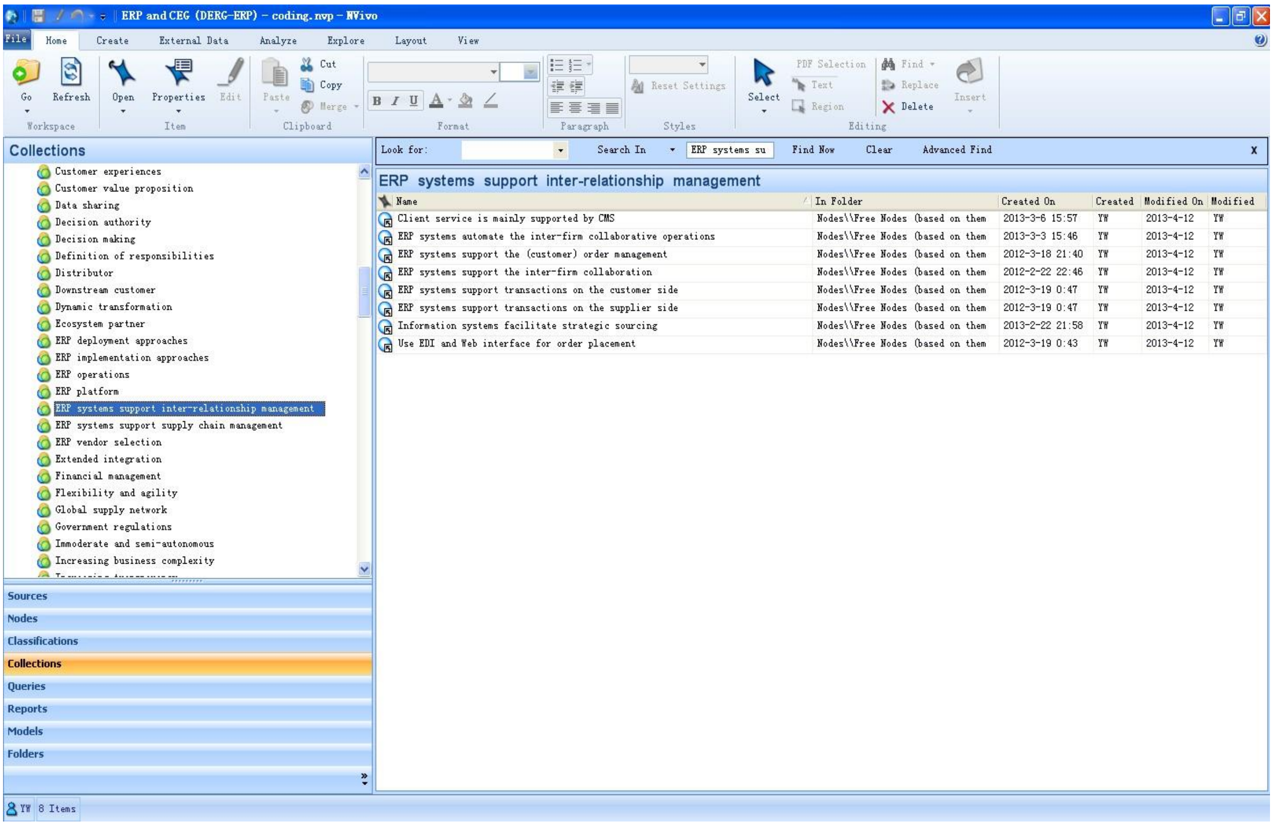


Figure 6.4. Full concept list and details using NVivo 9.2's *collection*s (*sets*)

This constant comparison of the identified codes generates theoretical characteristics of the categories (i.e. constant comparison moves from code to code level towards code to category level as the analysis process progresses; thereby integrating the associated knowledge (Glaser, 1994)). This is accompanied by a reduction process (i.e. uniformity in the coded data is achieved that enables the formulation of theory with a smaller set of higher level categories. According to Glaser and Strauss (1967) this reduction combined with a consequent generalisation leads to the *minimalisation* of codes and categories (parsimony) and the *applicability* of the developed theory to a wide range of situations (scope), the two major requirements of substantive theory development.

During the comparison of 158 codes across all interview transcripts (i.e. cross-case analysis) the relationships (connections) between the codes became clearer and the author started to group codes with similar meaning into categories. This was accomplished using a combination of the electronic NVivo software and the manual post-it (or index card) method. First, the post-its (free nodes) were reviewed and re-arranged on the flipchart in a manual way to identify emerging (conceptual) patterns and relationships between them on an abstract level. These groups of codes were also given a more abstract and comprehensive definition, and being formed into a category reflecting the common meaning of the subordinate group of codes. These categories were represented on the flipchart with bigger post-its around which the groups of individual codes were clustered.

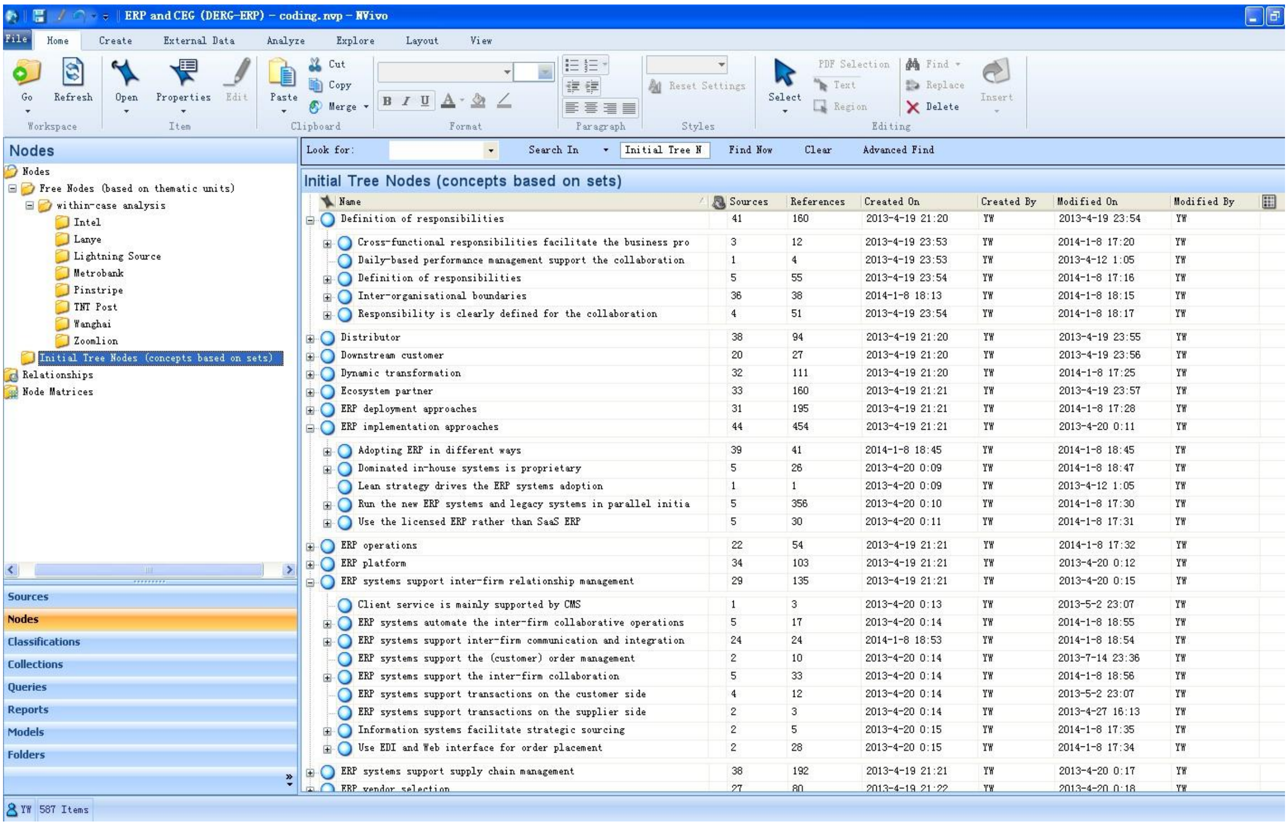


Figure 6.5. Refined free node list and details based on concepts using NVivo 9.2

In the meantime a thorough review of the text passages (i.e. references) that were coded with the respective free nodes was undertaken in NVivo to complement the manual flipchart process by creating node and documents (i.e. interview transcripts) links. Using the *nodes browser* of NVivo 9.2 each code was explored individually and evaluated against other codes of the (same) group as well as against the superior category by looking at the meaning that was reflected by the coded text of it. In the same way groups of codes were organised into categories and sub-categories; groups of categories were then organised into larger and even more abstract but provisional core categories or abstract themes integrating the categories with each other. A rough conceptual diagram of initially identified relationships between the provisional core categories, categories, and their sub-categories based on the 158 grouped free nodes (i.e. concepts) is shown in Figure 6.6.

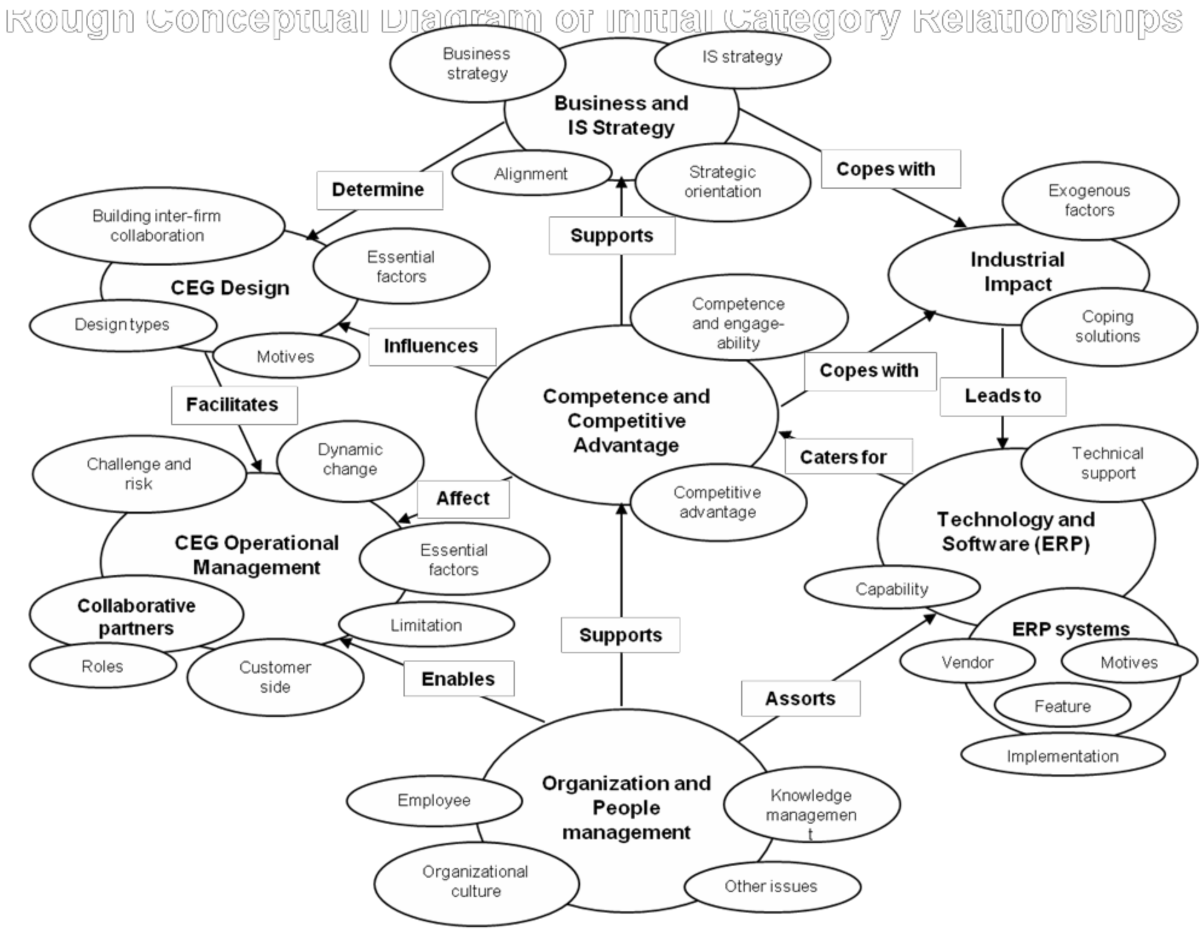


Figure 6.6. Rough conceptual diagram of initial category relationships

At the same time, this analysis process led to a re-organisation of codes from new version of free nodes (i.e. *concepts*) into tree nodes (i.e. axial coding) using the NVivo 9.2's *nodes browser* in an easy drag and drop manner. Therefore, a new project named "ERP and CEG (DERG-ERP) – further coding and analysis" was created in NVivo in order to facilitate the author to be able to go back to the original project (i.e. "ERP and CEG (DERG-ERP) – coding") anytime during the research study. Simultaneously, two decision rules were employed as part of the axial coding process to address the *parsimony* of codes and categories. First, in the course of thoroughly reviewing each individual code for commonality with others and evaluating it against the broader theoretical categories (or sub-categories) to develop the tree nodes, some of the original codes were merged or omitted due to being interdependent and overlapping. Second, phenomena that were infrequently encountered (lower than 5% of the *sources* and 5 *references*) were deleted. This led to a final full list of 133 codes now being tree codes (out of originally 1367 free nodes). The finer and more sophisticated re-organisation process (i.e. axial coding) using NVivo led to a refined and more advanced categorisation of the tree nodes into 23 analytical categories including 19 sub-categories guided by the initial relationships that have been identified in Figure 6.6 above (although there is no explicit rule, a number of 10-20 themes (i.e. categories or sub-categories) seems suitable (Auerbach and Silverstein, 2003, p. 65)); this helped the author to focus on the most critical issues. The result is shown in Figure 6.7 (tree nodes were allocated under *themes and categories* subfolder in *nodes*).

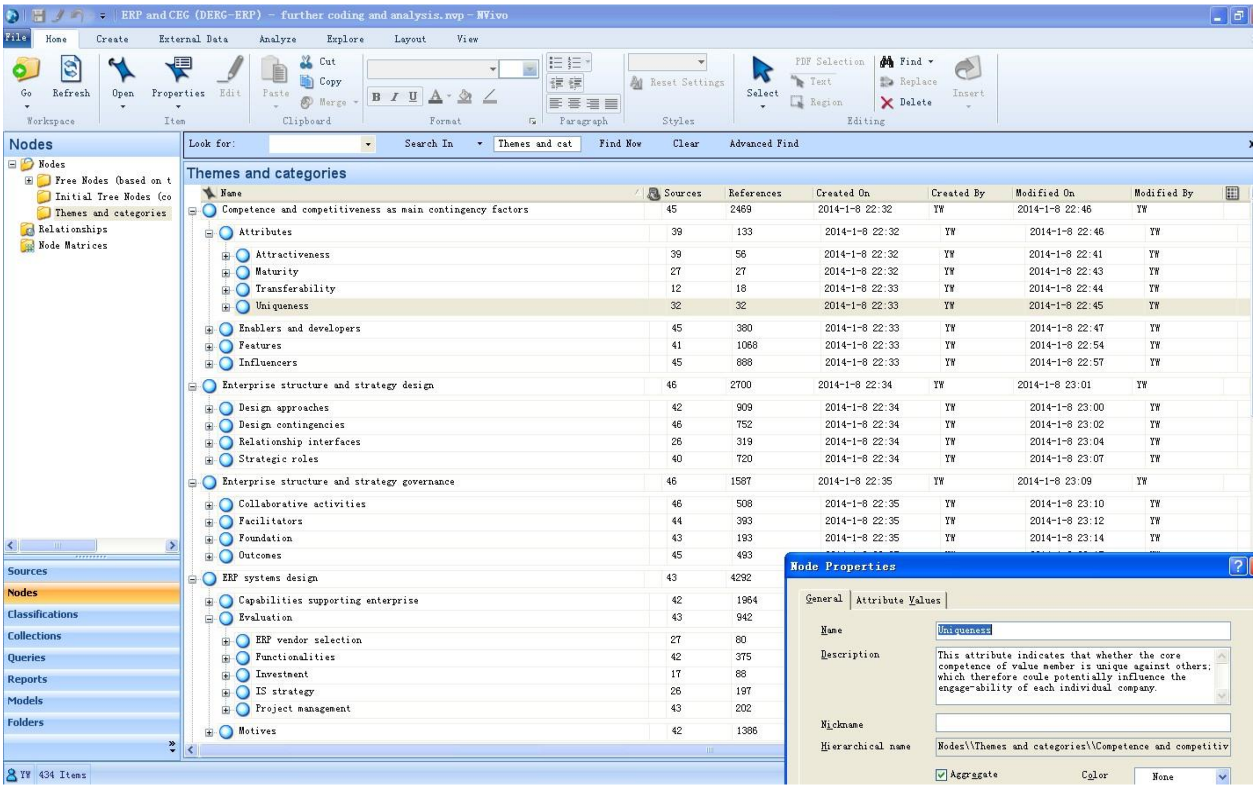


Figure 6.7. Categories, sub-categories, and codes organised in the NVivo 9.2 node browser

As can be seen in the right hand columns of Figure 6.7 all categories, sub-categories and codes (free nodes) are now organised in trees. Similar to Figure 6.3 above the description for the code (also the sub-category) ‘uniqueness’ (now a tree node) is given in the *node properties* window at the bottom. It also points out that this tree node emerged from the former free node ‘competence has to be unique’ which enables the author to trace the tree nodes back to their former free nodes. In addition, the details of *tree* (e.g. name, sources, and references of categories, sub-categories and individual codes) can be seen in the right hand columns.

This example also indicates that the code names were refined (compared to Figures 6.3 and 6.5 above). The goal was to choose a short quote that reflects the essence of each idea related to that code in a true and emotionally vivid way (Auerbach and Silverstein, 2003). Similarly, the name of categories should reflect the abstract patterns that pulled those codes together with a simple and easily understood phrase.

Although the categorisation (axial coding) process normally should continue until all individual codes are allocated to categories (see Figure 6.7), 7 orphan codes were not grouped into a category because no other codes with similar meaning could be found. However, since qualitative research is not focused on *quantity* of data/findings, individuality has an important place in this paradigm leading to those 7 codes being kept as standalone pieces rather than being omitted from the (nodes) database.[m]

m This still adheres to the two decision rules mentioned above

6.1.4 Stage 4: Development of a Coding Master Table (selective coding)

The essence of choosing a core category, as argued by Strauss and Corbin (1990, p. 121), is to "achieve the tight integration and dense development of categories required of a grounded theory (based methodology)". This analysis process is called *selective coding*. The (axial coding (see Sub-section 6.1.3) and) selective coding in this research study, however, were not carried out in strict accordance to Strauss and Corbin's (1990, 1998) coding procedure using 'logical coding diagrams'; this would require a sequential set of stages explaining each category to be specified in terms of: (i) its phenomenon under study, (ii) its intervening and causal conditions, (iii) the (data) context of its phenomenon, (iv) the actions and interactional strategies directed at handling its phenomenon, and (v) the (management) consequences related to its phenomenon.

Instead, the author developed a detailed Coding Master Table – an idea borrowed from the approach of classical content analysis (Bauer, 2000, p. 131), which includes a summary list of all categories, sub-categories and codes with a suitable title, description/definition, example text passages; and the frequency distribution (for each code) supported by a diagram outlining their relationships. In the author's opinion this is a more pragmatic way of developing a 'coding frame' (a.k.a. codebook and coding booklet) for each core category but can be seen as a sufficient substitution of the selective coding (and axial coding) processes and their associated 'logic diagram' by providing an equivalent analysis process. This is supported by Suddaby (2006) who states that a common characteristic of Grounded Theory (based methodological) research is an overemphasis on coding which lacks the spark of creative insight upon which empirical research is used. Glaser (1978) described this tension with the term 'theoretical sensitivity'.

The Coding Master Table is consistent with the principles of coherence and transparency to ensure the quality of the coding (Bauer, 2000, p. 141). Bauer points out that coherence means that any coding scheme should be internally consistent in its organisation and that all codes should flow from a single principle; whereas transparency argues for the coding scheme to be reported and made explicitly. In order to enable reliability, credibility and validity, the coding scheme should include *code title*, *definition*, *frequency* and *an illustrative example of representative text* (Bauer, 2000). Particularly the last aspect of having an illustrative text unit that applies to each code is less trivial because it enables the researcher to support the interpretation with corresponding empirical data so that the way of coding (i.e. data analysis) is understandable. In this context Auerbach and Silverstein (2003) argue that, "if your interpretation is supported by the data, then it is valid, even if there are other ways to interpret the same data" (p. 32). In Tables 6.2 and 6.3 two examples of the Coding Master Table are presented for the categories 'competence and competitiveness influencers' and 'outcomes of adopting ERP systems' that are also shown in Figure 6.7 above.

Table 6.2 Example of category ‘competence and competitiveness influencers’ (belonging to the provisional core category ‘competence and competitiveness’) in the Coding Master Table

Abstraction level	Code title/name	Definition/Description	Empirical example/data	Comments
Provisional core category	Competence and competitiveness	Not applicable	Not applicable	Not applicable
Category	Competence and competitiveness influencers	Critical factors influencing the competence and competitiveness	Not applicable	Not applicable
Code	Value added	The competence and competitiveness are dependent upon the company’s contribution, value-added, or engage-ability to fulfil the final missions of inter-firm collaborations	We have far-reaching distribution channels including Ingram book company. The meta-data of electronic book titles can be carried out globally	Influences the attractiveness and uniqueness of competence and competitiveness
Code	Integration capability	The competence and competitiveness are determined by the extent to which the company is integrated to its collaborative partners	We have set a B2B connection to go out to our logistics providers. They then send the response back to us to confirm the shipment. Also, they will give us the real time tracking information	Influences the types of inter-firm relationship structure and strategy design
Code	Competitive advantage	The competence and competitiveness can be influenced by the company’s competitive advantage which is often considered as a core business activity or core competence	The speed of LS is the top one within the printing industry in the UK because we have got the print-on-demand strategy	This is determined by the features of core competence
Code	Company size	The competence and competitiveness can be positively influenced by company size; particularly for the collaborative products and services	For our suppliers, I will be looking at the size of their business. We have got regular big suppliers who are very reliable. Also, what I hate to do is shut down my biggest downstream partner and customer	Links to ‘strategic roles’ of collaborators
Code	Company history	The competence and competitiveness are partly determined by the company’s reputation, historical structure, culture, business model, proven track record of success in inter-firm collaboration	If the customers are new and do not have any trading history they will be put onto the credit check before they can get the services from us	Influences the maturity and transferability of competence and competitiveness

Table 6.3 Example of category 'outcomes of adopting ERP systems' (belonging to the provisional core category 'ERP systems management') in the Coding Master Table

Abstraction level	**Code title/name**	**Definition/Description**	**Empirical example/data**	**Comments**
Provisional core category	ERP systems management	Not applicable	Not applicable	Not applicable
Category	Outcomes of adopting ERP systems	Outcomes and benefits that can be obtained through ERP systems adoption and management; particularly for the strategic inter-firm collaborations	Not applicable	Not applicable
Code	Process integration	Inter-organisational business processes integration and positively influenced by ERP systems adoption and management	We have Vanilla ERP systems and we have put funding to improve our B2B connections. So it is not just system-to-system integration but the underlying supply chain philosophy and the underlying business processes [integration]	Influences the types of inter-firm relationship structure and strategy design
Code	Systems integration	Disparate information systems and technologies from different organisations or functional units can be integrated through ERP systems adoption and management	Nowadays our customers are looking for a deeper connection between their systems and our systems. We have worked with several of our customers to implement RosettaNet connections	This is determined by the information systems (IS) strategy
Code	Increasing transparency	Information or data transparency across the supply network can be increased through ERP systems adoption and management	We can track our volume that is to be done [by adopting ERP systems]. We know how many units we have done on a weekly basis. We know that if our library is sitting on the goal	Links to 'knowledge sharing' in inter-firm collaborations management
Code	Real time information	ERP systems adoption and management could enable real time information and dynamic data transfer; which in turn facilitates decision making within the inter-firm collaborations	We wanted almost real time data which we could get via our own system. So we actually built front-end tools and move them into our native SAP [ERP] solution to allow us to do that	Links to 'operational improvements'
Code	Quick responsiveness	Quick responsiveness to the demand side of supply network can be achieved through ERP systems adoption and management	We want to be more responsive to external partners; we need to get the information from them and be able to respond automatically. Thus we set up connections between their ERP systems to ours	Influences the 'flexibility & agility' of competence and competitiveness

Tables 6.2 and 6.3 show the abstraction level of the code and category, its title, its definition or description, a representative example (i.e. empirical data) derived from the interview text reflecting its meaning, and comments which assisted its further analysis. These comments were derived from using techniques within NVivo 9.2 such as (node) links (in the *nodes browser*) by writing little memos and annotations concerning certain pieces of empirical data.

Particularly this process helped in identifying provisional core categories through the selective coding approach. These core categories would then become the building blocks for a new theoretical framework which moves the data analysis from a descriptive level to a more abstract and analytical level (Auerbach and Silverstein, 2003). Since a core category is the basis for theory generation/development (Glaser, 1978, p. 93) it needs to be constantly proven by its prevalent relationship to other categories. Glaser and Strauss (1967) identified several helpful criteria for selecting a core category:

- Centrality – the core category is related to many other categories
- Frequency – the meaning related to the core category must appear frequently in the (empirical) data
- Relation/Connection – the core category is easily relatable to other categories (and sub-categories)
- Implications – the core category shows clear implications for general theory
- Variation – the core category can build maximum variation into analysis

Besides considering these guidelines, Strauss and Corbin (1990) assert that a core category can be created (by giving the central phenomenon a name) or selected from the category list; and this research study primarily used the first approach. As a result, seven core categories (or abstract themes) were developed which have also been influenced by the *a priori* template categories derived from the basic research objectives in Stage 1 above. The result is shown in Table 6.4.

Table 6.4 Core categories of this research study

Template category (a priori)	**Objective**	**Core category (in vivo)**	**Definition/Description**
Inter-firm relationship status quo	Identification of current issues and practices associated with inter-firm collaboration and enterprise information systems development	Industrial impact	Factors that describe the characteristics of the industrial environment and their impacts on practices in the context of inter-firm collaboration and enterprise information systems development. Includes: Change Drivers, Change Aspects, and Coping Solutions
Inter-firm relationship structure design	Identification of issues related to the creation of inter-firm relationships and collaboration, and their design paradigm	(Multi-organisational) Enterprise structure and strategy design	Factors that are concerned with the design and development of inter-firm (i.e. enterprise) collaboration structure and strategy. Includes: Design Contingencies, Design Approaches, Strategic Roles, and Relationship Interfaces

Inter-firm relationship management	Identification of issues related to the management of inter-firm relationships and collaboration, and their collaborative activities	(Multi-organisational) Enterprise structure and strategy governance	Factors that are concerned with the execution and management of collaborative activities within the inter-firm (i.e. enterprise) collaboration, as well as the resultant benefits. Includes: Foundation, Facilitators, Outcomes, and Collaborative Activities
Inter-firm relationship contingency	Not identified before (*cf.* Stage 1)	Competence and competitiveness as main contingency factors	Inter-firm (i.e. enterprise) governance (and its ERP usage) is contingent upon the desired competitiveness and the competence of each individual company (within an enterprise); particularly a competence is considered as a bundle of skills/expertise and technologies that must be competitive unique, attractive, and transferable. Includes: Influencers, Features, Attributes, and Enablers and Developers
Information systems design	Identification of issues related to the configuration of ERP systems and their features within the context of inter-firm collaboration	ERP systems design	Factors that are concerned with the development and configuration of ERP information systems; particularly how their capabilities can/should be designed in support of inter-firm collaborations (this is contingent upon the types of enterprise). Includes: Motives, Evaluation, and Capabilities Supporting Enterprise
Information systems management	Identification of issues related to the management of ERP systems within the context of inter-firm collaboration	ERP systems management	Factors that are concerned with the execution and management of ERP information systems in the context of inter-firm collaborations, as well as the resultant benefits. Includes: Outcomes, Critical Successful Factors (CSFs), and (ERP Systems) Implementations
Organisational and people issues	Not identified before (*cf.* Stage 1)	Organisation and people management	Issues that consider the organisational change, people skills and knowledge management for the overall ERP-CEG portfolio governance. Includes: organisational management and people management

Once the core categories were identified and developed, the author set out to relate other categories to them whilst gradually densifying the theory by beginning to think about a general theoretical framework for the governance of ERP systems and multi-organisational (enterprise) collaborations, as well as how different ERP systems fit with different (multi-organisational) enterprise structures and strategies. At this point it was necessary to re-arrange codes (i.e. concepts), sub-categories and analytical categories in the Coding Master Table as well as the ‘trees’ in the *nodes browser* in NVivo 9.2 and even went back to further coding of the raw text in order to conform to the meaning or phenomenon that the core categories reflected; thus underpinning the key operations of iteratively applied constant comparison of Grounded Theory based methodological approach. As opposed to the 'orphan' codes it is unacceptable to have 'orphan' categories or sub-categories since all categories (and sub-categories) represent valuable codes that have been developed. The final code set resulting from this research project is shown in the NVivo 9.2's *nodes browser* in Figure 6.8.

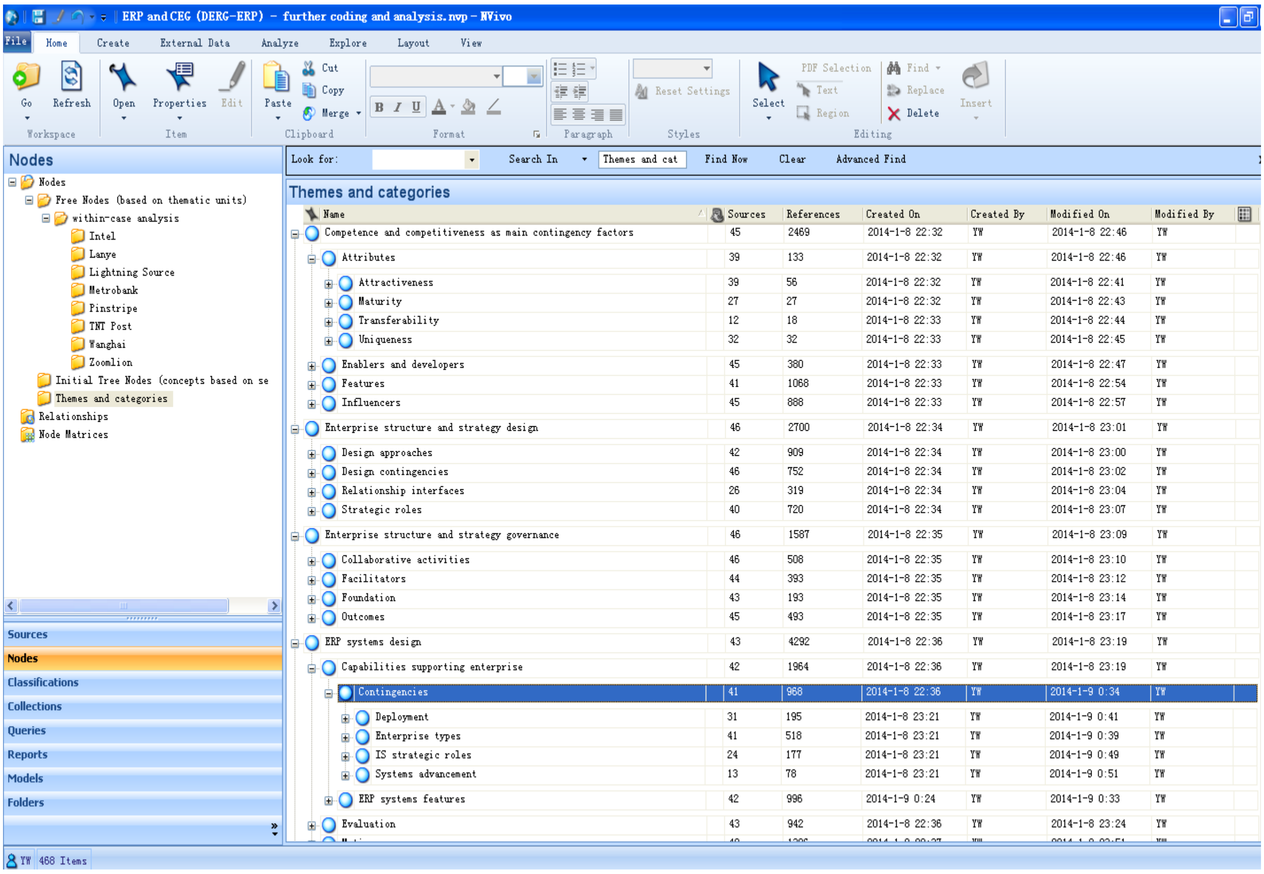


Figure 6.8. Code set including core categories, categories and sub-categories in the NVivo 9.2 node browser

In the left hand column of Figure 6.8 the 'trees' (i.e. code set) which include core categories, categories and sub-categories is shown. Due to space restriction on the screen not all trees could be opened completely; therefore not all 23 analytical categories and 19 sub-categories of the code set are presented in Figure 6.8. Similar to Figure 6.7 above, in the top right hand column the details of a selected item from the left hand column (in this case the sub-category 'contingencies of ERP system capabilities supporting enterprise') (together with other items) are given. It is specified which codes belong to this sub-category, how many passages have been coded with the respective code and when it was created and modified. This database represents the completed NVivo project "ERP and CEG (DERG-ERP) – further coding and analysis" which, however, does not yet reflect the very final results of the coding due to further re-coding process that took place in this research study as part of the theoretical sampling element of GTM.

In the first step of re-coding, the coding scheme was reviewed and re-developed by making minor changes and revisions, mainly in re-organisation of the codes and classifications of the individual code descriptions/definitions (as discussed in Sub-section 3.3.6 in Chapter 3). In the second step, the developed codes of the Coding Master Table were deductively applied to the interview text/transcripts (similar to theoretical coding or template analysis) in order to identify any redundancies or shortages in the coding from the raw text. This led to a subsequent refinement of the Coding Master Table – 6 new codes emerged, 8 codes were slightly renamed to reflect its analytical categories and sub-categories more accurately and concisely, and 2 'orphan' free nodes were merged due to their interdependency; this now leading to a set of 139 tree codes within 19 sub-categories, 23 (analytical) categories, 7 core categories and 5 'orphan' free nodes.

Once the re-coding was completed and all individual codes, sub-categories, analytical categories and core categories were identified, defined and provided with a text (empirical data) example, a frequency count was conducted to indicate how often each code occurred in the overall data set of 48 interviews. This does not contradict to the philosophical underpinnings of Grounded Theory based Methodology (GTM) based research in which positivistic techniques such as content analysis or word count can be used in a complementary sense (Suddaby, 2006). In this research study, repetitive occurrences were used since it is more clearly defined than magnitude estimations and therefore requires less subjective judgement (Krippendorff, 2004). The results are included in the Coding Master Table in a separate column stating the referenced interview in which the code was observed and the number of passages occurred in each referenced interview. The sum of all coded passages (i.e. references) generated an overall frequency figure provided in the lower right corner of the cell stating the code title/name.

The same example of category 'competence and competitiveness influencers' as in Table 6.2 (the core category 'competence and competitiveness') is used to demonstrate the difference between the initial Coding Master Table and the final design of Coding Master Table, seen in Table 6.5; while the example of category 'outcomes of adopting ERP systems' as shown in Table 6.3 (the core category 'ERP systems management') is replaced by another example – the category '(ERP systems) implementations', seen in Table 6.6, in order to present a completed structure of Coding Master Table that involves core category, category, sub-category, and individual code.

Table 6.5 Final design of Coding Master Table (example of core category ‘competence and competitiveness as main contingency factors’)

Category/Code	Definition/Description	Empirical example/data [#interview: paragraph[n]]	Coding
Competence and competitiveness as main contingency factors	Multi-organisational enterprise governance (and its ERP usage) is contingent upon the desired competitiveness and the competence of each individual company (within an enterprise); particularly a competence is considered as a bundle of skills/expertise and technologies that must be competitive unique, attractive, and transferable. Includes: Influencers, Features, Attributes, and Enablers and Developers	Not applicable	Referenced interview (number of passages therein[o]) (e.g. 3(15), 17(6))
(Competence and competitiveness) influencers	Critical factors influencing the competence and competitiveness	Not applicable	Not applicable
Competitive advantage 296	The possession and development of competence and competitiveness can be influenced by the company’s competitive advantage which is often considered as a core business activity or core competence	The speed of LS is the top one within the printing industry in the UK because we have got the print-on-demand strategy [#3: 62] I think we are really good at making our clients to collect the mail or the overall package on time; and we get them into our network on time. We have also built the SLAs (Service Level Agreements) into the contract [#24: 60]	1(13), 2(10), 3(21), 4(9), 5(3), 6(4), 7(14), 8(5), 9(9), 11(5), 12(17), 13(15), 14(2), 15(14), 16(8), 17(13), 18(5), 19(2), 20(5), 24(11), 25(10), 27(14), 30(2), 31(12), 35(7), 36(11), 37(12), 39(10), 41(7), 42(5), 43(4), 44(10), 45(4), 46(3)
Value added	The possession and development of competence and competitiveness are dependent upon the company’s contribution, value-added, or engage-ability to fulfil the final missions of multi-organisational collaborations	We have far-reaching distribution channels including Ingram book company. The meta-data of electronic book titles can be carried out globally [#4: 32] We are now working very closely with the ODMs (Original Design Manufacturers) to secure barebone	1(21), 2(9), 3(17), 4(11), 5(5), 6(2), 7(3), 9(3), 12(26), 13(7), 15(12), 16(8), 17(17), 18(5), 20(12), 22(2), 24(5), 25(11), 27(15), 31(14), 34(2), 35(7), 36(6), 37(12), 39(10), 41(3), 42(4), 43(8),

n The paragraph number can be easily retrieved by using ‘export document’ in NVivo9.2’s sources browser
o The number of coded passages (i.e. references) in each referenced interview can be obtained via NVivo9.2’s nodes browser

275		chassis of the laptop; the distributor will then purchase the mobile CPU from us and sell it at a better and more attractive price [#17: 4]	44(16), 46(2)
Scalability 128	The possession and development of competence and competitiveness are positively influenced by the company's scalability and flexibility in terms of its operations, business model, and organisational structure; particularly for the collaborative products and services	We cannot compete with the traditional printer on volume. But we have recently introduced a new offset printing service and so we need a partnership with an offset printer. Thus if customer's order is more than 2000 books we can go to an offset print instead of the print-on-demand solution [#4: 115]	1(1), 2(3), 3(11), 4(7), 5(3), 6(4), 7(2), 9(3), 12(5), 13(3), 15(4), 16(5), 17(4), 18(2), 19(2), 20(3), 22(5), 24(3), 25(7), 28(4), 29(8), 31(5), 33(2), 36(7), 37(4), 39(7), 41(3), 43(3), 44(5), 45(2), 46(1)
Company size 98	The possession and development of competence and competitiveness can be positively influenced by company size; particularly for the collaborative products and services	For our suppliers, I will be looking at the size of their business. We have got regular big suppliers who are very reliable. Also, what I hate to do is shut down my biggest downstream partner and customer [#2: 50]	1(17), 2(3), 3(17), 4(1), 7(2), 12(13), 13(3), 15(3), 18(2), 20(2), 23(1), 25(3), 26(1), 27(4), 31(2), 34(2), 35(2), 36(3), 37(3), 39(4), 43(3), 44(5), 45(2)
Integration capability 58	The competence and competitiveness are determined by the extent to which the company is integrated to its collaborative partners	We have set a B2B connection to go out to our logistics providers. They then send the response back to us to confirm the shipment. Also, they will give us the real time tracking information [#16: 63]	1(2), 5(2), 6(1), 7(1), 9(1), 12(3), 15(5), 16(4), 17(3), 20(1), 22(2), 25(2), 27(4), 28(2), 29(1), 31(5), 35(4), 36(1), 37(2), 39(2), 41(1), 43(4), 44(3), 45(1), 47(1)
Company history 33	The competence and competitiveness are partly determined by the company's reputation, historical structure, culture, business model, proven track record of success in multi-organisational collaboration	If the customers are new and do not have any trading history they will be put onto the credit check before they can get the services from us [#4: 56] We benefit from that because we are TNT – the one that has long standing brand position [#20: 12]	2(2), 4(2), 6(3), 7(1), 12(3), 15(2), 17(3), 20(2), 25(2), 27(2), 31(1), 35(2), 36(2), 37(2), 39(2), 44(2)

Table 6.6 Final design of Coding Master Table (example of core category 'ERP systems management')

Category/Code	**Definition/Description**	**Empirical example/data [#interview: paragraph]**	**Coding**
ERP systems management	Factors that are concerned with the execution and management of ERP information systems in the context of multi-organisational collaborations, as well as the resultant benefits. Includes: Outcomes, Critical Successful Factors (CSFs), and (ERP Systems) Implementations	Not applicable	Referenced interview (number of passages therein) (e.g. 3(15), 17(6))
(ERP systems) implementations	Factors that are concerned with ERP information systems implementation and project management in the context of multi-organisational collaborations	Not applicable	Not applicable
ERP vendors	Factors that are concerned with the responsibilities and activities of ERP vendors in adopting ERP information systems in the context of multi-organisational collaborations	Not applicable	Not applicable
ERP platform 103	Issues related to the types of ERP system platform offered by vendors in support of best ERP implementation practices within the context of multi-organisational collaborations	Our strategy for a number of years has been moving customers to RosettaNet; but actually most of our customers want to have EDI. Now we have what we call it the "Universal Gateway" so we are not going to push everybody to use RosettaNet platform; instead, they can either use RosettaNet [ERP] or use EDI [#15: 74]	1(3), 2(2), 3(2), 5(4), 6(1), 7(2), 8(2), 9(2), 12(4), 13(3), 15(9), 16(13), 17(2), 20(2), 21(3), 22(5), 25(9), 28(3), 29(2), 31(3), 32(2), 33(1), 34(1), 35(7), 36(3), 37(1), 42(2), 43(5), 44(3), 45(1), 47(1)
Operations 54	Multi-organisational ERP systems implementation partly rely on the operations of configuring and deploying ERP systems undertook by ERP vendors	The ERP vendor graphically analyzed our business process operations and identified the required key features of ERP systems to support our core business processes; they also deployed the web portals that enabled us to be better integrated with collaborative partners [#31: 52]	1(2), 5(3), 8(1), 12(4), 15(2), 16(7), 21(1), 22(4), 25(3), 28(4), 31(3), 35(8), 38(1), 42(2), 43(6), 44(3)
Consultancy	Multi-organisational ERP systems implementation partly rely on the	The ERP systems are all bespoke; even Oracle which is widely used	1(1), 4(2), 5(2), 8(2), 12(3), 15(3), 16(4),

40	ERP vendor consultants	across the globe is now totally spoken to LS how they work. So we could bring an external person from Oracle to teach our client services people how to do their job [#4: 176]	22(1), 25(1), 28(3), 31(2), 32(1), 35(6), 42(2), 43(4), 44(3)
ERP users	Factors that are concerned with the responsibilities and activities of ERP users in adopting ERP information systems in the context of multi-organisational collaborations	Not applicable	Not applicable
Implementation approaches 454	Issues related to the approaches of adopting ERP systems applied by users in support of best ERP implementation practices within the context of multi-organisational collaborations	We will run the new ERP information systems and legacy systems in parallel until the new systems is proved to run reliably [#3: 82] We are trying to fit our business processes around the technology rather than change the technology to fit our business processes; that is a mental shift of an organisation [#15: 10]	1(10), 2(4), 3(4), 4(5), 5(11), 6(7), 7(4), 9(6), 11(3), 12(18), 13(6), 15(27), 16(24), 17(8), 18(2), 19(3), 20(3), 21(8), 22(14), 24(3), 25(17), 26(5), 27(3), 28(11), 29(8), 30(3), 31(22), 32(5), 33(4), 34(3), 35(24), 36(10), 37(3), 39(5), 41(5), 42(8), 43(16), 44(11), 45(5), 47(3), 48(3)
Objectives	Explicit objectives are established by ERP users for systems implementation in the context of multi-organisational collaborations	We expect our new SAP ERP solution to align with our global management strategy, provide a unified, integrated IT platform and efficient working environment, and support differently structured multiple organisations requirements [#37: 78]	1(5), 2(4), 3(3), 4(3), 5(8), 6(3), 7(3), 9(4), 11(2), 12(11), 13(7), 14(1), 15(8), 16(10), 17(4), 18(2), 19(1), 20(4), 21(7), 22(5), 24(1), 25(9), 27(3), 28(6), 29(4), 31(2), 32(5), 33(3), 34(4), 35(10), 36(5), 37(3), 39(4), 40(1), 41(2), 42(5), 43(11), 44(10), 45(3), 47(3), 48(2)

191			
Management commitment 176	Multi-organisational ERP systems implementation partly rely on a high level of top management commitment from both individual company and (multi-organisational) 'enterprise'	ERP implementation – particularly within the context of inter-organisational collaborations, would be a long process, generally running into several months. Keeping an activity alive for such long duration would be nearly impossible without top management commitment [#43: 86]	1(1), 2(2), 3(1), 4(2), 5(4), 6(7), 7(3), 9(3), 12(14), 13(3), 15(8), 16(15), 17(3), 20(2), 21(2), 22(4), 25(5), 28(5), 31(8), 32(6), 35(12), 36(8), 37(3), 39(3), 40(4), 41(3), 42(5), 43(13), 44(15), 45(3), 46(1), 47(4), 48(4)
Training 129	Training is used to facilitate change management and knowledge sharing during ERP systems implementation in the context of multi-organisational collaborations	My job was to roll out the CPR programs to the customers; so I am going to train them on the programs, set them up and establish them with our partners in IT to set up the [ERP] systems available to the customer when you get everything rolling [#16: 10]	1(4), 3(1), 4(6), 5(4), 6(2), 7(2), 9(3), 12(3), 13(3), 15(7), 16(8), 17(6), 20(3), 21(4), 22(5), 25(6), 26(3), 28(3), 31(2), 32(5), 33(2), 35(14), 36(4), 37(1), 42(2), 43(11), 44(4), 45(4), 46(1), 47(3), 48(3)
Inter-firm trust 108	Inter-firm trust should be managed properly by ERP users during systems implementation in the context of inter-firm collaborations	Inter-firm trust, uncertainty and proactive environmental management most directly affect the extent to which firms engage in cooperative supply chain management and the adoption of corresponding ERP systems [#39: 102]	1(2), 4(1), 5(2), 6(4), 7(3), 9(2), 11(2), 12(3), 15(3), 16(6), 17(3), 20(1), 22(2), 25(4), 26(1), 28(4), 31(8), 35(12), 36(5), 37(8), 39(9),41(2), 42(3), 43(6), 44(8), 45(2), 46(2)
Operations processes reengineering	Multi-organisational ERP systems implementation requires the users' operational processes to be reengineered and managed properly	We went through the CPR (Customer Business Process Engineering) program where we basically decided how we were going to use this new supply chain module of SAP's, in order to do business through the way that we	5(3), 6(2), 9(2), 12(9), 15(5), 16(12), 20(1), 22(2), 25(4), 27(2), 28(4), 30(1), 31(4), 35(6), 36(2), 39(1), 41(1), 42(2), 43(10), 44(4)

77		want to do business. [#12: 86]	

As can be seen in comparison to Table 6.2, new code termed ‘scalability’ has been added into Table 6.5 during the re-coding process. Furthermore, some of the code definitions/descriptions (and titles) shown in Tables 6.5 and 6.6 have been refined. The column occupying the former comments has been replaced with the representation of the referenced interviews and number of passages which resulted in the frequency counts given for each code. The codes are now organised in accordance to their frequencies in a descending order in the Coding Master Table to better reflect their importance and impact. Although this provides opportunities to assess the extent and severity of certain aspects (e.g. a code) and even allows to draw some tentative conclusions, frequencies only represent a summary of qualitative data and not a shift from qualitative to quantitative data (Auerbach and Silverstein, 2003).

Figure 6.10 shown below presents the final hierarchical layout of the codes, sub-categories, categories and core categories of the Coding Master Table. The little grey boxes in bottom right corner of each code indicate their frequency count. In order to facilitate the understanding a more generic diagram based on earlier work (Clegg and Wan, 2013) is presented upfront in Figure 6.9 which only depicts the grey shaded boxes (in three different tones) from Figure 6.10 reflecting the top level core categories and their related categories and sub-categories; the core categories and their corresponding template categories (see white boxes in Figure 6.9) are also interrelated. Subsequently, Coding Diagram illustrates the full layout. It is advised that the Coding Master Table and the Coding Diagram are read together in order to get a better understanding of the logic and meaning of the coding (process).

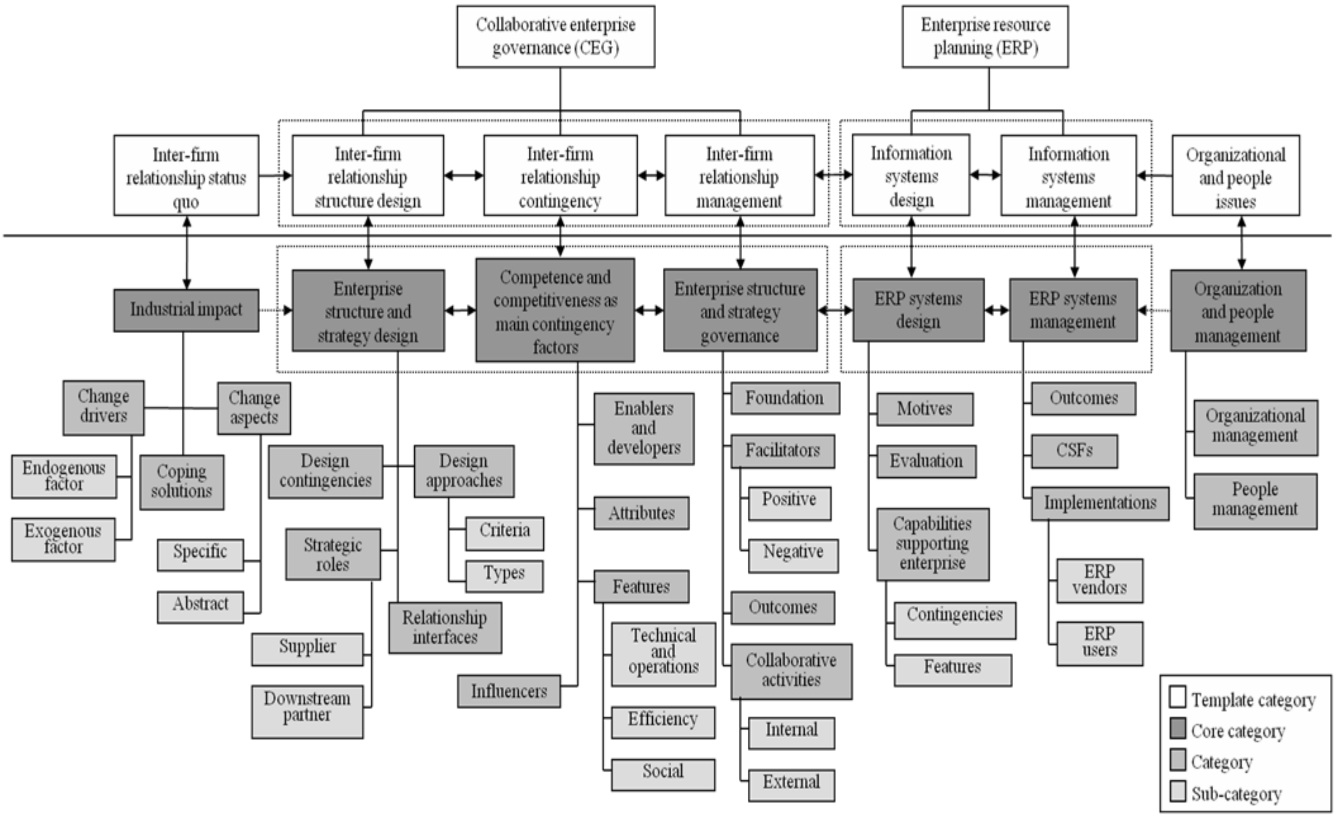
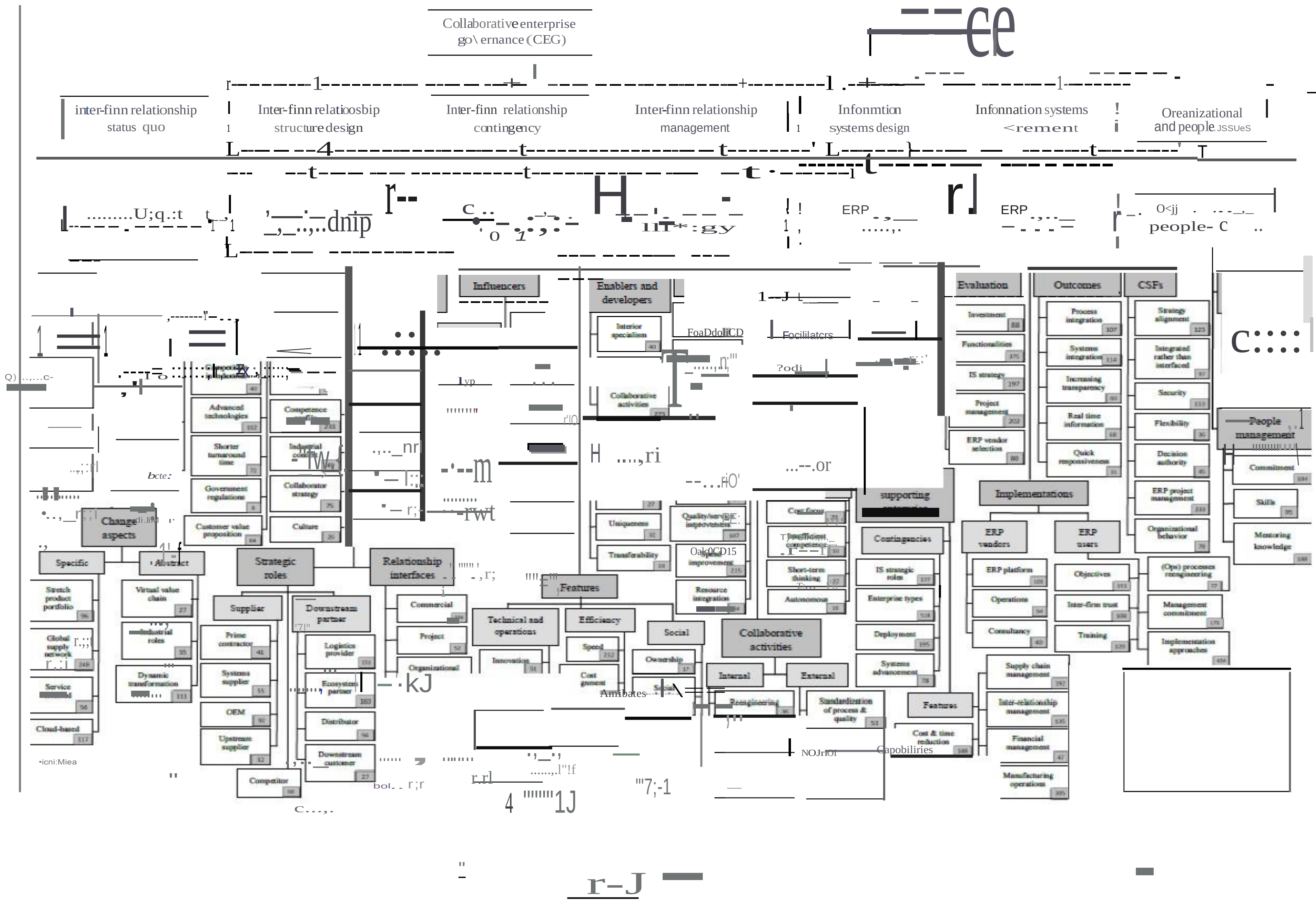


Figure 6.9. Generic coding diagram


Inter-firm relationship status quo
Inter-firm relationship management
Information systems design
Influencers
Enablers and developers
Evaluation
Outcomes
CSFs
Investment
Functionalities
IS strategy
Project management
ERP vendor selection
Process integration
Systems integration
Increasing transparency
Real time information
Quick responsiveness
Strategy alignment
Integrated rather than interfaced
Security
Flexibility
Decision authority
ERP project management
Organizational behavior
People management
Commitment
Skills
Mentoring knowledge
Implementations
ERP vendors
ERP users
ERP platform
Operations
Consultancy
Objectives
Inter-firm trust
Training
Management commitment
Implementation approaches
Contingencies
IS strategic roles
Enterprise types
Deployment
Systems advancement
Supply chain management
Inter-relationship management
Financial management
Manufacturing operations
Change aspects
Specific
Abstract
Stretch product portfolio
Service
Cloud-based
Virtual value chain
Industrial roles
Dynamic transformation
Advanced technologies
Shorter turnaround time
Government regulations
Customer value proposition
Culture
Collaborator strategy
Strategic roles
Supplier
Downstream partner
Prime contractor
Systems supplier
OEM
Upstream supplier
Competitor
Logistics provider
Ecosystem partner
Distributor
Downstream customer
Relationship interfaces
Commercial
Project
Organizational
Features
Technical and operations
Efficiency
Social
Innovation
Speed
Ownership
Collaborative activities
Internal
External
Reengineering
Standardization of process & quality
Cost & time reduction
Uniqueness
Transferability
Resource integration
Cost focus
Short-term thinking
Autonomous
Interior specialism
Focilitators

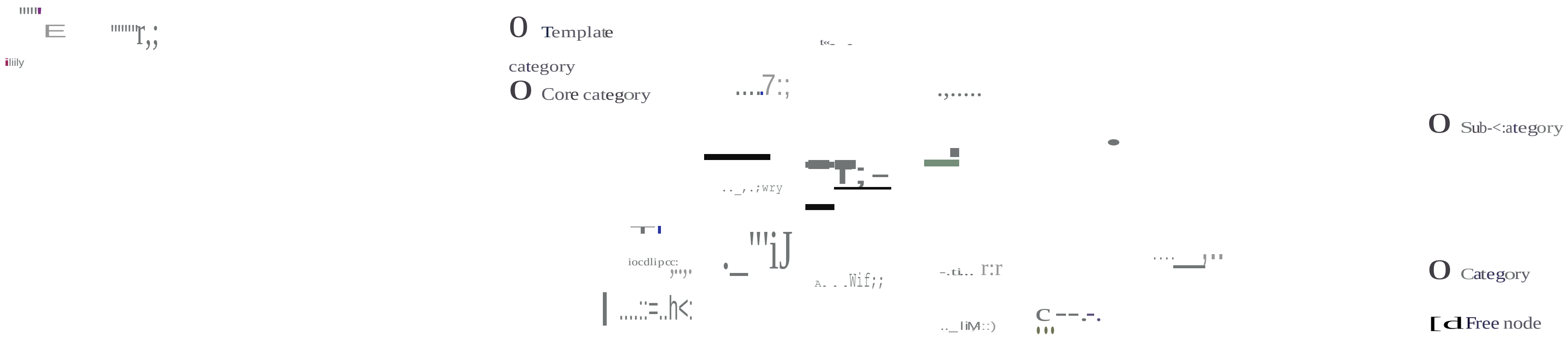


Figure 6.10. Coding diagram

6.1.5 Stage 5: Formation of theoretical narratives and propositions

The final stage of coding and empirical data analysis involved the transformation of core categories (or abstract themes) with all their subordinate categories, sub-categories and individual codes into a theoretical narrative leading to the generation of a set of tentative propositions. A theoretical narrative (and the related propositions) explicates the story of a core category in relation to the research questions using the subjective perspective of the research participants rather than academic parlance; thus grounding the narrative in the empirical data. **This is accomplished through a style of presentation that alternates between 'telling' (extensive theoretical elements) and 'showing' (live excerpts)** (Booth, 1961). It not only provides the abstract bridge between the research topic and objectives and the participants' subjective experience but also includes experiential data in the form of the researchers' theoretical background knowledge and experience within the narrative (Auerbach and Silverstein, 2003, p. 73). Therefore, *these narratives help to lift the empirical data onto a conceptual level by abstracting subjective experiences into theoretical statements* (Suddaby, 2006).

At this stage the frequency count conducted above proved useful as a guide towards evaluating the importance of the numerous codes. Although none of the individual codes were generally omitted from the narratives because of a low frequency number, the propositions were mainly formed on the basis of codes with higher frequencies. In the following, the detailed storyline of each core category followed by the respectively derived propositions that summarise the key aspects of the narrative (as perceived by the author) is given. The author also quotes directly from interview transcripts that include dramatic segments of on-the-spot field notes dropped by informants (Glaser and Strauss, 1968), in order to increase the credibility of theoretical narrative and propositions.

For the purpose of ensuring **transparency** and **traceability** for the reader, a diagram showing the coding of the respective core category is presented at the beginning of each sub-section. This is followed by a table summarising the code name, the number of frequency (i.e. reference), the number and ratio of source (i.e. referenced interview), and the coverage[p] of each individual code. Additionally, some of the core category coding diagrams include the *dashed boxes* containing related initial free nodes (which were not involved in Figure 6.10) to better support the theoretical narratives. Furthermore, the relevant categories and codes from the Coding Master Table and the main coding diagram in Figure 6.10 are put in brackets after relevant text passages during the narrative (*Category* in title case; *code* in lower case). Hence it is advised to read the narratives together with the Coding Diagram and the Coding Master Table.

However, for clarity reasons it is also important to mention that although the narrative of each core category is mainly based on the relationships of its related codes (as shown in the diagram at the beginning

p The importance of code can be evaluated in terms of the length and amount (i.e. proportion) of coded passages of each sub-section), there are various spillovers to other core categories and their subordinate categories and sub-categories. This is due to the interrelation of the various codes that emerges from the qualitative and complex nature of the (empirical) data.

Inter-firm relationship status quo – Industrial impact

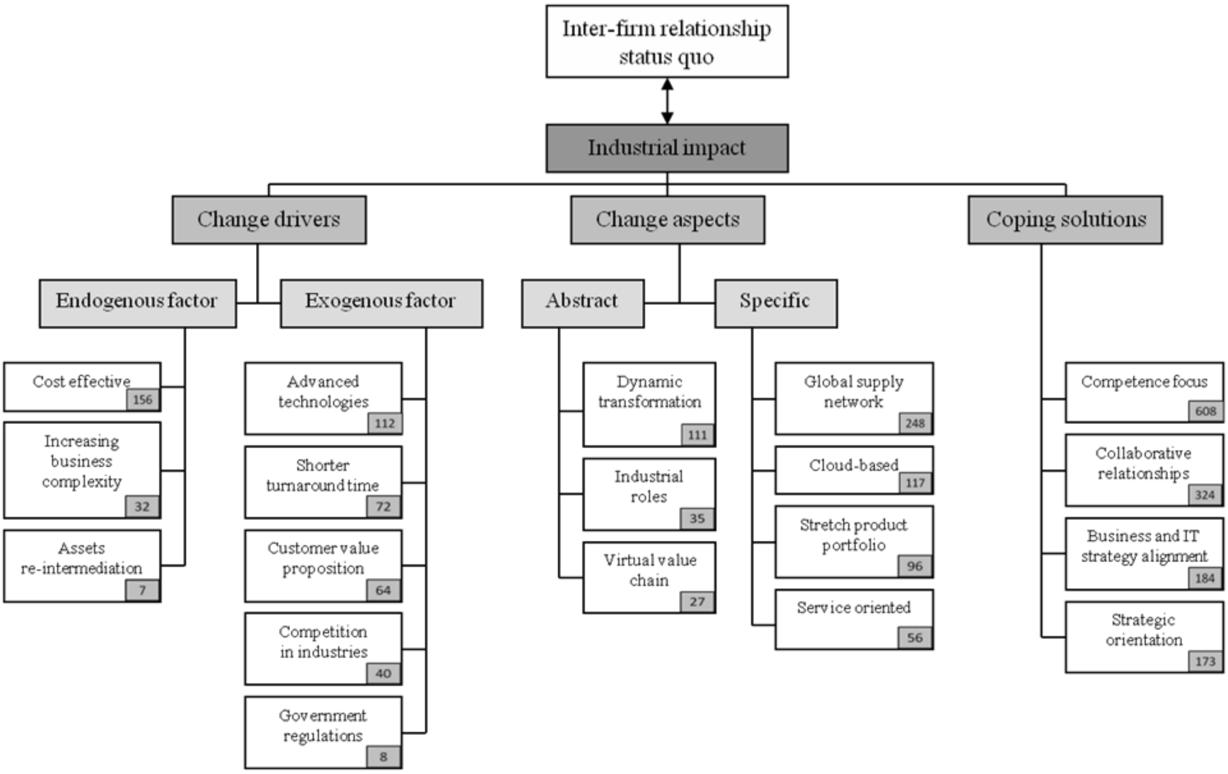


Figure 6.11. Coding of the core category ‘industrial impact’

Table 6.7 Occurrence and proportion of code in core category 'industrial impact'

Core category: industrial impact					
Category (sub-category)	Individual code	Frequency [#]	Source [#]	Source [in %]	Coverage [in %]
Change drivers (endogenous factor)	Cost effective	156	32	66.7	5.6
	Increasing business complexity	32	13	27.1	1.4
	Assets re-intermediation	7	3	6.3	1.2
Change drivers (exogenous factor)	Advanced technologies	112	40	83.3	4.5
	Shorter turnaround time	72	17	35.4	2.8
	Customer value proposition	64	24	50.0	3.3
	Competition in industries	40	15	31.3	1.9
	Government regulations	8	3	6.3	0.7
Change aspects (abstract)	Dynamic transformation	111	32	66.7	3.1
	Industrial roles	35	23	47.9	4.0
	Virtual value chain	27	26	54.2	3.4
Change aspects (specific)	Global supply network	248	40	83.3	13.7
	Cloud-based	117	16	33.3	2.1
	Stretch product portfolio	96	37	77.1	2.3
	Service oriented	56	35	72.9	2.2
Coping solutions	Competence focus	608	44	91.7	26.4
	Collaborative relationships	324	39	81.3	13.8
	Business and IT strategy alignment	184	31	64.6	5.0
	Strategic orientation	173	36	75.0	2.6

The purpose of analysing and discussing empirical data along with relevant narratives of the core category "industrial impact" is to identify current issues and practices associated with multi-organisational collaboration and ERP systems development. Attaining cost effective solutions (*cost effective*) and economies of scale is a common business objective for both manufacturer and service provider engaging in manufacturing, servitised manufacturing, and pure service industries where competition is marked by shorter product (or service) life cycles (*shorter turnaround time*) and greater variety of product (or service) segments (*stretch product portfolio*). Also, global competition (*competition in industries*) together with market demands for customised products and services delivered just-in-time (*service oriented*) place tremendous pressures on companies. The main reasons triggering this phenomenon are twofold. Firstly, customer requirements (*customer value proposition*) surrounding (product and service) quality, the surety of supply (*stability and reliability*), product performance, delivery times (*shorter turnaround time*) and innovation are changing even more rapidly. Manufacturing companies, in contrast to any service-based companies, are particularly subject to the challenge of effective inventory management (*cost effective*). To meet such stiff conditions, manufacturers and service providers have to respond by forming close multi-organisational relationships with their upstream suppliers and downstream partners (e.g. distributors and customers) (*collaborative relationships*) whilst moving away from the traditional 'make-to-stock' production model to the 'on-demand' (or 'build-to-order') customer service model (*service oriented*;

strategic orientation). As a consequence, "*the requirements concerning the whole supply network as well as the individual organisation embedded in it have increased*" (Chief Executive Officer, Wanghai, 20th July 2011)*.

Secondly, the fast evolution of information systems and technology and intelligent software (*advanced technologies*) appears to promise the ability to improve the cost effectiveness (*cost effective*), increase the product (or service) segmentation (*stretch product portfolio*), and decrease the lead times (*shorter turnaround time*); this in turn drastically changes the industrial landscape and the operational processes. On the other hand, the advent of enterprise information systems – particularly Enterprise Resource Planning (ERP) systems along with their upgraded adjunct technologies (*advanced technologies*) not only enables an effective operational performance but also provides opportunities to achieve collaborative business or even higher collaboration in virtual settings (*global supply network*; *virtual value chain*).

> "*We chose the improved functionality of SAP ECC (ERP Central Component) to launch into [ERP] EDI eCommerce, and in the process, achieve its vision of seamless inter-company transactions across international boundaries*." (Chief Information Officer, Zoomlion, 12th August 2011)*

The emerging global economy is rapidly replacing local markets; and "*this have led to a situation where local competition and markets (competition in industries) operate in the context of global [supply chain] standards*" (*global supply network*) (Chief Executive Officer, Metrobank, 18th August 2011)*. Although this open infrastructure allows manufacturers and service providers to work more closely with their suppliers and customers across the whole value chain (*virtual value chain*), the resulting complex interdependencies will lead to more (business) complexity in overall product and service development and processes (*increasing business complexity*). To simplify the impact of this complexity, companies need to create a holistic, real-time integrated decision-making environment (*decision making*; *strategic orientation*) where proactive operational decisions at every (collaborative) business level (*collaborative relationships*) can be made. Besides, the increasing market and operational complexities (*increasing business complexity*) requires companies to use a 're-intermediation mechanism' to reconcile their business assets (*assets re-intermediation*).

> "*Because our national business are running the transportation logistics and mail delivery business, they are predominately 'hybrid sales offices'. So there is a lot of reconciliation and data flow which goes between the region and the national structured business – not only on an invoicing point of view but it is also the data which we needed.*" (Senior Financial Controller, TNT Post, 4th July 2011)*

From an information systems and technology perspective, advances in the field of computer networks and telecommunications (*advanced technologies*) have increased the significance of e-commerce in which more and more value chain activities are conducted electronically (*virtual value chain*). Accordingly a number of distinct advantages can be offered by virtual value chain over the physical value chain; some of these advantages lie in forging strategic alliances between suppliers, customers, and manufacturers or service providers (*collaborative relationships*) with effects of saving time, cost, and space in an efficient operational process (*cost effective*). Nevertheless, this also creates the difficulties in developing advanced collaborative information systems and technologies (*advanced technologies*) to support different stages throughout the whole collaborative product or service life cycle (*global supply network*; *virtual value chain*). Therefore, more flexible ERP systems infrastructures need to be designed and implemented (*ERP platform*; *flexibility*; *implementation approaches*) in order to leverage the potential benefits of agile collaborative networks (*(ERP) capabilities supporting enterprise*; *global supply network*; *inter-firm collaboration*). Simultaneously, the 'on-demand' strategy raises the need for greater visibility (*increasing transparency*) among the supply chain to ensure customisation and rapid delivery of innovative products and services. These considerations along with higher IT cost pressure (*cost effective*) create an increasing orientation towards 'cloud-based ERP' or 'on-demand ERP' solutions (*cloud-based*).

> "*The scheduling process before was two to three hours per day. Now, with the Alutex [ERP] Production Scheduler, it is taking 10-20 minutes; so the schedulers have visibility into real-time information, and can provide up-to-date demand, supply and inventory data.*" (Logistics Director, Lanye 19th July 2011)*

In addition to the above change drivers, for every new (collaborative) product or service development and upgrade, government regulations are also important drivers that have to be considered and implemented (*government regulations*). Good practice examples are "green production mode" in concrete manufacturing industry and "governmental regulatoion and compliance" in the banking industry. Although these drivers are considered crucial they are not always completely fulfilled due to shorter product or service life cycles (*shorter turnaround time*) and cost competition (*competition in industries*; *cost effective*). Also, these enforced requirements (*government regulations*) will constantly increase the complexity of business environment as well as (collaborative) product and service development (*increasing business complexity*).

The outlined endogenous and exogenous factors make it increasingly difficult for manufacturers and service providers to perform the complex product and service development, as well as production and servitised activities on their own; this leads to increased outsourcing activities (*competence focus*), more integrated multi-organisational collaborations (*collaborative relationships*), and a change in roles of players in the industry (*industrial roles*). On the one hand, companies must take a smarter, more objective-driven and process-wide approach (*strategic orientation*) to product (or service) design and manufacturing. Thus they will contract or sub-contract out more and more activities whilst retain core-performing activities (*assets re-intermediation*; *competence focus*) which will result to a more dependency to strategic partners (*collaborative relationships*). This arrangement will also lead to a decentralised supply chain management (a.k.a. discrete manufacturing or service) and one without the necessities of incurring the cost of owning all the players across the entire virtual value chain (*cost effective*; *virtual value chain*). On the other hand, in the context of higher price competition (*competition in industries*), increased complexity (*increasing business complexity*), and shorter lead time (*shorter turnaround time*), the types of multi-organisational relationships have moved from an arms-length transaction towards the vertically integrated-, extended- or virtual relationships (*(Enterprise) types*). This requires companies to work with suppliers, customers, third-party cooperators and even former competitors more closely (*collaborative relationships*), in order to reduce the complexity of relationship interfaces (*Relationship interfaces*) and collaborative operational processes and hence the overall cost (*cost reduction*), and easily adapt to market changes and uncertainties via the greater flexibility and agility (*(Enterprise governance) outcomes*).

> "*There are a lot of areas where you find yourself on the one hand being a partner and on the other hand being a competitor. You end up in this complicated environment where you are both competitors and allies at the same time.*" (Supply Chain Programme Manager, Intel, 23rd May 2011)*

During any strategic development of multi-organisational collaborations and ERP systems adoption, companies have to position themselves in their supply chain (*strategic orientation*). The decision as to how many activities in the chain to occupy (*competence focus*) and which ERP systems capabilities are imperative (*(ERP systems design) motives*; *(ERP systems design) evaluation*) have to be made (*decision making*). This will also stimulate a consolidation and change of operational processes amongst value members within the same (virtual) value chain (*dynamic transformation*; *reengineering*; *virtual value chain*) along with dynamic establishment and re-establishment (*dynamic transformation*) of new partnerships or mergers and acquisition (M&A) deals of existing partners (*(Enterprise) types*). The idea is to acquire co-specialised complementary assets necessary to better fulfil the higher performance requirements while sustaining the competitive advantages (*assets re-intermediation*; *competence focus*; *Competence and competitiveness as main contingency factors*). Moreover, the challenges emerging from the collaborative partnerships in the context of increasing competitive markets are not only to realise competitive prices (*competition in industries*) but also to shift from manufacturing to the 'servitisation' strategy (*service oriented*); this also requires a stronger focus on competencies (*competence focus*) across servitised products, service segments, and servitised operational processes for the development of collaborative product and service.

> "*I think we have changed our business model based on the way that the industry was changing … other than some recent acquisition the outsourcing [strategy] gives us the competitive advantage.*" (Supply Chain Tech., Intel, 23rd May 2011)*

The combination of the endogenous factors (namely *cost effective*, *increasing business complexity*, and *assets re-intermediation*) and exogenous industrial forces (namely *advanced technologies*, *shorter turnaround time*, *customer value proposition*, *competition in industries*, and *government regulations*) mentioned above drove and still drives the change aspects (i.e. *dynamic transformation*, *industrial roles*, *virtual value chain*, *global supply network*, *cloud-based*, *stretch product portfolio*, and *service oriented*) in both manufacturing and service-based industries. To combat these, companies can no longer be seen in isolation; they must be seen in the context of the total business and the associated key linkages of the business through muti-organisational collaborations (*collaborative relationships*). Additionally, the 'on-demand' strategy with required process-wide approach and real-time integrated decision-making environment (*strategic orientation*) push the companies to develop core competence and strategic capabilities within the company, while outsourcing peripheral activities from the member-company (*competence focus*). Furthermore, aligning business and IT/IS strategy in collaborative organisational settings is a complex endeavor (*business and IT strategy alignment*). Yet, this is important because improved business and IT/IS strategy alignment (*business and IT strategy alignment*) entails a more efficient use of IT/IS (investment) in the multi-organisational relationships and collaborations supporting the integration of enterprise information systems (ERP systems) and operational processes across organisational boundaries. Thereby companies engaged in the collaborative supply network (*global supply network*) need to assess the current state of alignment and take appropriate action to improve it where needed (*decision making*).

> "*Our main [ERP] platform is Oracle. We also use other databases [systems] for our content management – we choose the Pollux to help us store the books for our customers here at Lightning Source.*" (IT System Manager, Lightning Source, 25th March 2011)*

The above insights and discussion on industrial impact (i.e. the status quo of inter-firm relationship and its challenges) are summarised in the following propositions #1 and #2.

Tentative proposition #1: *Change in the manufacturing and service-driven industries is driven by a combination of dynamic globalization, internal organisational issues and general industrial forces*

Tentative proposition #2: *Increasing business complexity, cost-effectiveness and shorter turnaround time requires organisations to move towards more ERP systems-enabled collaborative strategies*

Inter-firm relationship structure design – Enterprise structure and strategy design

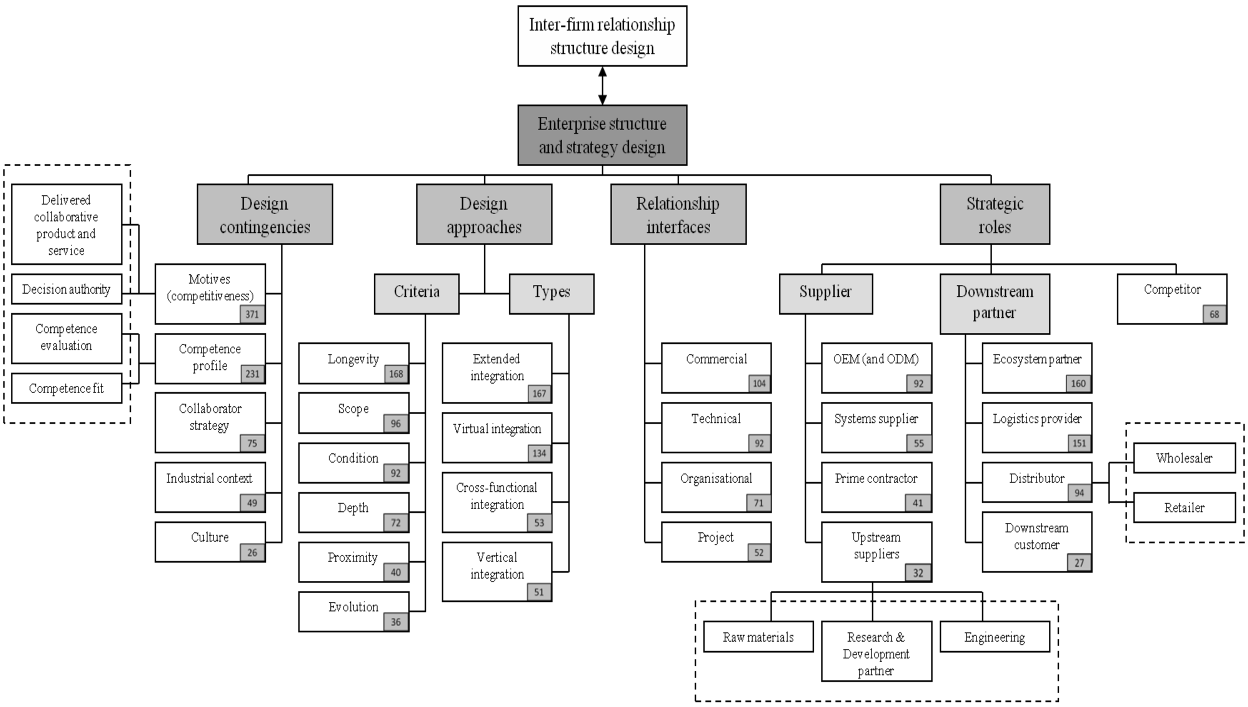


Figure 6.12. Coding of the core category 'enterprise structure and strategy design'

Table 6.8 Occurrence and proportion of code in core category 'enterprise structure and strategy design'

Core category: enterprise structure and strategy design					
Category (sub-category)	Individual code	Frequency [#]	Source [#]	Source [in %]	Coverage [in %]
Design contingencies	Motives (competitiveness)	371	46	95.8	28.3
	Competence profile	231	44	91.7	18.3
	Collaborator strategy	75	27	56.3	1.6
	Industrial context	49	36	75.0	2.0
	Culture	26	19	39.6	1.1
Design approaches (criteria)	Longevity	168	34	70.8	5.8
	Scope	96	27	56.3	2.3
	Condition	92	16	33.3	1.6
	Depth	72	20	41.7	2.8
	Proximity	40	36	75.0	3.3
	Evolution	36	15	31.3	1.4
Design approaches (types)	Extended integration	167	40	83.3	16.6
	Virtual integration	134	24	50.0	8.3
	Cross-functional integration	53	31	64.6	4.2
	Vertical integration	51	17	35.4	3.9
Relationship interfaces	Commercial	104	16	33.3	1.5
	Technical	92	21	43.8	2.2
	Organisational	71	16	33.3	1.7
	Project	52	24	50.0	2.1

Strategic roles (supplier)	OEM (and ODM)	92	9	18.8	1.0
	Systems supplier	55	18	37.5	1.6
	Prime contractor	41	10	20.8	0.8
	Upstream suppliers	32	30	62.5	2.3
Strategic roles (downstream partner)	Ecosystem partner	160	33	68.8	1.6
	Logistics provider	151	19	39.6	1.3
	Distributor	94	38	79.2	1.4
	Downstream customer	27	20	41.7	1.3
Strategic roles	Competitor	68	32	66.7	1.7

The purpose of analysing and discussing empirical data along with relevant narratives of the core category "enterprise structure and strategy design" is to identify the issues related to the creation of multi-organisational relationships and collaboration, and their design paradigm. The decisive industrial impact factors as identified above force companies to identify, improve and (partly) automate their core business processes; whilst at the same time outsource non-core processes to business partners (*collaborative relationships*; *competence focus*). This means that individual organisations are required to extend their resources, control structures and information systems, while protecting their market niche; in such a way, they become attractive partners for organisations (*attractiveness*) which offer products or services that are complementary to their own products/services (*value added*). For this reason, the design of multi-organisational relationship structure and strategy need to shift from a bottom-line based orientation (*cost focus*; *short-term thinking*; *(excessively) autonomous*) to a more strategic outsourcing orientation (*competence focus*; *collaborative relationships*) by involving the aspects such as competence, innovativeness and the ability of managing sub-contracted partners in the relationship paradigms design and the key business partner selection decisions (*(Competence) features*; *competence profile*).

> "*The other thing that is quite key is about the relationship with intermediaries such as mailing houses because most 'direct mail' customers, in comparison to those large transactional mailers who have their own prime facilities, do not tend to produce their own direct mail in-house; they will use a series of different mailing houses.*" (Group Services Director, TNT Post, 2nd June 2011)*

The design of multi-organisational relationship structure and strategy is mainly influenced by the competitiveness achieved via multi-organisational collaborations (a.k.a. motives or value drivers) (*motives (competitiveness)*). This drives managers to re-evaluate the organisation's value propositions and value creation capabilities. In the context of manufacturing (i.e. production-based) industries such as electronics, traditional printing and construction (*industrial context*), establishing multi-organisational relationships is crucial to expand market share, reduce cost and time in product development (*cost reduction*), increase quality of product (*quality/service improvement*), improve inventory management (*cost effective*), and make the very best and standard ecosystem processes (*resource integration*; *standardisation of process &*

quality). By contrast, in the context of servitised manufacturing and purely service-based industries such as digital printing, logistics, and banking (*industrial context*), the main concerns of setting up multi-organisational partnerships are depicted as lead times and inventory reduction (*cost effective*), rapid access to markets (*speed improvement*), quality product-service solutions that create higher value for customers (*quality/service improvement*), and more flexible & reliable service offerings (*customer value proposition*; *service oriented*). These motives are also indicated by the tentative proposition #2 shown above.

The motives and value drivers (*motives (competitiveness)*) of configuring the (multi-organisational) enterprise structure are particularly affected by the creation of complex and entirely customised products or services delivered through supply network (*delivered collaborative product and service*; *global supply network*; *increasing business complexity*), and decision making parties within each organisation (*decision authority*) engaged in the whole virtual value chain (*virtual value chain*). On the one hand, multi-organisational cooperation can be of strategic importance for those who wish to offer complex state-of-the-art products and services to their customers. Companies who solely focus on improving their internal processes (*(excessively) autonomous*; *proximity*) will have little influence over the significant part of the production of their collaborative products or the delivery of their collaborative services; therefore they will need to actively engage with their key partners to attain real competitive advantages (*competitive advantage*; *motives (competitiveness)*) under different circumstances (*industrial context*). Consequently, this combination of specialists (*interior specialism*) cooperating closely in delivering different complex products and services results in various approaches of collaborative architecture design and organising principles (*(Enterprise) design approaches*; *proximity*). On the other hand, multi-organisational collaboration is not just about developing close relationships at an operational level of activity, but also needs to be implemented at a strategic level with tactical decision-making in the organisations across the supply network (*decision authority*; *global supply network*). The main areas with different focuses participating in the decision making process in the context of multi-organisational collaboration cover purchasing, research and development (R&D) planning, quality assurance, inventory control and logistics. Purchasing selects and evaluates suppliers based on price and cost issues (*cost alignment*; *cost effective*); R&D planning requires connecting of technical know-how, competencies for products or services development, and specialised information (*innovation*; *interior specialism*; *technical intelligence*); quality assurance based on general quality and maturity of products, services and operational processes (*organisational performance*; *quality/service improvement*; *stability & reliability*); inventory control requires cost effectiveness, flexibility and shared risks (*cost effective*; *flexibility & agility*); and logistics based on delivery criteria (e.g. speed and reliability) (*flexibility & agility*; *speed*). Also, in the collaborative context, decision authority does not refer to the ability of one organisation to formally direct the actions of another, but rather the right to make decisions or even the joint decisions which are crucial to the multi-organisational collaboration (*decision authority*)..

"*We print something and then what we stock for our customers is their stocking levels that they have actually asked us to hold. Now part of thing we might do is to ask them to assist us with the stocking levels.*" (Managing Director, Pinstripe, 28th March 2011)*

Additionally, the design of multi-organisational relationship structure and strategy is greatly contingent upon the company's core competence (*Competence and competitiveness as main contingency factors*; *competence profile*). Organisational manager – particularly the decision makers therefore need criteria that allow them to decide with who they need to cooperate, and which means and structures they need to invest in. in doing so, they are assessing partner's competence (*competence evaluation*; *competence fit*; *competence profile*; *decision authority*) and configuring their own network. In other words, key questions are less concerned with the make-or-buy dilemma than with whom to collaborate in multi-organisational collaborative activities and how to choose the optimal multi-organisational (enterprise) relationship, structure and strategy in a supply network environment. It is supported by the fact that conventional manufacturers are increasingly collaborating with innovative component suppliers and ODMs (*Suppliers*) outside their traditional supply base that add value (e.g. co-engineering) and increase the network's competitiveness with their specific competencies and know-how (*competence profile*; *value added*); which are built and gained based on the manufacturers' outsourcing activities (*Collaborative activities*; *collaborator strategy*). In such case of aiming for innovation leadership on the market and unique selling points to differentiate from market competitors (*attractiveness*; *uniqueness*; *competence profile*), good strategic collaboration with competent partners is inevitable for success (*collaborative relationships*). However, as soon as the innovation matures or in situations where the manufacturers (or service providers) pursue a follower strategy in terms of the product and service profile (*maturity*), cost, efficiency, flexibility and reliability issues are emphasised to realise economies of scale (*(Competence features) efficiency*; *stability & reliability*).

"*We select suppliers on the basis of two factors: first, they have to have their manufacturing operations located in a geographical proximity of no more than 250 kilometres to our manufacturing facility. Second, they have to deliver major volume raw materials on at least a daily basis to us.*" (Inventory Manager, Wanghai, 20th July 2011)*

This implies that the potential to create a competitive advantage through the complementation of other partners' competencies within the supply network is important (*competence fit*; *competence profile*; *collaborative relationships*; *motives (competitiveness)*). Hence, it is often not so much a question about whether one business partner has a more sophisticated competence than another in absolute terms but whose competencies complement the core capabilities and know-how of the (focal) manufacturer or service providers in the best way because these companies are only interested in "*buying suitable competencies*" (Regional Director, Zoomlion, 4th September 2012)*. In turn, the organisational managers need to take into account the upgradation, learning, development and abandonment of dynamic core competences in relation to internal and external fit (*competence evaluation*; *competence fit*) within different value network configurations (*virtual value chain*).

> "*The collaboration strategy is very much depends on your own competence base and the competencies of your partners (e.g. the appraisal corporations). If they have the suitable competences, it is possible that we outsource the tasks such as assets mortgage and collateral to them.*" (Chief Operation Officer, Metrobank, 18th August 2011)*

Moreover, the design of multi-organisational (enterprise) structure and strategy is partly affected by factors involving the organisational culture, collaborator strategies and industrial context (*collaborator strategy*; *culture*; *industrial context*). Firstly, commitment maturity can influence managers' perspective regarding their firm's ability to cultivate specific enablers of successful collaboration (*(Positive) facilitators*). At the same time, business leaders are required to change the 'inward-looking' mindset (*autonomous*) by tapping into the partners' expertise and resources (*collaborative relationships*; *culture*; *knowledge sharing*) as competition intensifies (*competition in industries*) and as rapid technological developments (*advanced technologies*) redefine the balance between transaction costs and company's core competence (*competence focus*). This indicates that "*the key to integrating an acquired company or partner into one's own corporate system is the unification of the management and organisational culture*" (Executive Manager, Zoomlion, 12th August 2011)*. Secondly, companies working at different stages of multi-organisational networking may adopt different ruled operational structures (*collaborator strategy*) although they are normally required to have a common business goal for developing strategic collaborations. This means that in some cases, the collaboration strategy design of one company can be affected by another due to unequal influential positions; thus the weaker one has to adapt to the more powerful one's collaborative strategy, in order to achieve the synergy across the entire collaborative business processes (*collaboration and integration*; *collaborator strategy*; *resource integration*). However, the prospects for long-term relationships (*longevity*) based on such (multi-organisational) enterprise structure can prove problematic (e.g. interface problem and product/service quality problems) because all (joint) decisions influencing the multi-organisational partnerships are not fully mutually agreed on (*decision making*; *Relationship interfaces*). Thirdly, it is suggested that industry conditions act to influence the design approaches of enterprise structure and strategy (*(Design approaches) criteria*; *Types*; *industrial context*). For example, the type of relationships based on servitisation industry is inclined to adopt virtual enterprises by using web-based enterprise information systems than those production-based strategic alliances. This is because the service-oriented industries (e.g. logistics and banking) require more flexible and agile business performance with quicker and more accurate responsiveness to unpredictable market demands, owing to their inherent nature. Similarly, firms prefer a higher level of vertical integration when demand uncertainty is low.

> "*So that is an example of where collaboration with our partners on how they have just taken the old rules and applied it to what we do, which does not always work because we cannot do the same things.*" (Head of Sort Automation, TNT Post, 2nd June 2011)*

The insights gained from the above discussion on issues of (multi-organisational) enterprise structure and strategy design (i.e. inter-firm relationship structure design) are summarised in the following propositions #3 to #6.

Tentative proposition #3: *Inter-organisational relationships change over time, which is dependent upon individual core competencies*

Tentative proposition #4: *Inter-organisational relationships change over time, which is dependent upon the end product or service being delivered*

Tentative proposition #5: *Types of inter-organisational relationships and collaborative practices are determined by an industry-specific context*

Tentative proposition #6: *Service based inter-organisational collaborations have greater propensity to become virtual than product based inter-organisational collaborations*

Companies often engage in a multiplicity of different collaborative partnerships and relationships with their suppliers, downstream customers and third-party partners within the value network (S*trategic roles*; *Types*), in order to leverage the competences and resources, create new competitive space, and develop strategic enterprise architecture (*motives (competitiveness)*). This ultimately leads to a spectrum of multi-organisational relationships within the supply network involving different degrees of autonomy, involvement and responsibilities of partners (*(Design approaches) criteria*; *definition of responsibilities*; *types & degree of relationships*). Depending on various industrial roles (*Strategic roles*; *types & degree of relationships*), the relationships between different companies engaged in the same supply network show different characteristics in terms of their involvement in the product or service development processes (*depth*; *longevity*; *proximity*; *scope*).

> "*We have the relationship with our suppliers; so that might with the transportation. We have own distribution centers run by Intel employees and we also have outsourced distribution centers which are run by the third-party. So we have the mixture of those relationships.*" (Logistics & Manufacturing Manager, Intel, 24th May 2011)*

Despite these types of connectivity, no organisation should try to control all relevant relationships, or be even aware of them (*depth*; *proximity*; *relationship management*; *scope*). It should make a selection of the ones (i.e. enterprise paradigms) (*types*) it considers most important and direct its investments in resources, control structures and information systems towards them. Thus decision making must align transactions with governance structures that have different competencies (*decision making*; *competence profile*) in order to answer the question of whether and to what extent multi-organisational integration would make sense (*(Design approaches) criteria*).

> "*If I am looking at the distribution side of things, actually it is being the final part of my remit. So I would say the major players are people like DHL, you know the logistics purely get our books out to the customers; UPS is on the small scale. Again if you are sending out single books it would talk about people like Royal Mail who is our major supplier.*" (Supply Chain Manager, Lightning Source, 25th March 2011)*

In general, high frequency of transaction, high asset specificity of transactions and high uncertainty in transactions may lead to more long-term multi-organisational relationships (*condition*; *longevity*) in which systems are more or less integrated. This might lead to the choice of vertically integrated enterprises or an extended enterprise form of collaboration (*extended integration*; *vertical integration*), on the one hand to ascertain transactions (e.g. via contracting arrangements), and on the other hand to ensure a fast flow of information and goods (*speed improvement*). In these applications enterprise information systems (e.g. ERP) support process synchronisation and integration (*process integration*). Particularly, it is almost a prerequisite to forming an extended enterprise that intra-organisational integration between various functions (e.g. scheduling, marketing) needs to be achieved firstly (*cross-functional integration*). By contrast, low frequency, low asset specificity and low uncertainty of transactions might easily lead to market-like governance structures in which companies, depending on their customers' demands, can easily change relationships and their network positions (*condition*; *flexibility & agility*). These (concurrent engineering) environments seem more suitable for the virtual enterprise (*virtual integration*). ICT as supporter of fast exchange of information between participants and a fast response to customer demands (*quick responsiveness*; *real time information*) is a condition for virtual enterprises (*condition*). As a result, it can be argued that (multi-organisational) enterprise structure is both stable and reconfigurable; its dynamics is constantly shaping new multi-organisational relationship models (*evolution*) which must be driven through the changing assumptions relevant to the fundamentals of business strategy, core competence profiles, and the industry shift (*competence profile*; *industrial context*; *motives (competitiveness)*).

> "*If you look at the new environment it is now really about getting own software, getting the ingredient and then vertically integrate it to an ecosystem. That is one of our major change and how we have to change.*" (Logistics & Manufacturing Manager, Intel, 24th May 2011)*

Traditional production-based companies and servitised manufacturing firms, in comparison to those pure service-based companies, are more willing to increase their collaborative efforts with suppliers who have the necessary tangible and intangible assets (*interior specialism*; *value added*). The supplier-side external entities have different responsibilities and strategic roles (*(Strategic roles) supplier*) depending on how (multi-organisational) enterprise strategy is configured. For instance, the aim of semi-conductor manufacturers (e.g. Intel) that follow collaborative strategies (*collaborative relationships*) is to collaborate more closely and longer-term with OEMs and ODMs (*longevity*; *OEM (and ODM)*; *proximity*; *research & development partner*) by involving them more intensely in the R&D process (*depth*; *scope*) because their broad and well established competencies and know-how for designing and producing the chassis and motherboards (*competence profile*). Crane manufacturers (e.g. Zoomlion) adopt multiple sourcing strategies to not only ensure reliable and long-run distribution of raw materials and components (*collaborator strategy*; *stability & reliability*) through long-term collaboration with contracted suppliers (*longevity*; *upstream suppliers (raw materials)*) but also improve flexibility and agility (*flexibility & agility*) in the acquisition of goods by utilising 'interim procurement strategy' (e.g. cooperate with local suppliers in short-term period) (*longevity*; *proximity*; *scope*). Additionally, the systems suppliers are only responsible for managing complex performance packages, innovative facilities or enterprise systems (e.g. ERP) (*systems suppliers*), which sometimes leads to limited direct interfaces and interaction with focal companies during the R&D and fabrication processes (*depth*; *proximity*; *scope*) since systems suppliers are conventionally integrated in the sub-supply network in a 2nd or even 3rd tier position. Nevertheless, in the cases of highly innovative products and services (e.g. print-on-demand) the firms may work very closely with the technical guys from the partnering IT companies (*condition*; *proximity*), in order to make sure that the systems works uniquely well with their machineries and collaborative operational processes (*business and IT alignment*). Moreover, the independent engineering partners (*upstream suppliers (engineering)*) mainly focus on the earlier stages of collaborative project, product or service development (*scope*) such as concept and pre-series design due to their lack of manufacturing competence. However, in the context of industrial change (*Change aspects*) these companies extend their know-how towards the design and development of innovations and even whole complex product (or service) models (e.g. construction industry) (*innovation*). Thereby they are acting as prime contractors (*prime contractor*) for collaborative products (or service solutions) design, development, and completion by coordinating all involved parties in the whole supply network (*collaboration and integration*; *regular communication & coordination*).

> "*We use two types of sourcing strategies. One is collaborating with big contracted suppliers via long-term relationship which is under the 'cooperation agreement'. The other is called interim procurement strategy that is used to meet temporary R&D requirements.*" (Logistics & Inventory Manager, Zoomlion, 12th August 2011)*

> "*Our IT guys work very closely with the technical partners to make sure that our system works with the machinery. So if you talk about the integration the only way that we have integrated is backwards into the supplier of the machinery.*" (Managing Director, Lightning Source, 24th March 2011)*

On the downstream side of the supply network, the biggest responsibility lies with the logistics provider and distributor (*distributor*; *logistics provider*); because the most influential companies in the enterprise do not want to tie too much of their capacity and resources for distributing products (or services) and therefore outsource logistics solutions to suitable third-party providers (*motives (competitiveness)*). This collaborative partnership is built to improve the competitiveness via logistics providers and distributors' know-how and technical expertise (*collaborative relationships*; *competence fit*) and cover all important customer segments (*customer experience*; *customer value proposition*). Hence, the partnerships with logistics and distribution cooperators are suggested towards close and long-term integration (*longevity*; *proximity*) although their involvement in the collaborative value networks is limited to the later stages and processes (*scope*); this is particularly important for the service-based industries (e.g. printing and parcel/postal service) to achieve consumer-oriented strategy. On the other hand, as competition intensified (*competition in industries*), logistics providers and distributors are becoming increasingly important as they could add value to the competitive edges of the whole *enterprise* (in the sense of EC's definition) through their specific competencies and skills development (*competitive advantage*; *value added*) such as transportation routine optimisation and e-commerce (i.e. far-reaching marketing channels). Besides these cross-border relationships with distributors (*(distributor) retailer*; *wholesaler*), focal companies choose to collaborate closely with strategic downstream customers (*downstream customer*; *proximity*) by focusing on the 'bullwhip effect' which can complicate demand forecasting, increase costs and reduce customer service levels. This is supported by the fact that vendor-managed inventory (VMI) practices enable suppliers to assess stock level data via EDI, and take the necessary and quick replenishment action. Furthermore, innovative and servitised manufacturers (e.g. Intel) intend to set up the ecosystem with key partners (*ecosystem partner*) to develop completely end-to-end solutions, learn from the ecosystem to understand the standards built across it (*standardisation of process & quality*), and move quickly into the new industry segments and market opportunities (*meta core competence*).

> "*From a supply chain standpoint, I think if you are working with your customers closely you have got an understanding about when your products they are going to bring to the market. So that gives you some clue from that perspective.*" (Supply Chain Programme Manager, Intel, 23rd May 2011)*

In general, the occupation of a certain role within a supply network relationship depends on the type of competence (*(Competence) features*; *competence profile*) and its characteristics (*(Competence) attributes*) that are in the focus of the decision makers. This is often influenced by features of the multi-organisational business processes (*(Design approaches) criteria*) and the decision maker's strategy (*decision making*). Nevertheless, every company within a supply network needs to possess some task relevant knowledge along the steps of the product or service development and completion processes (*attractiveness*) in order to participate actively in the multi-organisational collaboration (*condition*). Related to this is the consideration of the phases of multi-organisational collaborative process which have different characteristics and performance requirements and hence require different competencies and roles within the supply network (*competence profile*; *Strategic roles*). This not only leads to different types of complex relationships in the virtual value network (*virtual value chain*) where for example a book printer can act as a distribution provider (e.g. Lightning Source) or where suppliers are increasingly involved in the early stages of the collaborative products development (e.g. Intel and Zoomlion); but also accelerates changes of the industrial players as described in the section on industrial impact (*industrial roles*) with the purpose of staying competitive (e.g. remaining in direct supply position to the customers). Moreover, in order to be adaptive to changing exogenous performance requirements (*customer value proposition*; *government regulations*; *shorter turnaround time*), relationships within the supply network need to be reconfigurable, flexible and able to change leading to a dynamic collaboration base (*evolution*) and new competences creation (*meta core competence*).

> "*Some customers have faster and more efficient methods than we do; but for other customers who do not have a faster distribution network it is better for them to let us do it.*" (Managing Director, Lightning Source, 24th March 2011)*

The above discussion implies that companies – particularly the most influential/focal companies engaging in any type of multi-organisational structure and strategy may have *more than one* strategic roles (*Strategic roles*); while simultaneously focusing on their most important competitive advantages (*competence focus*) that enable them to become more suitable and engaged (i.e. contributory) (*competence fit*) in the supply network, in order to avoid being moved to a lower tier level and an un-engaged state or even omitted from the entire enterprise (*condition*). This also indicates that every company within the value network will keep developing and reconfiguring business relationships to have better prospects for long-term multi-organisational collaboration with the key business partners (*longevity*), thereby differentiating themselves from rivals.

> "*Amazon is our competitor and customer. We are selling to Amazon but they are also competitor because they have a printer called 'CreateSpace' which is similar towards our print-on-demand capability.*" (IT System Manager, Lightning Source, 25th March 2011)*

> "*Now Royal Mail is by far our biggest partner; but also we are by far their biggest competitor.*" (Group Commercial Director, TNT Post, 2nd June 2011)*

One of the most critical challenges that emerge in this context of increased collaborative interaction between multiple parties is to integrate their individual competencies and related parts or resources into a coherent whole (*collaborative relationships*; *Relationship interfaces*; *relationship management*). In extreme cases the efficiency, effectiveness, and flexibility of multi-organisational collaboration were often lacking due to excessive outsourcing activities (*depth*; *short-term thinking*); this will potentially lead to interface and quality problems (e.g. immature product or service launch) and in turn require a more strategic (multi-organisational) enterprise approach (*Design approaches*). Thus companies engaged in the virtual value network (*virtual value chain*) – particularly the focal firms are increasingly trying to identify interface points in the process where they can achieve better internal links between involved functions as well as external links with their cooperators to enable a better exchange of core competencies and technical know-how (*competence focus*) in the context of multi-organisational collaboration (e.g. agile manufacturing and simultaneous engineering) (*knowledge management*; *relationship management*). This involves the development of a suitable environment in the form of a collaborative infrastructure with interfaces across all involved functions (*Relationship interfaces*; *Types*), which facilitates collaborative transactions across multi-organisational collaboration in all related aspects (*commercial*; *organisational*; *project*; *technical*).

> "*The coordination and management of the interfaces is one of the most crucial issues; which requires a competent coordinator.*" (Chief Executive Officer, Wanghai, 20th July 2011)*

> "*You can say that it is necessary to build a structure which enables the fulfilment of set targets in a collaborative process.*" (General Manager, Lanye, 19th July 2011)*

These aspects on designing (multi-organisational) enterprise structure and strategy (i.e. inter-firm relationship structure design) are summarised in the following proposition #7.

Tentative proposition #7: *Organisations could use different approaches to inter-organisational collaboration, structure and strategy within different supply networks simultaneously*

Inter-firm relationship management – Enterprise structure and strategy governance

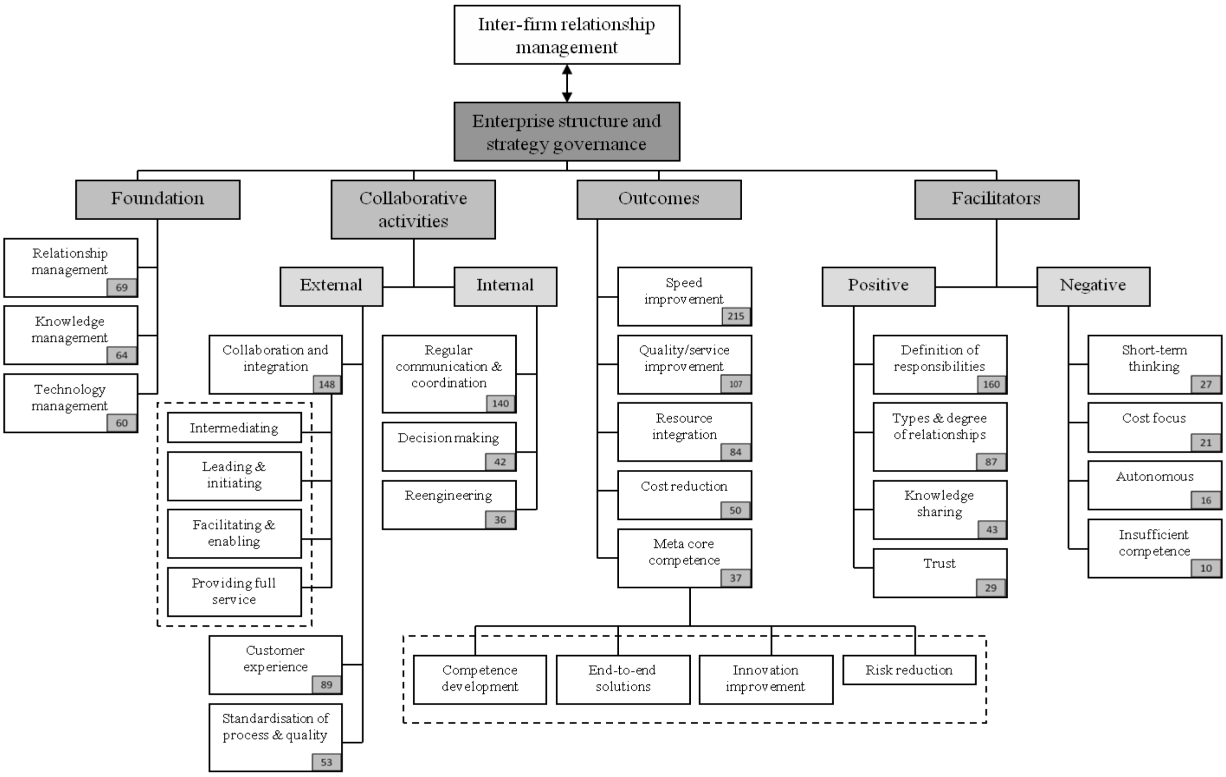


Figure 6.13. Coding of the core category 'enterprise structure and strategy governance'

Table 6.9 Occurrence and proportion of code in core category 'enterprise structure and strategy governance'

Core category: enterprise structure and strategy governance					
Category (sub-category)	Individual code	Frequency [#]	Source [#]	Source [in %]	Coverage [in %]
Foundation	Relationship management	69	42	87.5	15.6
	Knowledge management	64	34	70.8	2.6
	Technology management	60	37	77.1	3.4
Collaborative activities (external)	Collaboration and integration	148	44	91.7	23.5
	Customer experience	89	31	64.6	1.9
	Standardisation of process & quality	53	27	56.3	2.3
Collaborative activities (internal)	Regular communication & coordination	140	45	93.8	20.7
	Decision making	42	23	47.9	3.1
	Reengineering	36	18	37.5	1.8
Outcomes	Speed improvement	215	26	54.2	14.4
	Quality/service improvement	107	38	79.2	22.1
	Resource integration	84	35	72.9	5.7
	Cost reduction	50	40	83.3	2.0
	Meta core competence	37	11	22.9	1.3
Facilitators (positive)	Definition of responsibilities	160	41	85.4	10.7
	Types & degree of relationships	87	34	70.8	3.9

	Knowledge sharing	43	29	60.4	4.2
	Trust	29	18	37.5	5.5
Facilitators (negative)	Short-term thinking	27	12	25.0	1.8
	Cost focus	21	16	33.3	2.4
	Autonomous	16	8	16.7	1.1
	Insufficient competence	10	7	14.6	2.0

The purpose of analysing and discussing empirical data along with relevant narratives of the core category "enterprise structure and strategy governance" is to identify the issues related to the management of multi-organisational relationships and collaboration, and their collaborative activities. Facilitated by the various dimensions of an appropriate multi-organisational collaboration infrastructure and its related relationship interfaces (*commercial*; *organisational*; *project*; *technical*), each of these *enterprise* (in the sense of EC's definition) structures and strategies has to be managed differently depending on the type of collaborative relationships (*(Design approaches) criteria*; *types & degree of relationships*) that is ultimately influenced by the competencies and their attributes on which the product or service is grounded (*attractiveness*; *maturity*; *transferability*; *uniqueness*). Additionally, the characteristics of different multi-organisational enterprise paradigms implicitly affect the management of the resulting collaboration leading to a spectrum of collaborative activities (*Collaborative activities*) from cross-functional and hierarchical integration to temporary cooperative ventures (*Types*). As described above (*cf.* tentative propositions #3, #4 and #5) this is often influenced by factors such as product and service characteristics, culture and strategy of the collaborators, industry-specific context, and competence situation. Therefore, the 'legal entities' – particularly the most influential/focal companies in multi-organisational collaboration are performing various management tasks.

> "*The collaborative project 'Utilisation of Regenerative Earth Material' focuses on the initial and concept stages of the green manufacturing and sustainable development process. In this context we want to define the relationship with our partners, i.e. which contracts need to be made, how do we coordinate the R&D process, how do we evaluate their performance, etc.*" (General Manager, Lanye, 19th July 2011)*

However, the desired success of multi-organisational collaboration is often not fully achieved because "over the duration of the collaborative relationship every partner tried to gain more value for himself" (Chief Executive Officer, Lanye, 15th August 2012)*. Thus the successful multi-organisational collaboration that leads to the optimisation of the entire value network (*(Enterprise governance) outcomes*; *virtual value chain*) and the resultant holistic competitive advantage is closely related to the definition of the conditions and circumstances of these relationships (*Design contingencies*; *types & degree of relationships*). This includes the determination of clear responsibilities of each involved partner in the cross-boundary activities (*definition of responsibilities*) in alignment with the establishment of an appropriate collaboration infrastructure (*Relationship interfaces*; *Types*).

> "*Vendor management center is mainly responsible for the upstream supply chain management, i.e. make decisions on strategic procurement covering supplier management and development, supplier evaluation, and cost. Our department then executes that procurement plan (e.g. purchasing quantity).*" (Logistics & Inventory Manager, Zoomlion, 12th August 2011)*

In this context it is inevitable for the involved partners to clearly define their own core competencies first (*(Competence) features*; *(Competence) influencers*) before entering cross-boundary collaboration. Only then it is possible to clearly identify which partner takes over responsibilities for what activities (i.e. tasks and performances) (*Collaborative activities*) within the collaborative product or service development, completion and delivery processes (*definition of responsibilities*). This ultimately enables an efficient and effective management of the interfaces between cooperative partners in the multi-organisational collaboration and hence the delivery of a successful joint venture or alliance within the supply network (*(Enterprise governance) outcomes*; *global supply network*). On the other hand, a clear definition of management responsibilities (*definition of responsibilities*) should be well understood by both internal and external stakeholders in an *enterprise* (in the sense of EC's defnition) whilst the management and coordination responsibilities will be *enterprise* types and implementation dependent (*Collaborative activities*; *Design approaches*).

Due to more complex collaborative relationship constellations within multi-organisational networks, e.g. conflict areas between OEM/ODM, prime contractor and other upstream suppliers (*OEM (and ODM)*; *prime contractor*; *upstream suppliers*), in many cases the interfaces are not defined and managed properly (R*elationship interfaces*). This leads to "*an incredible coordination effort with a waste of resources that is triggered by the mistrust between the collaborating parties. As a result, the time for collaborative product and service realisation become shorter leading to an increasing pressure on the relationship*" (Chief Operation Officer, Metrobank, 18th August 2011)* (*cost focus*; *trust*). Therefore it is important to clearly define interfaces and responsibilities in order to be successful in a trusting multi-organisational collaboration (*definition of responsibilities*; *trust*).

> "*A critical aspect is the definition of boundaries of responsibilities and performances. Who does what and when and who is responsible for what; this is absolutely crucial for the whole network integration.*" (Business Sales Assistant, Zoomlion, 4th September 2012)*

This need for the identification of clear responsibilities and functional roles within the multi-organisational collaborations is summarised in proposition #8.

Tentative proposition #8: *Responsibilities and functional roles of each different organisation needs to be clearly defined within the supply network*

In the multi-organisational collaboration scenarios, *enterprise* integration (*collaboration and integration*) involves different kinds of joint investments and operational activities such as co-planning, co-forecasting, innovating (i.e. product/service development), manufacturing, third-party logistics, and decision making (*Collaborative activities*). Collaborative efforts carried out jointly with external partners (*External*) aim to drive supply network performance (e.g. cost reduction, quality assurance, supply chain flexibility and agility, delivery reliability) (*flexibility & agility*; *motives (competitiveness)*; *Outcomes*). For instance, in the mechanical engineering, semiconductor, and construction industries (e.g. Zoomlion, Intel, and Lanye), suppliers (*upstream suppliers*) take over the detailed component (e.g. chassis) or technology development and manufacturing or the development of innovative ideas in the concept stage of the product (or service) development process. As innovations are maturing, the suppliers can be integrated more deeply and given more responsibilities in the collaborative products (and services) development (*condition*; *depth*; *scope*); eventually guided by the focal firms to other areas of innovation (*leading & initiating*). However, there are cases (e.g. Lightning Source and Pinstripe) where the buyer firms handed over major parts of the multi-organisational collaboration process to prime contractors or big suppliers. In these situations, the most influential/focal firms only remain involved with a small core team in the established relationships in order to ensure an appropriate information flow that enables them to make qualified decisions (*decision making*; *knowledge sharing*). This reveals that different companies show different attitudes towards collaboration with strategic partners.

> "*The forward station inventory in the hubs is called the VMI program – Vendor Managed Inventory. It is really about having dedicated inventory for our customers like HP, Dell, and Apple. Because before they placed orders to us and we had everything internally in the warehouse(s); planned and managed them. Now we not only put in the products close to the customer but also have dedicated inventories, i.e. they give us their forecast and we put in product in the hub for them.*" (B2B Technologist, Intel, 24th May 2011)*

Supply network relations (particularly the extended and virtual *enterprises*) are more loosely coupled compared to hierarchical relations and, thus, stay market sensitive. Such a "*hybrid form of governance*" (Chief Executive Officer, Metrobank, 18th August 2011)* implies that relationships inside the network encompass both cooperative and competitive ties (e.g. Lightning Source & Amazon network, TNT Post & Royal Mail network, and Intel & Samsung network) (*types & degree of relationships*). Also, this is supported by the fact that the buyer firms are motivated to engage in supplier-supplier co-opetition (e.g. Wanghai and Lanye), in order to influence and manage the nature of the relationships between competing suppliers (*collaborator strategy*; *facilitating & enabling*; *scope*). If such interactions lack thereof, the buying firms stand to lose control of their supply network because over time their understanding of the suppliers' business is reduced (*knowledge sharing*). Thus in a loosely (or tightly (e.g. vertical integrated *enterprises*)) coupled supply network, the value members' operations need to be closely coordinated or even mandated by the focal firms (*intermediating*; *proximity*) in the enterprise to avoid any severe consequences.

> "*We directly engage the suppliers and influence their behaviours with contractual incentives and penalties to reinforce the desired co-opetitive supplier-supplier relationship.*" (Chief Executive Officer, Wanghai, 20th July 2011)*

In order to run multi-organisational collaboration effectively, efficiently, and flexibly, one partner needs to possess the ultimate responsibilities for the management of the entire supply network (*definition of responsibilities*; *global supply network*). In this context one or more actors engaged in an *enterprise* (in the sense of EC's definition) are typically able to exert more power over other network members due to their network centrality, size, or their ability to bridge structural holes (*company size*; *competitive advantage*; *integration capability*; *transferability*). This management or "hub firm" role can be ascribed to the focal firms that set up the supply network and take a proactive attitude in the care of it (*leading & initiating*); because the ultimate responsibility for purchasing, financial control, marketing and sales within the (multi-organisational) *enterprise* remains with them (*decision making*; *definition of responsibilities*). Additionally, due to the closeness to the end consumers, the focal firm has more power to lead the supply network while determining the corresponding marketing strategy and choosing network partners than other network members (*competence evaluation*; *decision making*; *leading & initiating*); this is especially true in service-based industries (e.g. printing, logistics and banking) where the (multi-organisational) *enterprise* strategy is mostly customer demand and experience driven (*customer experience*).

> "*Our customers themselves do not have a clear picture of what is coming in the future. In fact, quite often they rely on us to tell them what we think is coming in the future.*" (Supply Chain Programme Manager, Intel, 23rd May 2011)*

Moreover, in product-based industries (*industrial context*), multi-organisational collaboration governance requires that partners collaborate to identify the critical nodes and links through which material flows across the network (*standardisation of process & quality*). At these nodes and links, control limits are agreed within which fluctuations in levels of collaborative activities are acceptable (*types & degree of relationships*). Such collaborative efforts (e.g. dashboard management and event management) are devoted to improve operational effectiveness and control across the supply network, reduce process variability and ambiguity in (multi-organisational) *enterprises*, and quickly identify the market opportunities (*competence development*; *risk reduction*). Simultaneously, it has been found that through the collaborative activities (e.g. agile manufacturing and simultaneous engineering) based on the multi-organisational network infrastructure, product-based companies predominantly focus on standardising and specifying products quality as well as looking to stretch their product portfolio (*standardisation of process & quality*; *stretch product portfolio*), in order to reinforce the *enterprise* competitiveness and market position; whilst offering new products to the marketplace (*competence development*; *innovation improvement*; *quality/service improvement*).

"*We always standardise our manufacturing processes, e.g. what type of concrete the downstream partners require; how many concrete blocks are needed ... the benefit is that the quality can be better controlled.*" (General Manager, Lanye, 19th July 2011)*

"*One of the things that we want to do is to stretch our products; so we want to offer new products to the marketplace ... our quality is specified so it has read out what we should do [and] what type of quality the customer can expect; and we check it all the way down the line.*" (Managing Director, Lightning Source, 24th March 2011)*

By contrast, in the context of purely service-based or servitised manufacturing industries (*industrial context*), it has been found that companies engaged in the collaborative supply network predominantly concentrate on consumers' experiences (*customer experience*) as they believe that providing better service to customers is more important than controlling costing (*cost focus*; *providing full service*; *service oriented*). Intel is a good example of an organisation that is strategically steering the servitisation of manufacturing to improve the customer experience, e.g. significant improvements in supply chain have been made to increase agility, flexibility and responsiveness back to the customers (*customer experience*; *flexibility & agility*; *quality/service improvement*; *quick responsiveness*). This not only helps Intel sense, influence and fulfil customer (and customer's consumer) demands (*facilitating & enabling*) but also encourages customer loyalty through improved brand differentiation (*uniqueness*). In turn, the service-led competitive strategy helps service-based companies to stay in an engaged and closely integrated condition within the value network (*condition*; *proximity*) and even increase their responsibility and contribution within the multi-organisational collaboration (*depth*; *evolution*; *scope*). This also indicates that (multi-organisational) *enterprise* strategy should be re-oriented by moving away from the purely production-based form to the integrated product-service solution-based form (*service oriented*; *strategic orientation*).

"*We have made some significant improvements in supply chain over the last two to three years which increases our agility, flexibility and response back to the customers. And when we look at our satisfaction service the scores have gone up massively because it not only helps the customers be able to support their customers but it enables them to have better return on working capital, i.e. be able to turn their cash flow a lot quicker.*" (Supply Planning & Customer Management, Intel, 24th May 2011)*

On the other hand, the successful multi-organisational co-operations depends on a set of operational activities within each involved companies (*(Collaborative activities) internal*). First, inside an individual firm – particularly a multi-unit organisation, different functional departments need to cooperate and communicate with each other on a regular basis (*knowledge management*; *regular communication & coordination*) to achieve cross-functional integration (*cross-functional integration*); which in turn enhances the firm's capability to collaborate with its external partners (*integration capability*). A lack of intra-organisational communication and coordination (*(Internal) regular communication & coordination*) can result in poor performance and high (cooperation) costs. Thus every legal entity engaging in any type of (multi-organisational) *enterprise* has to be built on a culture of sharing advice and experience and regular communication (*culture*; *knowledge sharing*; *regular communication & coordination*); this also implies that multi-organisational relationship management can be significantly improved when intra-organisational and inter-organisational coordination occurs simultaneously. Secondly, it is important that decision makers carefully consider what the objective of outsourcing activities to the external partners is (*competence focus*; *decision making*). Particularly, decision making about partner selection is challenging, because of the complexity of putting together a supply network under dynamic conditions (*competence evaluation*; *decision making*; *global supply network*; *increasing business complexity*). As a consequence, the organisational managers need multiple criteria that are likely to change over time to cope with uncertainty and ambiguity involved in the partner selection decision-making process (*change*; *decision making*). Thirdly, business process reengineering (*reengineering*) is considered as the most essential element that enables individual firm to adapt to new changes incurred by multi-organisational collaboration (*(Collaborative activities) external*; *(Facilitators) positive*). The nature of certain categories of multi-organisational relationships also requires abilities that induce certain types of internal organisational (re)configurations (*reengineering*; *Types*). For instance, the customer process reengineering (CPR) program introduced by Intel which aims to change the management of supply chain and streamline different internal business processes to really move to a customer-focused organisation (e.g. ‘next day delivery’ rather than long lead time) (*quick responsiveness*); this is also supported by (SAP) ERP systems (*(operations) processes reengineering*; *process integration*; *supply chain management*).

> “*We need to figure out who we are going to work with. We will work closely with Nokia on new mobile phone device which is going to use our new low-power devices that are coming out.*” (Supply Chain Programme Manager, Intel, 23rd May 2011)*

> “*We were looking at internal [operations], changing our business processes internally to accommodate these new processes, become more responsive to customers, and give empowerment to the geographies as well ... so it is a kind of massive effort to completely reengineer our processes.*” (B2B Technologist, Intel, 24th May 2011)*

These issues on managing (multi-organisational) enterprise structure and strategy (i.e. inter-firm relationship management) are summarised in the following propositions #9 to #12.

Tentative proposition #9: *Collaboration with new external organisations requires internal business processes to be reengineered to accommodate new changes*

Tentative proposition #10: *In the context of inter-organisational collaboration, product-based organisations predominantly focus on the portfolio and quality of products, and the standardisation of business processes*

Tentative proposition #11: *In the context of inter-organisational collaboration, service-oriented organisations predominantly concentrate on consumers' experiences*

Tentative proposition #12: *There is need for a leader or a 'broker' organisation within the supply network who has core competencies and responsibilities to supervise, evaluate and manage cooperation between other organisations*

The establishment of a more advanced relationship and collaboration infrastructure along with all its elements (e.g. common processes are defined within the supply network) (*Relationship interfaces*; *types & degree of relationships*) facilitates a better multi-organisational collaboration that ultimately results in the successful delivery of (multi-organisational) *enterprise* structure and strategy (*(Enterprise structure and strategy governance) outcomes*; *motives (competitiveness)*). This is because that the stronger integration of partners should reveal synergy potentials in the form of cost and time to market (*cost reduction*; *speed improvement*) as well as technical functions (*innovation improvement*; *quality/service improvement*). In addition, collaboration between partners with superior capabilities in terms of innovation, technical intelligence and modularity can directly enhance the holistic (multi-organisational) *enterprise* performance (*innovation*; *technical intelligence*) whilst developing competence and creating end-to-end product-service solutions through the new ecosystem (*end-to-end solutions*; *flexibility & agility*; *(meta core competence) competence development*). If, however, the partners are not properly integrated as required by the *enterprise* structure and strategy (*Design approaches*) or significant 'partner switches' occur during the collaborative product or service development and completion processes, problems in terms of quality, cost, flexibility and time to market can arise due to necessary change processes which reduce the competitiveness of the of the overall supply network (*change*; *reengineering*).

> "*Cost [reduction] is very important; and obviously the skill sets of the partner are held which is also very important.*" (Account Director & Sales Manager, Pinstripe, 28th March 2011)*

> "*The big benefit for us internally is it has cleared the reporting line who you need to talk to. In the other parts of the business, we make it simple for our customers to talk to us because they are now talking to single entity and being linked together with groups offering products from the family portfolio.*" (IT System Manager, Lightning Source, 25th March 2011)*

This is especially true in the virtual enterprise which is more complex and innovative than the extended enterprise and vertically integrated enterprise; where it is essential that the partners agilely contribute with their technical knowledge and innovativeness in a more coordinated and just-in-time manner (*competence profile*; *innovation*). Only then it can be assured that highly matured and robust products or services will emerge whilst greater responsiveness can be achieved through a mutually extended and sychronised lead times, a smooth linkage of interfaces (*innovation improvement*; *quality/service improvement*; *quick responsiveness*; *Relationship interfaces*), reduced work cycles, and more timely information (*real time* *information*; *types & degree of relationships*) resulting from intense, open and ERP systems-enabled multi-organisational collaboration (*(ERP systems management) outcomes*; *trust*); which in turn reduces the potential risks (*risk reduction*). Besides, a certain benchmark in terms of control and autonomous actions is always justified (*autonomous*). Since imposing too much control detracts from innovation and flexibility (*flexibility & agility*; *innovation*); conversely, allowing too much emergence can undermine managerial predictability and work routines (*risk reduction*; *standardisation of process & quality*). Therefore, in order not to destroy the collaborative spirit of the supply network, the most influential/focal firms in the enterprise need to manage this paradox through appropriately balancing how much to control and how much to let emerge when governing the (multi-organisational) enterprise structures and strategies (*cf.* tentative proposition #12) (*relationship management*; *types & degree of relationships*). Also, the answer to this dilemma lies within the evaluation of the competencies of the partners and their willingness and capability to collaborate within a supply network (*commitment*; *(Competence and competitiveness as main contingency factors) features*; *competence evaluation*). This implies that multi-organisational enterprise governance can be facilitated by moving away from adversarial cost pressure (*cost focus*) towards integration of competent partners (*competence focus*).

> "*I suppose the biggest difficulties and changes when you collaborate with the partners are that you lose control of an external resource. [But] obviously within the production unit here we have got total control.*" (Account Director & Sales Manager, Pinstripe, 28th March 2011)*

Furthermore, it is important to identify an equilibrium of mutual agreement within the supply network (*trust*), e.g. a price target which the focal firms consider as competitive and the partners can make a profit with. Only then it is possible to optimise the total supply network rather than its individual parts (e.g. significantly reduce the safety stock level with low-forecast errors within an enterprise and directly enhance an *enterprise*'s speed to react to customer requests) (*cost reduction*; *quality/service improvement*; *quick responsiveness*; *risk reduction*; *speed improvement*), integrate multiple resources across the entire multi-organisational *enterprises*, and develop end-to-end solutions within the ecosystem (*end-to-end solutions*; *resource integration*)

> "*We have a mailing house where we have stored one of our own machines. So they get the benefit of producing mail in their own depot; and then we get the benefit of having spare capacity to use ourselves. And that builds upon the relationships; between us and the key mailing house which is a good strategic partner to have.*" (Head of Sort Automation, TNT Post, 2nd June 2011)*

Because in multi-organisational supply networks a company can only survive through the information of its collaborating partners (*knowledge sharing*), the existing 'firm centric' supply chain models where every partner focuses on his own optimisation (*autonomous*; *short-term thinking*) have to change towards 'net centric' models (i.e. the enterprises) where the whole supply network is in the focus of optimisation (*resource integration*). If collaborative product, service and/or operational process changes are necessary during multi-organisational collaboration all legal entities need to engage in discussing and implementing the change in the most efficient, effective, and flexible way in order to produce the parts and components of collaborative products (or services) at the cost target (*knowledge sharing*; *regular communication & coordination*; *trust*). This means that effectively the risk is shared (*risk reduction*) in a "win-win" situation for a long-term growth and benefit (*(Enterprise structure and strategy governance) outcomes*).

> "*The relationship should be built on confidence; the partners will then come in and talk to you about their issue.*" (Supply Chain Manager, Lightning Source, 25th March 2011)*

The strategic, holistic and even long-term thinking in terms of the supply network based on the definition of clear responsibilities and interfaces (*definition of responsibilities*; *Relationship interfaces*), and an intense, open and ERP systems-enabled multi-organisational collaboration can be negatively influenced by short-term orientated and functional thinking of the involved partners (*short-term thinking*). This is often rooted in authority and competence conflicts of internal decision making (*decision authority*; *decision making*) based on an autonomous-oriented and functional organisation and power structure (*autonomous*) of the individual company. In other words, the dominance of decision authority (*autonomous*; *decision authority*) has negative implications on the success of multi-organisational collaboration in a more sustainable way. Additionally, positive outcomes derived from (multi-organisational) *enterprise* governance can be negatively affected by insufficient competence due to partner's inherent ability (e.g. immature skills) (*insufficient competence*; *interior specialism*). Meanwhile, companies – particularly the most influential firms engaged in the *enterprises* have to endure the potential risk that the intimate partners (*proximity*) may obtain the similar core competences by sharing the ideas or technical information (*knowledge sharing*; *technical intelligence*); this can ultimately change or even terminate the inter-organisational relationships because the attractiveness and uniqueness of core competence are decreased (*attractiveness*; *uniqueness*). Hence, collaboration and collaborative behaviour needs to be defined and supported by the management in order to overcome short-term orientated thinking and functional conflicts within the organisation as well as the whole supply network (*short-term thinking*) which can potentially result in negative outcomes such as lock-in situations and interface problems (*Relationship interfaces*). It is thereby necessary to improve the internal and external simultaneous operational activities in the collaborative processes between all strategic partners through the establishment of moderated autonomous cross-functional teams (i.e. parts of different companies) reflecting the collaborative product or service structure (*autonomous*; *cross-functional integration*; *knowledge sharing*). More importantly, the focal firms in the enterprise need to manage the dilemma of granting enough freedom to the partners to participate with their specific competencies but also keep a sufficient level of competencies for themselves in order to sustain the partnerships and be able to manage the interfaces effectively (*autonomous*; *insufficient competence*; *Relationship interfaces*; *types & degree of relationships*).

"*We have a lot of constraints of working with Amazon because they command their own destiny. And they pretty much tell us what to do, which can be very frustrating sometimes.*" (Client Services Manager, Lightning Source, 25th March 2011)*

"*If Amazon has the ability to do what we do themselves, they may over the time decide not to send so many books [to us]*." (Managing Director, Lightning Source, 24th March 2011)*

However, it not only requires the redesign and restructuring of the individual organisations to enable improved collaboration in the supply network (*change*; *knowledge sharing*; *reengineering*; *regular communication & coordination*; *structure*) but also a change in their culture and thinking (*culture*; *(Facilitators) positive*). This indicates that the focal firms in the enterprise need to encourage the strategic partners to share their ideas, innovations and know how with other partners in the supply network (*facilitating & enabling*; *knowledge management*; *knowledge sharing*). Also, the thinking has to be changed from getting parts at the cheapest price (*cost focus*) towards developing future partnerships (e.g. innovative collaborative venture) that are going to benefit the business in a strategic manner (*collaborative relationships*; *competence focus*). Doing so, control over the alliance's outcomes and a more effective collaborative products/services delivery can be assured (*(Enterprise structure and strategy governance) outcomes*).

"*Our collaboration as I believe is now to greatly understand what our customer's thinking is happening in the marketplace; and working with them to determine what is the best strategic course of action for both organisations.*" (Supply Chain Tech., Intel, 23rd May 2011)*

"*This is a step on which all cooperators have to work because if you want to remain in the market then it needs to be possible to collaborate free from company characteristics.*" (Production Manager, Lanye, 19th July 2011)*

These insights on managing (multi-organisational) enterprise structure and strategy (i.e. inter-firm relationship management) are summarised in the following propositions #13 and #14.

Tentative proposition #13: *Organisations are more willing to collaborate with other organisations who have a proven track record of successes in inter-organisational business collaborations*

Tentative proposition #14: *Once organisations obtain a similar set competences at a similar level of maturity as their partner organisations, the partnerships could change as a result*

Information systems design – ERP systems design

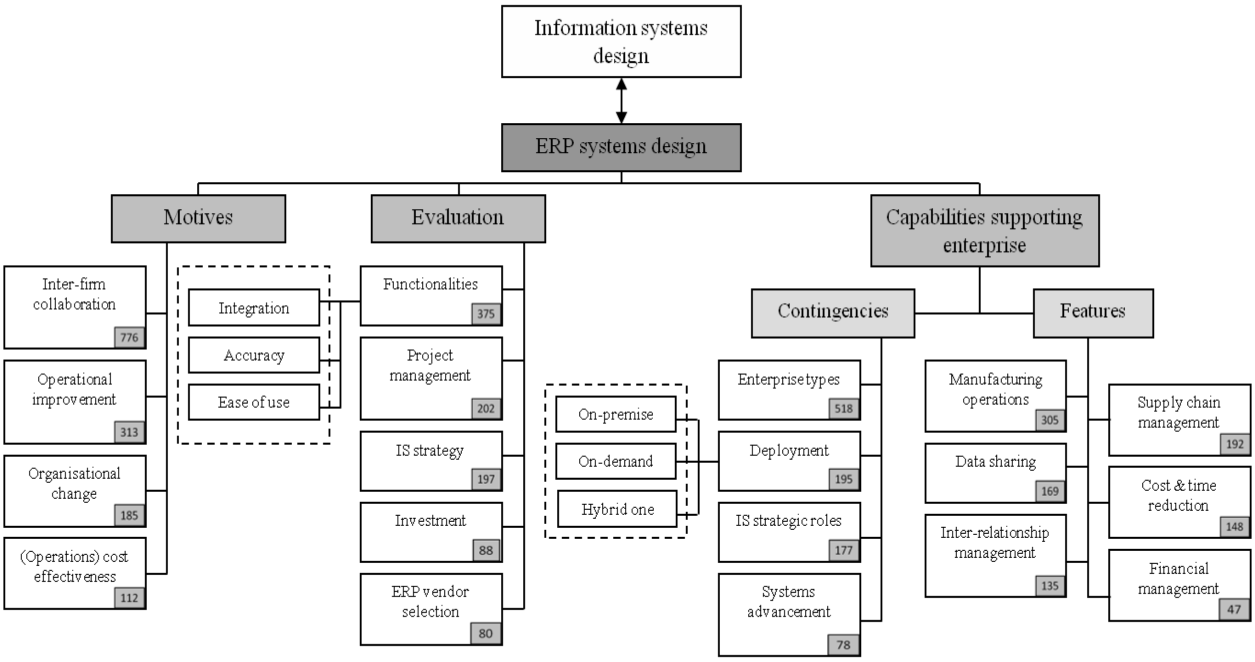


Figure 6.14. Coding of the core category 'ERP systems design'

Table 6.10 Occurrence and proportion of code in core category 'ERP systems design'

Core category: ERP systems design					
Category (sub-category)	Individual code	Frequency [#]	Source [#]	Source [in %]	Coverage [in %]
Motives	Inter-firm collaboration	776	37	77.1	24.3
	Operational improvement	313	40	83.3	18.6
	Organisational change	185	23	47.9	11.0
	(Operations) cost effectiveness	112	34	70.8	16.1
Evaluation	Functionalities	375	42	87.5	31.4
	Project management	202	43	89.6	9.9
	IS strategy	197	26	54.2	15.7
	Investment	88	17	35.4	6.3
	ERP vendor selection	80	27	56.3	3.5
Capabilities supporting enterprise (contingencies)	Enterprise types	518	41	85.4	20.2
	Deployment	195	31	64.6	21.8
	IS strategic roles	177	24	50.0	12.7
	Systems advancement	78	13	27.1	2.9
Capabilities supporting enterprise (features)	Manufacturing operations	305	20	41.7	22.4
	Supply chain management	192	38	79.2	27.6
	Data sharing	169	28	58.3	15.0
	Cost & time reduction	148	32	66.7	8.1
	Inter-relationship management	135	29	60.4	6.6
	Financial management	47	10	20.8	2.9

The purpose of analysing and discussing empirical data along with relevant narratives of the core category "ERP systems design" is to identify the issues related to the configuration of ERP systems and their features within the context of multi-organisational collaboration. There are many reasons/motives why companies engaging in any type of (multi-organisational) *enterprises* (*(Enterprise) types*) would design and adopt ERP solutions (*(ERP systems design) motives*). As individual firms focus on their core competencies (*competence focus*), there is increased incidence of collaborative dependence (*collaborative relationships*). This in turn increases the need for collaborative commerce between firms (*global supply network*; *virtual value chain*). Therefore the ability to form appropriate multi-organisational information systemslinkages has been recognised as a key requirement for the effective operation of *enterprise* (in the sense of EC's definition) structures and strategies (*(Motives) inter-firm collaboration*). In other words, "(multi-organisational) *enterprise* participants" are naturally seeking to integrate their systems with suppliers, customers and other business partners by implementing *enterprise*-wide information systems (e.g. Lightning Source's EDI and Intel's RosettaNet) and B2B network which allow the flow of information across organisational boundaries (*ERP platform*; *process integration*; *systems integration*).

> "*Our customers use a web portal to enter orders which then goes into our SAP [ERP] system. We have also got some customers who use RosettaNet to talk with Intel's SAP [ERP] systems*" (Supply Planning & Customer Management, Intel, 24th May 2011)*

Additionally, improving productivity and forecast accuracy, integrating information systems, reducing costs structures and facilitating organisational change are the top business drivers for companies engaging in the multi-organisational *enterprise* with ERP adoption (*operational improvement*; *(operations) cost effectiveness*; *organisational change*; *systems integration*). Firstly, through the use of ERP information systems both large-sized companies and SMEs want to enhance their (internal and external) operations through streamlining, improving and controlling business processes of major importance such as procurement and inventory management, customer offers and complaints, and marketing campaigns (*operational improvement*; *process integration*). Simultaneously, the companies aspire to obtain the ability of managing service related personnel (e.g. engineering and R&D departments) and related costs by configuring the resource management module of ERP systems (*(process integration) internal*). Secondly, as ERP systems can replace complex and manual interfaces between different systems with standardised, cross-functional transaction automation (*process integration*; *systems integration*); order cycle times and operating capital can be significantly reduced, resulting in improved throughput, customer response times, and delivery speeds (*cost & time reduction*; *operational improvement*; *(operations) cost effectiveness*; *quick responsiveness*; *speed improvement*). This is particularly important for the 'customer centric' companies (e.g. Lightning Source and Metrobank) in the service-oriented industries who need more agile business performance to achieve the successful multi-organisational collaboration (*(Enterprise governance) outcomes*; *flexibility & agility*; *service oriented*). Thirdly, designing and adopting ERP systems can trigger major organisational changes (*organisational change*) that require business processes reengineering and mental shift while potentially creating high risks (*operations processes reengineering*; *organisational behavior*); in an ideal scenario this should enables (multi-organisational) *enterprises* to become more agile, flexible and, integrated, i.e. be able to continuously monitor market demand; quickly respond by providing new products (and services); and quickly modify business methods (*flexibility & agility*; *process integration*; *quick responsiveness*; *stretch product portfolio*).It has also been found that the success of (multi-organisational) *enterprise* structures and strategies is not only attributed to the multi-organisational integration supported by ERPII and ERPIII types information systems, but also in conjunction with each individual organisational (i.e. enterprise member) operations and behavioral integration facilitated by traditional ERPI type systems (*(Capabilities supporting enterprise) enterprise types*; *(Features) inter-relationship management*; *organisational behavior*).

> "*Lanye's production areas want to make substantial operational improvements by using PushSoft [ERP] barcode technology to track the movement of parts through the production process.*" (Production Manager, Lanye, 19th July 2011)*

> "*The other big change is the philosophy – we are not going to customise SAP [ERP]; we need to move within the native SAP [ERP] functionalities. So that has driven the changing business process.*" (Logistics & Manufacturing Manager, Intel, 24th May 2011)*

The functionality of the ERP systems is often considered as the most critical evaluation factor as without proper functionalities, the implementation and use of any ERP type systems would be worthless in the context of multi-organisational collaboration (*functionalities*). The empirical data analysis and case findings also implies that integration, accuracy, and 'ease of use' are regarded as key factors when evaluating ERP functionalities supporting (multi-organisational) *enterprise* strategy (*accuracy*; *ease of use*; *integration*).

> "*We use RFID [and ERP] to eliminate the multiple items via barcode and cross system exchange the information. We also use it for service quality on certain save mailing that we have as part of our processes.*" (Head of Sort Automation, TNT, 2nd June 2011)*

Most notably, the main problem presented by some empirical cases is the 'misfit' between ERP functionalities and business requirements; which means that there is a gap between capabilities offered by ERP package and the (IS) functionalities required from the adopting (multi-organisational) *enterprise* structures and strategies (*(Enterprise) types*; *functionalities*; *strategy alignment*). Therefore, companies – particularly the most influential/focal companies need to clearly identify where ERP systems are going within their own *enterprise* in order to avoid the dangers of taking actions that do not contribute to the entire value stream (*IS strategy*; *value added*; *virtual value chain*). Additionally, for achieving full potential of ERP systems, especially under collaborative business structures such as *vertical integrated enterprises*, *extended enterprises*, and *virtual enterprises* (*extended integration*; *vertical integration*; *virtual integration*), the evaluators (e.g. *enterprise* leaders, integrators, or facilitators) should consider the impact of ERP information systems on external stakeholders (*(ERP systems management) outcomes*; *IS strategy*).

Designing and adopting ERP systems within the context of multi-organisational collaboration also encompasses the evaluation of inter-organisational IS projects and investments (*investment*; *project management*). In comparison to traditional ERP project implementation (i.e. scope at single organisational level), an inter-organisational information systems project builds in more complexity due to the number of organisations involved and the scale of an IT/IS project. Thus appropriate project management is required to attain the benefits of *(multi-organisational) enterprises-wide ERP solutions* (*(ERP systems management) outcomes*; *project management*). Best practices of successful companies who engaged in any types of (multi-organisational) enterprises (*(Enterprise) types*) have followed more structured ways of implementing ERP based on their degree of need for integration instead of adopting ERP either as a 'big bang' or in a phased approach (*enterprise types*; *implementation approaches*). On the other hand, many focal companies in the enterprise indicated that they did consider cost as a prominent factor in ERP systems evaluation (*investment*). This is especially true that the high cost prevents ERP systems from spreading to SMEs who mostly engaged in the EEs and VEs which are more complex, innovative and reconfigurable than the VIEs (*enterprise types*); and the corresponding ERP systems should be changeable and adaptable, which can incur extensive investment on ERP systems customisation (*flexibility*; *investment*). As a result, it potentially raises the problem that small *enterprise members* cannot afford and use the proper ERP information systems to best connect with the most influential/focal companies during multi-organisational collaboration; which can cripples the benefits of (multi-organisational) enterprise-wide ERP solutions (*(ERP systems management) outcomes*; *integrated rather than interfaced*). This in turn negatively affects the success of *enterprises* structure and strategy (*(Enterprise governance) outcomes*; *inter-firm relationship management*; *investment*). Thus companies – particular the most influential companies in the enterprise should take a more futuristic, long-term view of their collaborative operations processes and linked the ERP investment with strategic planning and modern evaluation and control systems (*investment*; *strategy alignment*).

> "*When you look at the downstream it is not just Intel but all of our suppliers; do they use the [ERP] technology to align up with our manufacturing processes. We do spend a lot of money to actually develop the manufacturing [information] technology but when you look at the underlying technology within our suppliers like DGF they do not have that real time technology – that is a huge investment for those companies.*" (Logistics & Manufacturing Manager, Intel, 24th May 2011)*

Moreover, the selection of ERP systems vendors should be considered when evaluating the design of multi-organisational ERP systems (*ERP vendor selection*). The most essential criteria which have been found from the empirical cases include ERP delivery lead-time, specialised industrial functionalities of ERP software, quality of support services, accessibility, security, and vendor reputation (*(ERP vendor) operations*; *functionalities*; *security*). Zoomlion could be used as an example as the selection team initially focused on locating a Chinese application vendor (i.e. Kingdee) but found that the packages available domestically were focused on financials and weak on (distributed) manufacturing capabilities needed. Thus the search shifted to global ERP provider (i.e. SAP) offering the right functionality to meet manufacturing and compliance requirements (*functionalities*; *IS strategic roles*; *ERP vendor selection*).

> "*We selected the Three-Prosper Technology [ERP] solution for its deep concrete manufacturing industry functionality and for its low total cost of ownership. Three-Prosper Technology has proven to be a flexible solution and their software tools allow for fast implementation.*" (Chief Information Officer, Wanghai, 9th August 2012)*

The insights gained from the above discussion on issues of ERP systems design (i.e. information systems design) and strategic roles are summarised in the following proposition #15.

Tentative proposition #15: *The role of ERP systems in supporting operational business has evolved from intra-organisational optimisation and integration into multiple inter-organisational collaborations*

The verdict on whether ERP systems capabilities can fully support (multi-organisational) *enterprise* structures and strategies is greatly contingent upon the targeted *enterprise* types (i.e. VIE, EE, and VE) (*enterprise types*; *Features*). Concretely speaking, when (multi-organisational) *enterprises* design requirements or management patterns change (i.e. one enterprise type moves towards another enterprise type), the ERP systems could be quickly reconfigured correspondingly (*flexibility*); and *vice versa*. The purpose is to establish the 'right' kind of multi-organisational collaboration structure type(s) needed to conduct meaningful information exchange enabled by the 'right' ERP information systems (*data sharing*; *enterprise types*; *IS strategic roles*); thus achieve a sustainable competitive advantage (*(Enterprise governance) outcomes*). Some big companies such as Zoomlion, for instance, have used *traditional ERP(I)* (i.e. SAP R/3) systems as the basis to introduce more consistent operating practices across their geographically dispersed units (*process integration*). In turn, they are able to achieve highly tight intra-enterprise coordination through their businesses (*depth*; *scope*) as required by the *VIE* paradigm. For some other companies such as TNT, however, differences in regional parcel service markets remain so profound that strict process uniformity would be counterproductive. If companies who collaborate in such circumstances do not allow their regional units to tailor their operations to local customer demands and regulatory strictures (*customer experience*), they risk sacrificing key markets to more flexible competitors (e.g. DHL and FedEx). Thus, to preserve local autonomy while maintaining a certain degree of *enterprise-wide* control (characteristics representing a *VE*) – a very different approach to ERP systems needs to be taken. Rather than implement a single monolithic ERP system, this type of multi-organisational enterprise structure and strategy need to roll out a web-based multi-organisational ERP systems along with separable functional modules (*implementation approaches*). In comparison to these two cases, companies such as Lightning Source and Intel who act as the primary manufacturer or service provider in an *EE* will concentrate on their core competences and outsource their non-core activities to other *enterprise* members (*competence focus*; *Strategic roles*). To cope with the complex extended enterprises (i.e. medium degrees of inter-firm integration with moderately lean and agile resources), traditional proprietary ERP(I) systems and web-based ERP versions shall not be deemed as the best choices; instead, by imposing a moderately open, flexible ERP architecture, better real time information, smooth connections between the focal firms, suppliers, customers, and other supply chain partners, and standardised multi-organisational operating processes can be realised (*collaboration and integration*; *standardisationof process & quality*).

> "*ERP system supporting inter-firm relationships is becoming much more complex – it is no longer one-to-one relationship. We have the marketing influencing relationship with HP and Dell who might collaborate with their manufacturing partners in a very different fashion ... our strategy has been moving customers to RosettaNet; but actually most of our customers want to have EDI. Now we have the 'Universal Gateway' so we are not going to push everybody to use RosettaNet; instead, they can either use RosettaNet or use EDI.*" (Logistics & Manufacturing Manager, Intel, 24th May 2011)*

> "*In the central warehouse, the environment was strengthened so that when orders dropped, they could ship the same day. The result was better collaboration across the enterprise, and more efficient control of stocks.*" (Inventory Manager, Wanghai, 20th July 2011)*

The argument on whether and how ERP capabilities can support different (multi-organisational) *enterprises* (*Types*) could also be described by the assumption that designing and adopting ERP IS as such is a change project, which demands either the organisational changes (*operations processes reengineering*; *(Organisational management) change*) or the implemented ERP system is adjusted (*deployment*; *functionalities*; *IS strategic roles*). This is a fact independent whether the delivery model for ERP systems is proprietary, SaaS/open source, or hybrid (*ERP platform*; *hybrid one*; *implementation approaches*; *on-demand*; *on-premise*). It is supported by the fact that Zoomlion and Lanye initially deployed traditional on-premise ERP infrastructure to meet requirements for their VIE structures and strategies; since on-premise ERP enabled them to run all applications on the same platform, i.e. avoided tough vertical integration issues and improved visibility into the VIE operation (*ERP platform*; *increasing transparency*; *systems integration*). Additionally, companies deploying the proprietary ERP systems are allowed to completely configure and customise the software as they need while controlling over all systems and data (i.e. avoid data lock-in); which is in line with the VIE characteristics (*enterprise types*; *flexibility*). Intel and Metrobank could be used as counter examples, since they have been aware of moving towards the cloud-based ERP and SOA-ERP infrastructures; and trying to set up 'one gateway' which can translate multiple protocols via true ERP-to-ERP systems integration (*on-demand*; *systems integration*). As a result, the dynamically reconfigurable VE can be fully supported by such multi-organisational ERP information systems delivered through a more flexible and scalable (ERP) deployment architecture at lower cost (compared with EDI and RosettaNet) (*enterprise types*; *flexibility*; *inter-relationship management*; *on-demand*).

> "*We have got web portals in various systems but we are trying to move to a more service-oriented architecture – one gateway for everything which can translate multiple protocols but also go through true ERP-to-ERP systems ... we are doing 'customer forward integration' like ERP-to-ERP systems integration for some lower tiers (customers) like CANT. We are also doing some micro work with Microsoft about the cloud-based [ERP] solutions and services; so the information can be accessed in the 'cloud'.*" (B2B Technologist, Intel, 24th May 2011)*

Moreover, it can be argued that *what (multi-organisational) enterprise types could be catered for by what ERP capabilities* is partly affected by factors involving the strategic roles of (ERP) information systems and the technological advancement (*IS strategic roles*; *systems advancement*). Specifically, strategic roles are not just like systems functionalities or features supporting detailed operational parts; rather, it should be understood as a higher level and more general strategic viewpoint, e.g. smooth information communication between different multi-organisational enterprise members; whilst (ERP) systems advancement is related to specific information systems competencies of supporting different *enterprise* (in the sense of EC's definition) structure and strategies under different circumstances (e.g. full collaborative commerce functionality, all internal functions supported plus core inter-company processes, web-based ERP, compatibility with SOA and cloud computing, and open network). Consequently, ERP information systems capabilities could be configured for supporting different multi-organisatinal relationships and collaboration (*enterprise types*) that can be classified into six key features (or aspects) based on the empirical observations from this research study; these are (i) automating and streamlining manufacturing operations (*manufacturing operations*; *process integration (internal)*), (ii) integrating collaborative activities through the entire supply chain (*process integration (supply chain)*; *supply chain management*), (iii) facilitating data/information and knowledge sharing (*data sharing*; *increasing transparency*; *real time information*) whilst (iv) reducing the cost and time of operating collaborative project (*cost & time reduction*; *quick responsiveness*), (v) enabling inter-organisational relationship management (*inter-relationship management*; *process integration (external)*), and (vi) improving the financial management (*financial management*).

> "*I think a holistic, integrated ERP system is definitely the most things we need right now because we waste so much time manually doing stuff with data. If you had this management information database you could do that in hours instead of six weeks.*" (Head of Sort Automation, TNT Post, 2nd June 2011)*

"*Three-Prosper Technology ERP system has provided Wanghai with a web-based solution – a move that will facilitate and improve information sharing with suppliers and inter-managed inventory processes.*" (Chief Information Officer, Wanghai, 9th August 2012)*

The above discussed issues of ERP systems design (i.e. information systems design) are summarised in the following propositions #16 to #18.

Tentative proposition #16: *Future ERP systems should be designed based on web-based technologies by deploying service oriented architectures and cloud computing applications instead of being based on proprietary in-house enterprise information systems*

Tentative proposition #17: *'On-demand' ERP solutions will benefit and enable organisations to access technologies without significant individual investment cost in inter-organisational systems integration*

Tentative proposition #18: *There is a high degree of compatibility between 'cloud-based ERP' and service oriented architectures and hence the two will grow in unison*

Information systems management – ERP systems management

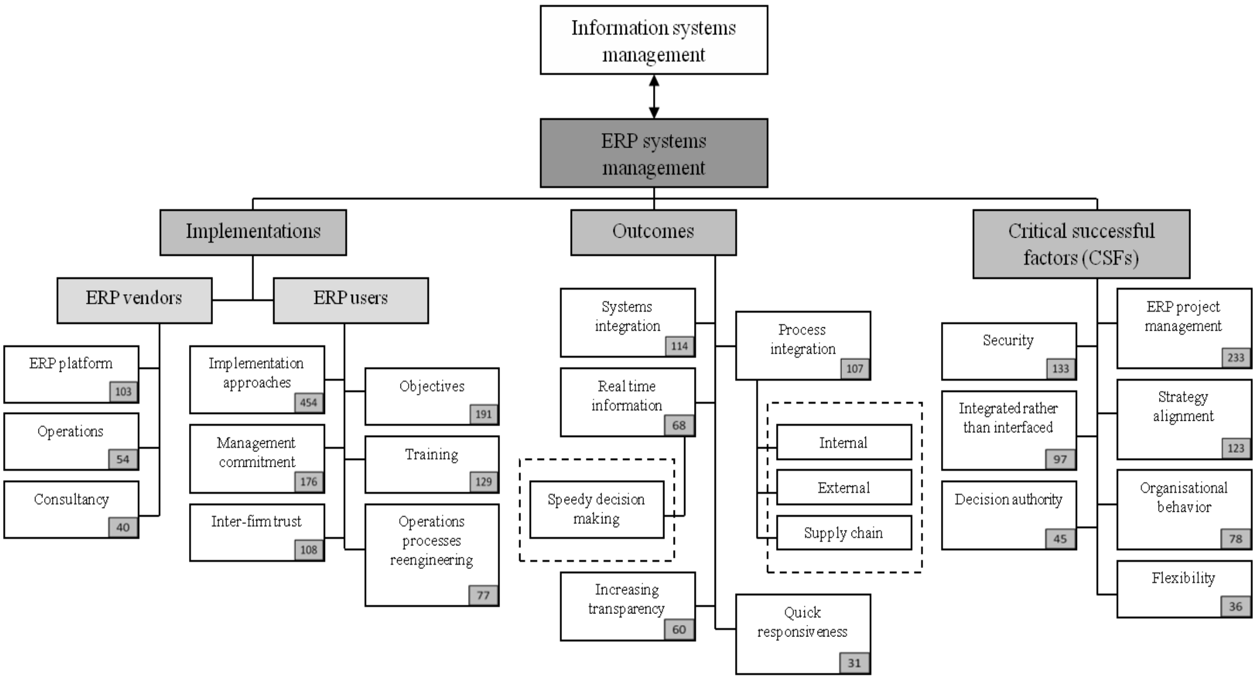


Figure 6.15. Coding of the core category 'ERP systems management'

Table 6.11 Occurrence and proportion of code in core category 'ERP systems management'

Core category: ERP systems management					
Category (sub-category)	Individual code	Frequency [#]	Source [#]	Source [in %]	Coverage [in %]
Implementations (ERP vendors)	ERP platform	103	34	70.8	19.7
	Operations	54	22	45.8	12.3
	Consultancy	40	14	29.2	2.7
Implementations (ERP users)	Implementation approaches	454	45	93.8	21.4
	Objectives	191	46	95.8	23.0
	Management commitment	176	27	56.3	3.6
	Training	129	25	52.1	6.2
	Inter-firm trust	108	12	25.0	5.0
	Operations processes reengineering	77	7	14.6	4.1
Outcomes	Systems integration	114	31	64.6	15.3
	Process integration	107	20	41.7	20.0
	Real time information	68	26	54.2	22.0
	Increasing transparency	60	13	27.1	2.8
	Quick responsiveness	31	8	16.7	3.3
Critical successful factors (CSFs)	ERP project management	233	28	58.3	16.4
	Security	133	10	20.8	4.4
	Strategy alignment	123	15	31.3	11.9
	Integrated rather than interfaced	97	13	27.1	5.7
	Organisational behavior	78	4	8.3	2.8
	Decision authority	45	9	18.8	4.0

	Flexibility	36	6	12.5	6.4

The purpose of analysing and discussing empirical data along with relevant narratives of the core category "ERP systems management" is to identify the issues related to the management of ERP systems within the context of multi-organisational collaboration. Firstly, it has been found that the discrepancies between ERP software and multi-organisational practices can be a combination of systems capabilities or functionality, which is 'too far' or 'too close' (*business and IT alignment*; *strategy alignment*). The systems can be 'too far' from the specific needs of the multi-organisational collaborative operations; thus requiring extensive configuration and development. The systems can also be 'too close' because of irrelevant or inappropriate functionalities that often cannot be modified (*flexibility*). One useful approach to answer the question on whether/how ERP information systems implementation impact on multi-organisational business performance is to consider the levels of ambition of the established (multi-organisational) *enterprise* paradigm concerned (*(Enterprise governance) outcomes*; *enterprise types*) and what it is that they aspire to achieve in terms of competitive results (under different business circumstances) (*(ERP systems management) outcomes*). It has been found that the most salient benefits of adopting and managing ERP IS within the context of multi-organisational collaboration include (i) integrating different ERP systems (or functional modules) or the same ERP systems at different geographical locations (*integrated rather than interfaced*; *systems integration*); (ii) automating, streamlining, and integrating dynamic dispersed operational processes across the multi-organisational boundaries (*collaboration and integration*; *process integration*); (iii) producing and accessing information/data in a real-time environment to facilitate rapid and better collaborative decision making (*knowledge sharing*; *speedy decision making*); (iv) increasing transparency and traceability of accurate and relevant information within individual companies and synchronising data exchange between supply chain echelons (*increasing transparency*; *real time information*); and (v) helping (multi-organisational) *enterprises* and individual (enterprise) value members to become more responsive to the constantly changing customer requests in a more agile manner (*customer value proposition*; *flexibility & agility*; *quick responsiveness*).

> "*Alutex ERP system combined with GPS technologies has improved the quality, reliability, and traceability of information and products throughout the manufacturing process ... we know who's accessing the system; and we can see where our orders are.*" (General Manager, Lanye, 19th July 2011)*

> "*SAP ERP system along with its web-based solution has significantly reduced the time it takes Metrobank to deliver new processes and integrate with new customers. The standardised approach enables seamless collaboration between Metrobank and its partners, and provides the ability to bring outside parties on board much faster.*" (Group Commercial Director, TNT Post, 2nd June 2011)*

Despite all of the benefits ERP information system offers within the context of supply network (*(ERP systems management) outcomes*), some organisations engaged in the multi-organisational (enterprise) cooperation still struggle to implement ERP systems effectively. This is not because ERP solutions are poorly designed, but because there is inadequate understanding of the way that an *enterprise*-wide ERP solution should be adopted (*objectives*; *strategy alignment*). To this effect, companies may end up exceeding their planned implementation budgets, and time to implement (*ERP project management*). Consequently, one of the most fundamental elements in ERP enable collaborative enterprise governance is having a clear defined vision and the formulation of the right strategies. In other words, alignment of ERP IS strategy with (multi-organisational) *enterprise* structures and business strategies is considered a fundamental principle (*business and IT strategy alignment*; *objectives*; *strategy alignment*); and this can be enabled by senior executive support for ERP systems, involvement of IT people in strategy development, and the level of IT people's understanding of the business goals (*ERP project management*; *management commitment*; *People management*). Additionally, security issues (e.g. data protection spanning multi-organisational operations) and the flexibility (e.g. accommodate new operational process changes instead of making heavy customisation) of ERP systems architecture and functional capabilities are regarded as the critical successful factors of managing ERP IS in an *enterprise* (in the sense of EC's definition); since most individual *enterprise* members – particularly the most influential/focal firms seek to become more responsive, agile, dynamic and reconfigurable to meet new emerging (multi-organisational) *enterprise* operational requirements. Relate to this point, the base platform infrastructure of the supporting ERP system holds increased significance, which should be one that can be customisable, scalable, integrated, and stable. In turn, collaborative activities through the entire virtual value stream supported by ERP systems can become really integrated rather than interfaced.

> "*I think where we have data travelling automatically between us and our customers and suppliers. We tend to use what available standards out there to secure that data exchange and allow it to have been a correction or a verification that ensures that despite data flying out on the Internet, nobody can pick it up and understand it.*" (Group Services Director, TNT Post, 2nd June 2011)*

> "*So I think it would help us if we had a better ERP system which was integrated rather than interfaced, was really integrated together to save people doing manual keying because manual keying, one is time consuming; two is bringing errors.*" (Managing Director, Lightning Source, 24th March 2011)*

Moreover, many companies (in particular the most influential companies) that attempt to implement and manage ERP solutions within the collaborative enterprises context may run into difficulty because the organisation is not ready for (multi-organisational) enterprise systems integration and the various functional units within the supply network have their own agendas and objectives that conflict with each other (*organisational behavior*; *process integration*; *systems integration*). Therefore, there is a need for multi-organisational trust and communication to reach consensus on the common vision (or mission) (*inter-firm trust*). Also, it seems that as partners learn to trust one-another, they may be prone to commit a larger amount of resources to an innovative collaborative venture (*management commitment*; *resource integration*); which implies that building a collaboration capability (along with the supporting ERP systems) is really a process of building trust; and resistance can exert a fearful influence and reaction if trust is absent within an *enterprise*. Other associated organisational issues such as organisational change management, facilitating business learning, and empowering (a.k.a. decision authority) should also be taken into account (*decision authority*; *knowledge management*; *Organisational management*).

Specifically, when implementing ERP information systems within the context of multi-organisational relationships and collaboration, companies should consider whether the system (e.g. IT capabilities and deployment approaches) will match their overall (multi-organisational) *enterprise* structure and strategy (*implementation approaches*; *objectives*). And this could be a fact independent whether the delivery model for ERP systems is proprietary, SaaS/open source, or hybrid one (*ERP platform*; *hybrid one*; *implementation approaches*; *on-demand*; *on-premise*). Simultaneously, three key aspects should be taken on board. Firstly, multi-organisational business processes need to be adjusted to form new collaborative forms while non-value-added parts of business processes were expunged after the implementation of *enterprise*-wide ERP systems (*operations processes reengineering*). Secondly, a successful multi-organisational ERP adoption and management require strong leadership and top management commitment as they ensure a smooth change management (or risk management) and (multi-organisational enterprise-wide) ERP system rollout (*ERP project management*; *management commitment*; *(People management) commitment*). Meanwhile, for companies belonging to the same supply network, it makes sense for them to select the same (shared industry) standards, e.g. EDI, Web Based inter-exchange (WBI), and the RosettaNet e-business standard, when they are going to implement multi-organisational ERP information systems. Thirdly, adequate training has been one of the significant reasons of an *enterprise*-wide ERP success. This indicates that a particular challenge in multi-organisational ERP IS adoption is to select an appropriate plan for end-user training and education. It is however to stress that the main goal of ERP training should be the effective understanding of the various business processes behind the ERP applications; whilst ERP training should address all aspects of the system, be continuous and based on knowledge transfer principles wherever consultants are involved (*(ERP vendor) consultancy*; *knowledge sharing*; *mentoring knowledge*; *training*).

> "*(ERP) implementation approaches within my team and within all the planning groups then look at SAP for order maintenance (and) order entry. So our customers use a Web Portal to enter orders that then going to our SAP system. We have also got some customers who use RosettaNet to talk with an Intel and SAP as well. So internally SAP is what we use but with the customers our B2B is excel spreadsheet.*" (Supply Planning & Customer Management, Intel, 24th May 2011)*

Furthermore, an *enterprise*-wide ERP solution can be put together in a number of ways. At one end, an *enterprise* can install a single vendor package. At the other end, it can integrate different modules from different vendors and/or custom software for a BoB (i.e. Best-of-Breed) solution (*ERP platform*; *implementation approaches*). Both approaches are undoubtedly complex due to their scale, scope, and BPR requirements (*operations processes reengineering*). Thereby individual firms engaged in the supply network should work closely with ERP vendors after the system was installed rather than having to learn how to use it, which helps to get a quick return on investment (*(ERP vendor) operations*; *relationship management*; *training*). Particularly, most ERP vendors (e.g. SAP, Oracle, and PeopleSoft) have promoted a "one size fits all" solution built on "industry best practices"; which could force (multi-organisational) *enterprises* to either conform to the "best practices" and configurations suggested by ERP vendors and implementation consultants or embark on extremely costly reconfiguration of their ERP solutions (e.g. Intel) (*consultancy*; *ERP platform*; *(ERP vendor) operations*; *implementation approaches*).

> "*We felt that Three Prosper Technology consulting was the most qualified consulting firm to assist us with training and consulting services for both ERP systems and e-business solutions.*" (Chief Information Officer, Wanghai, 9th August 2012)*

> "*The IBM consultants had thorough knowledge of the crane manufacturing industry and how the SAP system should be applied within the industry.*" (Chief Information Officer, Zoomlion, 12th August 2011)*

These aspects on managing ERP systems design (i.e. information systems management) are summarised in the following proposition s #19 to #24.

Tentative proposition #19: *Information security and flexibility of ERP systems will be key determinants in their adoption and use in inter-organisational collaborations*

Tentative proposition #20: *Inter-organisational integration requires different organisations within the same collaborative supply network to use ERP system(s)*

Tentative proposition #21: *Inter-organisational integration requires ERP systems within the same collaborative supply network to use the same ERP system to become highly integrated*

Tentative proposition #22: *The tighter inter-organisational collaborative structures and strategies become; the more integrated and flexible ERP systems also need to become*

Tentative proposition #23: *Third-party consulting organisations are becoming increasingly responsible for handling web-based ERP system implementations, which could make non-web-based ERP vendors lose their influential positions over end-users*

Tentative proposition #24: *Inter-organisational collaboration can be facilitated best by integrating 'best of breed' functional modules from different ERP solutions, rather than customising a single 'one-size-fit all' solution*

Inter-firm relationship contingency – competence and competitiveness as main contingency factors

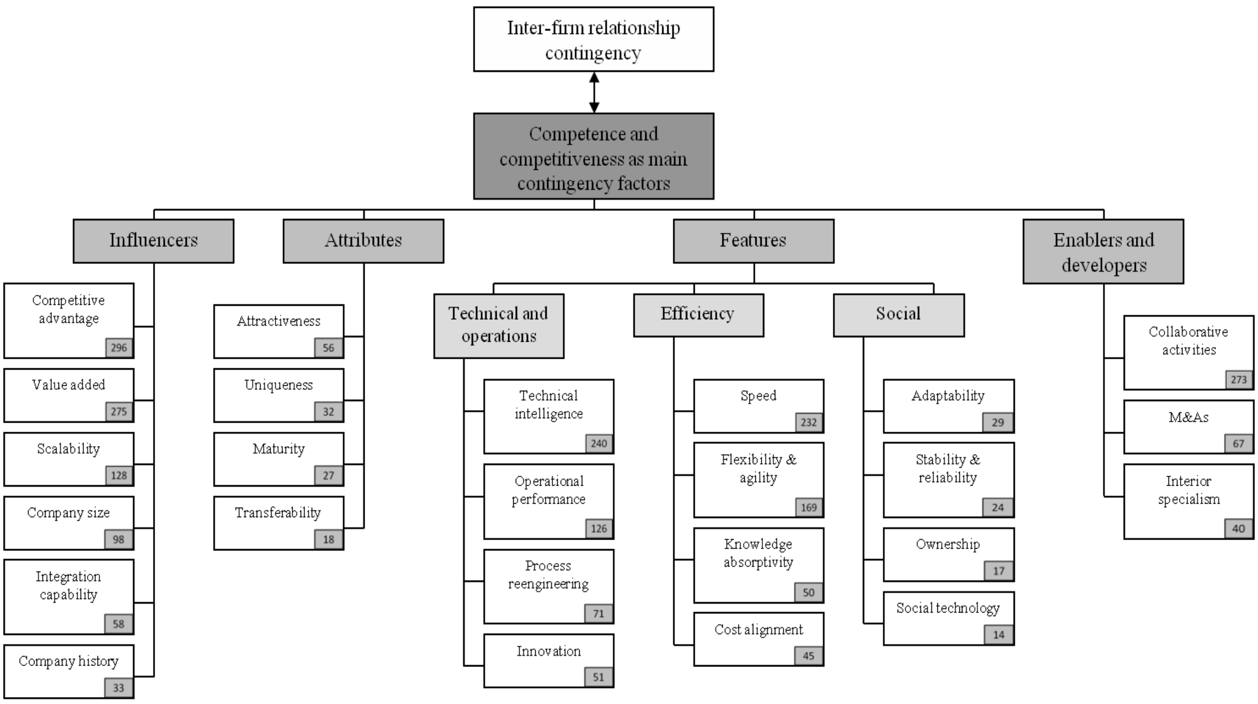


Figure 6.16. Coding of the core category 'competence and competitiveness as main contingency factors'

Table 6.12 Occurrence and proportion of code in core category 'competence and competitiveness as main contingency factors'

Core category: competence and competitiveness as main contingency factors					
Category (sub-category)	Individual code	Frequency [#]	Source [#]	Source [in %]	Coverage [in %]
Influencers	Competitive advantage	296	44	91.7	26.4
	Value added	275	37	77.1	24.5
	Scalability	128	27	56.3	16.4
	Company size	98	15	31.3	4.6

	Integration capability	58	22	45.8	8.7
	Company history	33	18	37.5	11.2
Attributes	Attractiveness	56	39	81.3	13.5
	Uniqueness	32	32	66.7	18.0
	Maturity	27	27	56.3	12.0
	Transferability	18	12	25.0	8.5
Features (technical and operations)	Technical intelligence	240	31	64.6	9.9
	Operational performance	126	40	83.3	13.2
	Process reengineering	71	28	58.3	10.7
	Innovation	51	17	35.4	14.0
Features (efficiency)	Speed	232	38	79.2	11.6
	Flexibility & agility	169	32	66.7	14.6
	Knowledge absorptivity	50	16	33.3	3.0
	Cost alignment	45	14	29.2	2.1
Features (social)	Adaptability	29	10	20.8	3.5
	Stability & reliability	24	12	25.0	1.9
	Ownership	17	9	18.8	2.0
	Social technology	14	3	6.3	1.7
Enablers and developers	Collaborative activities	273	45	93.8	26.4
	M&As	67	20	41.7	5.2
	Interior specialism	40	31	64.6	2.6

The purpose of analysing and discussing empirical data along with relevant narratives of the core category "competence and competitiveness as main contingency factors" is to discuss how multi-organisational and the supporting ERP systems can be affected or driven by the (enterprise) value members' competence as well as the overall desired competitiveness. It has been found that the (semi-) autonomy of those cross-functional parts of an organisation is closely related to the existence of relevant and sufficient know-how on a meta-level, i.e. reflection of all functions and core competencies that are necessary in the context of multi-organisational relationships and collaboration (*competence fit*; *competence focus*; *competence profile*). This not only involves innovative capacity (*innovation*), specific technical knowledge about parts and systems for the joint product production or service solutions delivery (*operational performance*; *technical intelligence*), and the understanding of their complex interfaces and interaction with other parts (or systems) within the overall supply network (*integration capability*; *operational performance*; *regular communication & coordination*); which may require each individual company's business processes to be reengineered to better accommodate new changes triggered by new established multi-organisational partnerships (*adaptability*; *(Collaborative activities) reengineering*; *process reengineering*). It also involves the management skills and social characteristics which are necessary to link with other partners in the (multi-organisational) *enterprise* to successfully produce and deliver a coherent product or service solution to the end consumers (*customer value proposition*; *ownership*; *stability & reliability*).

> "*On the one hand a certain degree of specialisation is necessary. On the other hand, you need to be able to understand and offer the global aspects of a part or system.*" (Regional Marketing & Sale Manager, Zoomlion, 4th September 2012)*

Even if individual companies (e.g. OEMs, logistics provider, and distributor) (*Strategic roles*) with a key account structure are able to provide good parts of collaborative products or service solutions, the assigned responsibilities of any legal entity engaged within a multi-organisational collaboration mainly dependent on the type and level of its core competence (*competence focus*) as well as the expected competitiveness through the design and management of the entire *enterprises* (in the sense of EC's definition) (*(Enterprise governance) outcomes*); and more specifically, the perception of the required core competence in respect to the existing one (*competence fit*; *competence profile*). Thus, the more unique, advanced, and suitable the cross-functional knowledge and the core competencies of an *enterprise* partner are, the more responsibilities it will be given within the whole supply network (*depth*; *scope*) since the more value this creates for the successful delivery of the multi-organisational cooperation and hence the sustainable competitiveness of the entire virtual value chain (*(Enterprise governance)*; *virtual value chain*). This requires, "*a certain degree of specialisation to differentiate from other partners in the supply network*" (Production Manager, Lanye, 19th July 2011)* but also the core competence to "*cover the potential risks and problems and the work that can emerge related to your product in the wider context of the crane*" (Regional Director, Zoomlion, 4th September 2012)*.

Accordingly, the maximisation of the collaborative activities involvement within any type of (multi-organisational) *enterprise* is a basic objective for each partner, especially the SMEs; which needs to be based on the sophistication of the required core competencies for multi-organisational relationships and collaboration (*competence focus*; *(Features) efficiency*; *(Features) social*; *(Features) technical and operations*; *value added*) as characterised by their (competence) attributes: attractiveness, uniqueness, maturity, and transferability (*attractiveness*; *maturity*; *transferability*; *uniqueness*). This then ultimately improves the competitiveness of the entire supply network as long as a strategic (multi-organisational) *enterprise* structure and strategy is applied (*collaboration and integration*; *competence focus*; *collaborative relationships*; *(Design approaches) types*).

> "*If our product is not right, the partner would not work with Lightning Source; and probably the product is the driver at the perception of print-on-demand being cheap and quick. But there is also a perception that we should be like traditional printing. So there is a very much balance to find between cheap, quick, and quality.*" (Client Services Manager, Lightning Source, 25th March 2011)*

These aspects of value proposition and core competencies are summarised in the following proposition #25.

Tentative proposition #25: *Initial motives for inter-organisational collaboration are based upon the attractiveness of an organisation's core competences*

As a consequence, the "*core competencies of the suppliers needed to increase drastically in order to be able to address complex service solutions on the meta-level*" (Chief Operation Officer, Metrobank, 18th August 2011)*. However, it is obvious that many partners cannot (or might not be able to) develop the necessary core competencies completely on their own (*collaborative activities*; *interior specialism*; *M&As*), e.g. due to financial constraints, a lack of experience or the characteristics of their products (or services) (*competitive advantage*; *company history*; *company size*; *scalability*) for the ultimate joint products or services delivered by their (multi-organisational) *enterprises*. Therefore, these legal entities were and still are dependent on the cooperation and interaction with others, e.g. the most influential companies in the enterprise, focal manufacturers or service providers, in multi-organisational relationships and collaboration within the supply network (*collaborative activities*; *global supply network*).

With increasing maturity of multi-organisational partnerships and cooperation (*depth*; *maturity*; *proximity*) further development tasks and performances are more and more sourced to the external partners, "*which could automatically improves the competencies and know-how of the focal companies through more involvement in the collaborative projects*" (Chief Executive Officer, Wanghai, 20th July 2011)* (*collaborative activities*; *value added*). Simultaneously, these value members within the same *enterprises* (in the sense of EC's definition) can develop their own ecosystem by designing, producing, and delivering completely end-to-end (product-service) solutions for customers (*end-to-end solutions*).

> "*We would start doing more visibility, i.e. ensuring that the software groups talk to the factory planning groups to the tech.; so the guys who are designing and building the CPUs are from the factory right out to the customer. So that we have a single voice going out to the customer base on here, i.e. the package of everything you can get rather than traditional vertical approach … we were from being very 'vertically focused' to be very 'end-to-end solution focused'.*" (Supply Planning & Customer Management, Intel, 24th May 2011)*

The above discussed issues of (core) competence and competitiveness as main contingency factors (i.e. inter-firm relationship contingency) are summarised in the following propositions #26 and #27.

Tentative proposition #26: *Collaboration between different organisations can create new meta core competencies and specific systems resulting in 'end-to-end' product-service solutions*

Tentative proposition #27: *Building inter-organisational collaboration is an effective way to reduce cost and lead time, increase the efficiency, improve flexibility and reactivity to demand; and encourage innovation*

Organisational and people issues – organisational and people management

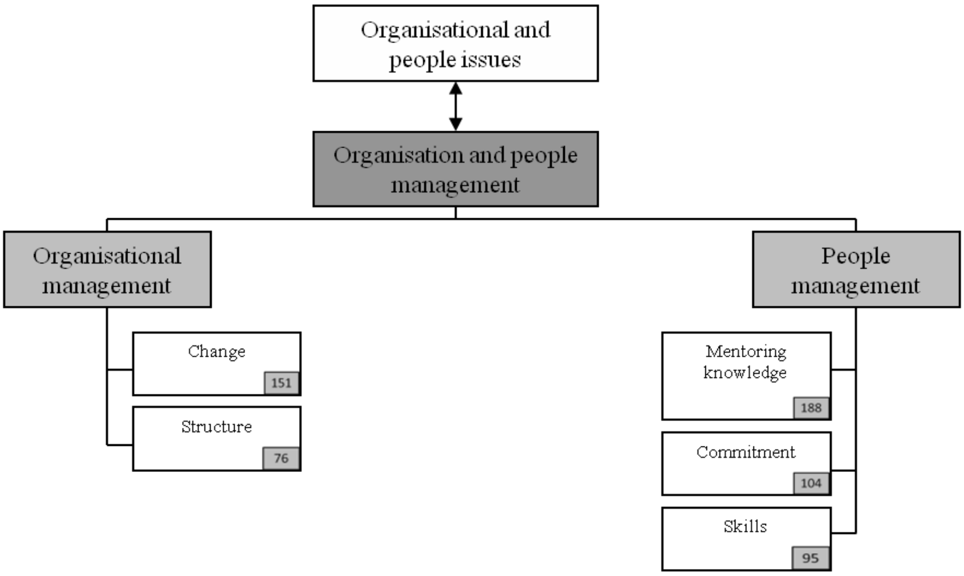


Figure 6.17. Coding of the core category 'organisational and people management'

Table 6.13 Occurrence and proportion of code in core category 'organisational and people management'

Core category: competence and competitiveness as main contingency factors					
Category (sub-category)	Individual code	Frequency [#]	Source [#]	Source [in %]	Coverage [in %]
Organisational management	Change	151	30	62.5	9.9
	Structure	76	24	50.0	6.4
People management	Mentoring knowledge	188	27	56.3	14.0
	Commitment	104	22	45.8	13.2
	Skills	95	28	58.3	3.1

The purpose of analysing and discussing empirical data along with relevant narratives of the core category "organisational and people management" is to identify the issues related to the management of organisation and people within the context of multi-organisational collaboration. Specifically, designing, managing, and developing ERP information systems within the context of multi-organisational relationships and collaboration is still a big challenge because there is a need for better accommodating the dynamic changes occurring within organisations (both individual value members and the whole *enterprises*) (*collaboration & integration*; *(Organisational management) change*; *reengineering*). This indicates that (multi-organisational) *enterprise*-wide ERP adoption has significant impact on company's culture and organisational structure; whilst successful implementation requiring that people, processes, functional units, and organisational (culture and structure) change (*(Organisational management) change*; *culture*; *People management*; *structure*).

> "*I had two separate organisations – manufacturing and distribution. So that is one big change and now I broadly only need one manager because from my point of view the process is an order to when it gets out the door. It is not an order and it gets for feel by manufacturing and it sits into another department. The whole processes are one process.*" (Operations Director, Lightning Source, 24th March 2011)*

On the one hand, among companies – particularly the most influential/focal firms who have developed dynamic collaborative capabilities and enterprise information systems, the key success factor has been a recognition that they need to proactively and simultaneously change both structure and culture to remove fear and reward collaborative and information systems risks taking (*collaborative activities*; *culture*; *(Organisational management) change*; *(Relationship interfaces) organisational*; *structure*). Changed behaviour can lead to an effective multi-organisational collaboration which translates into greater commitment to the collaborative vision (*commitment*; *organisational behavior*). Over time, collaborative learning provided the building blocks for a dynamic collaborative capabilities and the supporting ERP information systems use (*knowledge management*; *mentoring knowledge*; *technology management*). On the other hand, organisational change management within the context of ERP systems enabled collaborative *enterprise* governance comprises people management and social changes (*(Organisational management) change*; *People management*), needed by top management when introducing new operational processes and structures in order to prepare people to accept changes and decrease their reluctance to change (*ERP project management*; *management commitment*; *(People management) commitment*). Effective communication is an important factor when talking about changes and it is required through the whole supply network and on all functional levels (or different stages of the entire virtual value stream), although employees might not be directly connected with the *enterprise*-wide business process management (*knowledge absorptivity*; *regulation communication & coordination*; *relationship management*). Furthermore, the unique challenge in designing and managing (multi-organisational) *enterprise*-wide ERP projects includes re-engineering business processes to 'fit' the process which the ERP software supports (*ERP project management*; *(Organisational management) change*; *operations processes reengineering*; *reengineering*); this can also be regarded as the development of 'strategic alignment' emphasising the multivariate fit among business strategy, IT strategy, organisational infrastructure, and operational processes (*business and IT strategy alignment*; *strategic orientation*). For example, Intel did the CPR project to re-engineer and streamline business processes to *not only* act be quite agile in react to customer needs quickly within its supply network *but also* move into the new off-the-shelf SAP ERP standards since the old ERP systems did not have all the functionalities that met Intel's operational requirements so the company was quite constrained on some (joint) products in the complex collaborative environment.

> "*The biggest thing for me in there is the culture change for people who working on the floor.*" (Managing Director, Lightning Source, 24th March 2011)*

"*We have made some changes be quite flexible – really quite customer-oriented; so we act be quite agile in react to customer needs quite quickly … we did the CPR to reengineer our business processes and streamline them … we have just moved to a new off-the-shelf standard SAP because in the past SAP did not have the solutions which met our requirements; so we were quite constrained on some products and we needed some tools and products in the process to manage the constrained environment.*" (B2B Technologist, Intel, 24th May 2011)*

Even if companies manage to form a favorable multi-organisational enterprise environment, including top management support, readiness to change, and required (ERP) technological capabilities/competences (*(Organisational management) change*; *(People management) commitment*; *technical intelligence*), the *enterprise*-wide ERP project would certainly lead to a failure if the vital people (e.g. functional managers and employees and ERP end users) lack eligible skills and knowledge about the new (multi-organisational) *enterprise* business process, or if they are not educated properly and on time (*mentoring knowledge*; *skills*; *training*). However, this is still not a guarantee for successful ERP systems enable (collaborative) *enterprise* governance because people also have be motivated, cooperative, prepared to train, be aware of the roles and responsibilities within , as well as be flexible and capable of performing different tasks (*management commitment*; *skills*; *training*). Moreover, any individual companies – particularly the most influential/focal companies engaged in an *enterprise* (in the sense of EC's definition) will face a certain level of organisational and people resistance due to its disruptive change. In response to this, building inter-firm trust is one key aspect (*inter-firm trust*); whilst high commitment maturity that enables *value members* to achieve collaborative goals supported by ERP information systems is another key aspect (*management commitment*; *(People management) commitment*). These facts also implies that organisational behavior (*Organisation and people management; organisational behavior*) is a key challenge when designing, adopting, and managing web-based (or cloud-based) ERP information systems in multi-organisational collaborations; because *value members* within an *enterprise* may not be ready (i.e. possess adequate capabilities) for governing the next generation of ERP IS based on the novel strategic concepts (e.g. open and dynamic network supported by cloud-ERP or SOA-based ERP) (*competitive advantage*; *interior specialism*).

"*We have regular reviews with key accounts of our customer product and service. We always looking at training needs both on our side and on our customer's side because the customer has to use our technology, e.g. we have to train them to use our website. That is always a two way.*" (Managing Director, Lightning Source, 24th March 2011)*

The above insights and discussion on organisational and people management (in the context of ERP systems enabled inter-firm collaboration) (i.e. organisational and people issues) are summarised in the following propositions #28 and #29.

Tentative proposition #28: *Organisational cultural diversity, trust issues and resistance to change have to be managed when adopting ERP systems, especially in inter-organisational collaboration*

Tentative proposition #29: *Organisational behavior is a key challenge when adopting and managing web-based ERP systems in inter-organisational collaborations*

6.2 Data validation

The aim of this data validation is to verify and validate the developed understanding and interpretation of ERP information systems enabled multi-organisational relationships and collaboration in both manufacturing and service-oriented industries (that resulted in the above set of tentative propositions) in order to build a sufficient empirical basis for the comparison with relevant literature (see Sections 7.1 to 7.5 in Chapter 7) and the development of the novel concept (i.e. DERG-ERP) (given in Section 7.6 in Chapter 7). This conforms with Grounded Theory-based methodological practice which uses ongoing observations to validate tentative ideas and conceptual structures (Suddaby, 2006).

The validation exercise was based on self-administered questionnaire survey enabling an empirical quantification of the qualitative data through a more objective research technique. It was the aim of this validation exercise to base the qualitative findings on a broader empirical foundation within the UK and Chinese manufacturing and service business industries (research population). In this opinion of the author this was achieved through a questionnaire survey sample representing 116 industrial experts from 16 different companies as opposed to an interview sample consisting of 48 participants from 8 companies (as in Chapter 3).

The validation of the 29 *tentative* propositions through the questionnaire survey implicitly validated the relevant and coded text of the interviews and its related individual codes, sub-categories, categories, core categories, and abstract themes on which the theoretical propositions are based. In other words, **the evaluation of these propositions through industrial experts in the survey provided feedback on the quality and adequacy of the data coding and analysis, which enables a further conceptual development and inductive theory building/generation** (Glaser, 1978). In this context every respondent was asked to assess each tentative proposition on two dimensions of perception:

- Agreement – *whether they agreed or disagreed with the proposition*
- Importance – *the importance of the proposition for daily business activities*

Thereby, this exercise established whether respondents agreed with the researcher's analysis and interpretation of the raw interview data and whether they thought the observations were important enough to warrant building into a consolidated conceptual framework. The respondents were asked to rank their perceptions on two dimensions in interval levels using 7-point Likert scales as follows:

(1) Agreement (strongly agree = 3, agree = 2, mildly agree = 1, neutral = 0, mildly disagree = -1, disagree = -2, strongly disagree = -3); positive scores indicate agreement and negative scores indicate disagreement.

(2) Importance (extremely high importance = 7, very high importance = 6, high importance = 5, medium = 4, low importance = 3, very low importance = 2, extremely low importance = 1); all positive scores were used as this was a weighting factor.

This numerical codification of the two dimensions enabled a descriptive analysis of the data through the calculation of measures of central tendency (modus, median, mean) for each tentative proposition in order to represent their characteristics (Blaikie, 2003). Even though the numerical values of the scales of the dimensions *Agreement* and *Importance* were coded differently (-3 to 3 versus 1 to 7) their interval lengths were the same (i.e. 7-point scales). This made a differentiation of the ratings comparable. The results are shown in Table 6.14.

Table 6.14 Validated propositions relating to ERP systems and inter-organisational (enterprise) collaborations (N = 116)

Core category	No.	Propositions relating to ERP systems and inter-organisational collaborations	Mean Agreement	Mean Importance
Inter-firm relationship status quo (Industrial impact)	#1	Change in the manufacturing and service-driven industries is driven by a combination of dynamic globalization, internal organisational issues and general industrial forces	1.76	5.40
	#2	Increasing business complexity, cost-effectiveness and shorter turnaround time requires organisations to move towards more collaborative strategies	1.83	5.45
Inter-firm relationship structure design (Enterprise structure and strategy design)	#3	Inter-organisational relationships change over time, which is dependent upon individual core competencies	1.04	4.89
	#4	Inter-organisational relationships change over time, which is dependent upon the end product or service being delivered	1.39	4.99
	#5	Types of inter-organisational relationships and collaborative practices are determined by an industry-specific context	1.34	4.93
	#6	Service based inter-organisational collaborations have greater propensity to become virtual than product based inter-organisational collaborations	0.60	4.30
	#7	Organisations could use different approaches to inter-organisational collaboration, structure and strategy within different supply networks simultaneously	1.51	5.03
Inter-firm relationship	#8	Responsibilities and functional roles of each different organisation needs to be clearly defined within the supply	1.99	5.54

structure management (Enterprise structure and strategy governance)		network		
	#9	Collaboration with new external organisations requires internal business processes to be reengineered to accommodate new changes	1.38	5.20
	#10	In the context of inter-organisational collaboration, product-based organisations predominantly focus on the portfolio and quality of products, and the standardization of business processes	1.35	4.95
	#11	In the context of inter-organisational collaboration, service-oriented organisations predominantly concentrate on consumers' experiences	1.64	5.32
	#12	There is need for a leader or a 'broker' organisation within the supply network who has core competencies and responsibilities to supervise, evaluate and manage cooperation between other organisations	0.91	4.89
	#13	Organisations are more willing to collaborate with other organisations who have a proven track record of successes in inter-organisational business collaborations	1.79	5.23
	#14	Once organisations obtain a similar set competences at a similar level of maturity as their partner organisations, the partnerships could change as a result	0.98	4.68
Information systems design (Enterprise resource planning systems design)	#15	The role of ERP systems in supporting operational business has evolved from intra-organisational optimisation and integration into multiple inter-organisational collaborations	1.58	4.93
	#16	Future ERP systems should be designed based on web-based technologies by deploying service oriented architectures and cloud computing applications instead of being based on proprietary in-house enterprise information systems	1.47	4.90
	#17	'On-demand' ERP solutions will benefit and enable organisations to access technologies without significant individual investment cost in inter-organisational systems integration	1.24	4.87
	#18	There is a high degree of compatibility between 'cloud-based ERP' and service oriented architectures and hence the two will grow in unison	1.09	4.82
Information systems management (Enterprise resource planning systems management)	#19	Information security and flexibility of ERP systems will be key determinants in their adoption and use in inter-organisational collaborations	1.94	5.62
	#20	Inter-organisational integration requires different organisations within the same collaborative supply network to use ERP system(s)	1.02	4.71
	#21	Inter-organisational integration requires ERP systems within the same collaborative supply network to use the same ERP system to become highly integrated	0.61	4.42
	#22	The tighter inter-organisational collaborative structures and strategies become; the more integrated and flexible ERP systems also need to become	1.33	5.04

	#23	Third-party consulting organisations are becoming increasingly responsible for handling web-based ERP system implementations, which could make non-web-based ERP vendors lose their influential positions over end-users	0.41	4.24
	#24	Inter-organisational collaboration can be facilitated best by integrating 'best of breed' functional modules from different ERP solutions, rather than customising a single 'one-size-fit all' solution	0.66	4.44
Inter-firm relationship contingency (Competence and competitiveness as main contingency factors)	#25	Initial motives for inter-organisational collaboration are based upon the attractiveness of an organisation's core competences	1.37	4.97
	#26	Collaboration between different organisations can create new meta core competencies and specific systems resulting in 'end-to-end' product-service solutions	1.50	4.98
	#27	Building inter-organisational collaboration is an effective way to reduce cost and lead time, increase the efficiency, improve flexibility and reactivity to demand; and encourage innovation	1.77	5.31
Organisational and people issues (Organisation and people management)	#28	Organisational cultural diversity, trust issues and resistance to change have to be managed when adopting ERP systems, especially in inter-organisational collaboration	2.00	5.63
	#29	Organisational behavior is a key challenge when adopting and managing web-based ERP systems in inter-organisational collaborations	1.64	5.26

As can be seen in Table 6.14, the respondents agreed with all the theoretical propositions (i.e. a rating above 0 = neutral) and considered them to be important (i.e. a rating above 4 = medium). For the purpose of the theory building/generation nature of this research the author deliberately did not engage in any form of statistical analysis, e.g. exploratory factor analysis, because the induction of relationships between the theoretical propositions can *only* be done based on the understanding of the content and context of the core categories (as will be explained in Chapter 7). **Thus the validation of these propositions must *not* be confused with quantitative hypotheses testing**; **the purpose of Ground Theory-based methodological approach (used by this research study) is only to *code* and *describe* data enough to be able to *generate* and *suggest* theories *not to prove* it statistically** (Glaser, 1994). Hence, the author would like to argue that this research study has not engaged in the practice of methodological slurring by using GTM for testing hypotheses but rather makes statements about how actors perceive the social reality of ERP systems enabled multi-organisational relationships and collaboration via a form of validity assessment (Suddaby, 2006).

6.3 Chapter summary

A fundamental tension in analysis empirical qualitative data is the need to be open to the data versus the need to impose some structure on the analytical process (King, 1998). After the initial observations in 8 empirical cases (as in Section 5.1), the author tried to address this challenge in the above described data coding and analysis procedure by combining various ideas of different qualitative data analysis concepts, such as Grounded Theory-based approach (theoretical coding) and template analysis (thematic coding). The result was a coding and analysis process in five stages in order to draw a connection between the specific raw text (i.e. interview transcripts) and the abstract research objectives.

In a first step, the author developed five abstract *a priori* themes based on the general research objectives which have been identified in Chapters 1 and 3 in order to provide some guidance during the data coding but still allow for enough flexibility to produce insightful interpretations of the text (as in Sub-section 6.1.1). In a second step, each interview (intra-case analysis) was coded and analysed using the QSR NVivo 9.2software tool. This open coding process subsequently led to a composite list of 1367 provisional codes of the entire sample of 48 interviews (as in Sub-section 6.1.2). In a third step, the set of codes was compared across all interviews (cross-case analysis) and the author grouped codes with similar meaning into categories and sub-categories (axial coding) leading to 139 tree codes, 19 sub-categories, and 23 (analytical) categories (as in Sub-section 6.1.3). In a fourth step, relationships of the developed categories were identified and data explaining their interrelation was extracted (as in Sub-section 6.1.4). This enabled their refinement and the development of 7 core categories or abstract themes which explain all other (sub-) categories and hence the data (selective coding). They were condensed in a detailed Coding Master Table including code title, description/definition, example text passages and referenced interviews in which the code appeared. The fifth and final step of the coding and analysis process involved the transformation of the 7 core categories into theoretical narratives (as in Sub-section 6.1.5); which was achieved by breaking them down into their components (categories and individual codes) and verbalising their relationship using the language of the original relevant text given by the interviewees. This led to the generation of a set of 29 tentative propositions which summarise the most important aspects of the theoretical narratives.

The subsequent validation of these propositions (as in Section 6.2) was based on a self-administered questionnaire survey enabling an extensive feedback on the quality and adequacy of the coding and analysis to evaluate whether the derived theoretical propositions were ‘agreed’ and ‘important’ on. Due to *Agreement* and *Importance* ratings above neutral and medium respectively all propositions were subject to the analytical interest of this research study which supported the accuracy and reliability of the (data) coding and analysis process and enabled an informed inductive theory building/generation process.

Not only do these two distinct stages serve the purpose of multi-method triangulation by applying a mix of quantitative and qualitative techniques, but also the goal of theoretical sampling to refine the emerging construct by exploring it in different empirical contexts. Sections 7.1 to 7.5 in the followiog Chapter 7 add to this empirical discussion by discussiog the empirical findiogs, i.e. validated propositions, in the context of their theoretical perspectives as identified io Chapter 2 before leading over to the author's ioterpretation and assembly of the results by inducting a novel conceptual framework (i.e. DERG-ERP) in Section 7.6 io the followiog Chapter 7.

Chapter 7 – Theoretical Discussion of Empirical Findings and Development of the Novel Dynamic Enterprise Reference Grid for ERP

After having presented the empirical findings of this research in the form of a set of validated propositions on enterprise resource planning systems management and multi-organisational relationships and collaboration in the previous Chapter 6, this chapter aims at discussing these findings in the context of specific extant literature (the first main part of this chapter). This is an important feature of theory generating research that ultimately leads to theory extension (Eisenhardt, 1989). In turn, a new contingency model to support the enterprisation of operations (Clegg and Wan, 2013), known as the Dynamic Enterprise Reference Grid for ERP (DERG-ERP) is developed and illustrated (the second main part of this chapter).

The basic literature on ERP systems management and collaborative enterprise governance (see Appendix A – Table IV) to be enfolded consists of a broad body of theoretical perspectives in well established academic disciplines (as in Subsection 2.2.2 in Chapter 2). Since each of these theoretical perspectives generally refers to more than one individual proposition and *vice versa*, the first main part of this chapter (given in Sections 7.1 to 7.5) is structured around the theoretical propositions and their related core categories, which is similar to Chapter 6, in order to avoid redundancies. **The theoretical discussion thereby mainly builds on the literature identified in the literature overview (see Appendix A – Table IV) supported by literary context on the theoretical perspectives involved**. Additionally, it is apparent that the extant management information systems and multi-organisational relationship theory cannot fully explain all empirical observations on the sustainable governance of ERP systems and multi-organisational relationships and collaboration, as well as how different ERP systems fit with different multi-organisational enterprise structures and strategy in a comprehensive manner, thus the second main part this chapter (given in Sections 7.6, 7.7 and 7.8) is devoted to the development of a novel and comprehensive conceptual framework for the sustainable governance of ERP-enabled collaboration in multi-organisational relationships using empirical evidence from eight companies in both manufacturing and service-based industries (in the UK and China); **this presents the ultimate goal of this research study and can be considered as the core of this thesis by providing a novel contribution via the extension of the existing ERP management and multi-organisational relationship and collaboration theories and literature** (i.e. how different ERP systems are designed and managed to contingently fit into different multi-organisational enterprise structures). This is based on the new concept of *DERG-ERP* which is mainly based on the validated propositions (from Chapter 6) and the theoretical perspectives identified to have merit in the context of ERP systems enabled multi-organisational enterprise governance (from Chapter 2).

In regard to the first main part (see Sections 7.1 to 7.5), each section is mainly based on its related propositions but also indicates spillovers to other propositions discussed in the context of their relevant core category in more detail in a different section. Therefore, Section 7.1 confronts the findings regarding the industrial impact (i.e. the *status quo* of inter-firm relationship influenced by various industrial factors) with the relevant literature. Section 7.2 presents insights on (multi-organisational) enterprise structure and strategy design and management. Section 7.3 discusses the aspects of competencies and competitiveness as main contingency factors of (multi-organisational) enterprise (and ERP) governance. Section 7.4 turns to the basic discussion of designing and managing ERP systems in the context of multi-organisational collaboration whereas Section 7.5 sheds light on the issues associated with organisational and people management. **In other words, Sections 7.1 to 7.5 critically discussed how the contribution of this research study extends the existing literature**. Subsequently, Section 7.6 engages in the construction of a competence and competitiveness based contingency framework in the context of the new concept of *Dynamic Enterprise Reference Grid for ERP* to **address the shortcomings of the existing literature** (see Chapter 2 and Sections 7.1 to 7.5), as well as providing guidance to practitioners dealing with ERP systems enabled multi-organisational relationship and collaboration governance; as well as designing and managing different ERP systems to fit with different multi-organisational enterprise structures and strategies. Sections 7.7 and 7.8 take the conceptual arguments back to the level of the empirical findings, i.e. to the validated propositions, in an iterative loop in order to facilitate the internal validity of the theoretical framework (i.e. DERG-ERP). Section 7.9 graphically illustrates how the new DERG-ERP model applied to the 8 empirical cases; whilst Sections 7.10 and 7.11 critically discuss the contrast between the Chinese and the UK companies, as well as the contrast between the companies in manufacturing industries and the ones in service-based industries. In the final Section 7.12 the main aspects of this chapter are summarised.

7.1 Confronting findings on *industrial impact* with relevant literature

The following discussion in this section will mainly draw on the confrontation of the industrial impact with the relevant perspectives in the extant literature.

There are few empirical studies examining and analysing factors that have caused firms to participate in ERP systems enabled multi-organisational (or supply network) collaboration (Cao and Hoffman, 2011; Choy *et al*., 2004; Yam *et al*., 2007). The question in this context is whether the existing studies can explain why multi-organisational collaboration and the supporting ERP information systems in both manufacturing and service-oriented industries increasingly occurs; and why in this context the governance of (multi-organisational) enterprise-wide ERP (note: the governance of enterprise means design and management of multi-organisational relationships and collaboration; while the governance of ERP refers to enterprise systems configuration, adoption, and management) becomes increasingly contingent upon the focus on the core competencies (of value chain members) and the strategic information systems capabilities of supporting multi-organisational enterprise structures and strategies.

Cao and Dowlatshahi (2005) provide an overview of various motives for ERP systems enabled multi-organisational cooperation identified in the literature, including factors such as global competition, product proliferation with shorter and uncertain life cycles, innovative process technologies, and customers who simultaneously demand quick response, lower costs, and greater customisation. Similarly, Poba-Nzaou and Raymond (2010), Muscatello *et al*. (2003) argue that most large firms/focal firms as well as SMEs have deployed information technologies (IT) and information systems (IS), and have implemented in particular, in order to survive, grow, and increase their competitiveness in the new e-business environment. Whilst these changes and challenges arise from various sources some key drivers can be identified as expanding product (or service) and process complexity and variety, shorter product (or service) life cycles and hence shorter turnaround time, increasing outsourcing tendencies, rapid technological development, changing customer expectations, global value chains (a.k.a. virtual value chain), service-oriented manufacturing, and government regulations. This conforms to the observations and empirical findings made during this research study (*cf.* proposition #1).

Although a few studies seem to recognise the importance of configuring inter-organisational information systems to promote inter-organisational processes and the resulting outcomes (Rai and Tang, 2010; Saeed *et al*., 2011); they are still grounded at either linear supply chain (integration) level or process-based multi-organisational relationship portfolios whilst failing to account for how and why different multi-organisational enterprise structures and strategy can be dynamically governed by designing, managing, and developing different ERP information systems (*cf.* propositions #2 and #15). Additionally, the existing literature *does not* address the main challenge that occurs in the context of more partnership collaboration in which competitiveness for the relationship need to be achieved and maintained by applying the most appropriate ERP systems towards a contingency perspective (*cf.* proposition #22). Thus this study extends this view onto the *inter-company* level rather than *intra-company* coordination or linear supply chain integration by identifying the core competencies (which is referred to as core competence “engage-ability”) and strategic information systems (IS) capabilities (which is referred to as enterprise supporting ERP capability) as main contingencies and link them to the governance (i.e. design and management) of the resulting multi-organisational relationships and their corresponding ERP systems.

7.2 Confronting findings on *enterprise structure and strategy design and governance* with relevant literature

The following discussion in this section will mainly draw on the confrontation of the issues regarding the design and management of (multi-organisational) enterprise structure and strategy with the relevant theoretical perspectives in the extant literature.

Major factors that influence or moderate the company’s decisions on the multi-organisational relationships and collaboration governance (i.e. design and management) were found to be the value of individual partner's core competencies (*cf.* proposition #3), the joint product or services solutions (*cf.* proposition #4), and the industry-specific context (*cf.* proposition #5) from this research study. These factors are partly recognised and accounted for in various scholarly contributions to a greater or lesser degree. Firstly, individual core competence as the most significant contingent factor affects and transforms relations among companies engaged in the collaborative supply network (*cf.* proposition #3). This assumes that each *enterprise module* (which is a sub-unit of multi-organisational enterprise, i.e. parts of a company participating in the *enterprise*) is built upon a particular highly specific core competence that belongs to an individual company (e.g. the most influential/focal company in the multi-organisational enterprises) that gives part of that company a unique and valued proposition. The core competence should be combined with other less specific resources which are shareable across the (multi-organisational) *enterprises*. This observation is supported by Svahn and Westerlund (2009) who state that firms are no longer able to develop major product or service innovations alone because of the dispersion of knowledge and technological resources driven by organisational specialisation. In addition, the growing need for greater effectiveness in their operation has forced more companies to focus on their core competencies, leading to the externalisation of the activities to business partners, and thus, to increased dependence on each other's resources and capabilities (Grant, 1996; Prahalad and Hamel, 1990); this, however, raises potential risks of undermining the stability of multi-organisational enterprises because once organisations obtain a similar set of competences at a similar level of maturity as their partner organisations, the multi-organisational partnerships could change as a result (*cf.* proposition #14). Gottfredson *et al.* (2005) add to this (i.e. core competence-based thinking) by illustrating that peripheral and core outsourcing intensity can be used to predict outsourcing performance, e.g. even some core functions like R&D can be delegated to external providers.

The second contingency factor for multi-organisational enterprise relationship and collaboration governance (i.e. design and management) identified during this research study is the collaborative products and complex service solutions being delivered by the entire (multi-organisational) *enterprises* (*cf.* proposition #4). This means that when companies – particularly the most influential/focal companies actively engaging with their key partners to attain real competitive advantages under different circumstances, the combination of specialists (i.e. core competencies) cooperating closely in delivering different complex products and services can potentially result in various approaches of collaborative architecture design and management principles. Previous research (i.e. extant literature) showed that the relationship between e-collaboration and (operational) performance is diminished when (joint) products (or services) are low in complexity (Rosenzweig, 2009). Simultaneously, it advocated that market variability and environmental munificence could weaken the relationship between e-collaboration and (operational) performance; which conforms to the third contingency factor for (multi-organisational) enterprise structure and strategy design and management/governance identified during this research – known as industry-specific context (*cf.* proposition #5). Previous research has also revealed that industry conditions and environmental turbulence (a.k.a. environmental contingencies) act to make (multi-organisational) *enterprise* paradigms (e.g. vertical integration) favorable and unfavorable. For instance, multi-organisational relationships in service-based industries will have greater propensity to adopt *virtual enterprises* than those (traditional) production-based multi-organisational collaborations (*cf.* proposition #6). This is because that the service-oriented industries require more flexible and agile business performance with quicker and more accurate responsiveness to unpredictable market demands, owning to their inherent nature. These theoretical discussions together with empirical findings further imply that organisations could use different multi-organisational enterprise approaches simultaneously to achieve the most competitive advantages by considering three key contingency factors (*cf.* proposition #7); which extends the existing literature on how to design, develop and manage multi-organisational relationships and collaboration.

The most effective means to facilitate successful multi-organisational collaboration (as rated by the questionnaire respondents) were identified as (i) a clear definition of distinct responsibilities of the involved partners – particularly for the most influential/focal firms participating in the (multi-organisational) enterprise (*cf.* proposition #8) and (ii) (internal) business processes reengineering (*cf.* proposition #9). Cousins and Crone (2003) emphasise the importance of obligation contracting due to the increased number of complex exchanges in uncertain multi-organisational collaboration environments (e.g. multiple sourced arrangement). Similarly, Kelly *et al*. (2002) and Wu and Sun (2002) state that for multi-organisational collaboration to be successful, the role and the activities of each potential partner needs to be appropriately determined and understood in advance (*cf.* proposition #8). On the other hand, the type of organisational change needed to support new networked paradigm has been addressed extensively by a lot of researchers (Shi *et al*., 1998); which indicates that (multi-organisational enterprise) collaboration with new external organisations requires internal business processes to be reengineered to accommodate new changes (*cf.* proposition #9). This is supported by Dayal *et al*. (2001) who argue that business processes re-engineering is a predominant mechanism allowing individual companies (engaged in the multi-organisational *enterprise*) to reach agreement on the new (inter-organisational) business process description and management principles.

Additionally, the empirical findings of this research clearly showed that the expected (business) competitiveness (e.g. quick respond to the changing customer demands and high operational efficiency) can significantly affect the governance (i.e. design and management) of multi-organisational enterprise structures and strategy. Therefore, in the context of multi-organisational collaboration, product-based organisations (e.g. semi-conductor manufacturing and precast concrete fabrication) predominantly focus on the standardisation of business processes, i.e. identifying the critical nodes and links through which material flows across the network, and the portfolio and quality of joint products, i.e. specifying products quality while stretching the product portfolio (*cf.* proposition #10). By contrast, service-oriented organisations (e.g. logistics and banking) predominantly concentrate on (end) consumers' experiences (*cf.* proposition #11) since they believe that offering good services to customers is more important than controlling cost and quality, e.g. improving agility, flexibility, and responsiveness back the (downstream) customers. These observations, however, have not been fully considered within the existing research streams (a.k.a. extant literature) of multi-organisational operations management and the supporting management information systems.

With the purpose of running multi-organisational collaboration effectively, efficiently, and flexibly, one partner needs to possess the ultimate responsibilities for the governance of the entire (multi-organisational) enterprises. In this context one or more actors participating in the (multi-organisational) enterprises – particularly the most influential/focal firms are typically able to exert more power over other *value members* due to their network centrality, size, and abilities to bridge structural holes; and they can be regarded as some kinds of leader or broker' organisation within the supply network who have core competencies to supervise, evaluate, and coordinate the interface between partners in inter-firm collaboration (*cf.* proposition #12). This is partly identical to Lang *et al.*'s (2002) argument, i.e. the (multi-organisational) collaboration is a team effort and often a task can only be achieved when the collective resources and expertise are assembled. Hence, the primary task of relationship governance (i.e. design and management) is to establish the coordination structures through which the dispersed knowledge can be integrated.

Furthermore, decision making about partner selection is challenging as a result of the complexity of putting together a supply network under dynamic conditions. In order to be successful, performances and expected benefits have to be carefully evaluated and balanced in order to become a partner of the right network for the right task (Jain and Benyoucef, 2008). This consequently indicates that organisations are more willing to collaborate with other organisations who have a proven track record of successes in multi-organisational business collaborations (*cf.* proposition #13); whilst the organisational managers need multiple criteria that are likely to change over time to cope with uncertainty and ambiguity involved in the partner selection decision-making process. This empirical finding also extends the existing literature on how to dynamically manage the multi-organisational relationships and collaboration (e.g. collaborative decision making, partners selection).

7.3 Confronting findings on *competence and competitiveness as main contingency factors* with relevant literature

In the above discussion on industrial impact (Section 7.1) and (multi-organisational) enterprise structure and strategy design and governance/management (Section 7.2), the aspect of core competence (along with the expected competitiveness) recurred as underlying feature of multi-organisational relationships and collaboration governance (i.e. design and management). Thus core competencies (and competitiveness) and the focus on these were recognised during this empirical research to be the most crucial contingency aspect that facilitates multi-organisational collaboration through internal and external integration, determines the relationship structure and strategy between the partners (e.g. the most influential/focal companies and their cooperators) and their related roles and activities through a distinct value proposition (*cf.* propositions #3 and #25), and contributes to the success and competitive advantages of the multi-organisational collaboration and the individual partners through its development and deployment (*cf.* propositions #26 and #27); which have not been strongly addressed by the existing literature.

The multi-organisational enterprise has risen in importance with the push to develop core competence and strategic capabilities within the company while outsourcing peripheral activities from the member-companies (Gottfredson *et al*., 2005). In the context, it is proposed by the author that **the more mature, unique, attractive, and transferable these task specific competencies are, the higher the value proposition they create for the multi-organisational (enterprise) relationships and collaboration** (*cf.* proposition #25). A value proposition can be referred to as the offer of a *value member* to provide a certain value to other *value members* which is a function of carefully shaped (core) competencies (Bititci *et al*., 2004). Drawing on Madhok and Tallman (1998) this can be seen as a more inclusive and integrative perspective that provides more robust insights into the value creation in multi-organisational relationships based a combination of elements from Transaction Cost Economics (TCE), Resource-based View (RBV), and Resource Dependency Theory (RDT).

This conforms the empirical findings from this research study that multi-organisational relationships are a vehicle for developing new and deploying existing core competencies through multi-organisational collaboration (*cf.* proposition #26), i.e. cooperation between partners with superior capabilities in terms of innovation, technical intelligence and modularity can directly enhance the holistic (multi-organisational) *enterprise* performance whilst developing new meta core competencies and creating ‘end-to-end’ product-service solutions through the new ecosystem. In addition, an outcome for firms – particularly the most influential/focal companies in the enterprise resulting from their membership in relationship is that they can develop managerial capabilities associated with forming new relationships (interface capabilities), and therefore, improving their absorptive capability (Gulati, 1999). Moreover, empirical results of this study show that building and managing MULTI-organisational collaboration appropriately is an effective means to increase the efficiency, improve flexibility, innovation and reactivity to demand, and reduce cost and lead time, ultimately providing sustainable competitive advantages (*cf.* proposition #27). This is widely accepted in the existing literature and has been proven in many studies and contributions across various industries (Fynes *et al*., 2005; Stevenson and Spring, 2009; Yasuda, 2005).

7.4 Confronting findings on *ERP systems design and management* with relevant literature

The following discussion in this section will mainly draw on the confrontation of the issues regarding ERP systems design and management (supporting multi-organisational enterprise structures and strategy) with relevant theoretical perspectives in the extant literature.

One of the main aims of this research was to investigate the importance of configuring and implementing the relevant and appropriate ERP information systems to bring effective changes into multi-organisational relationships and collaboration. Empirical findings of this study revealed that the strategic roles of ERP systems in supporting operational business has evolved from intra-organisational optimisation and integration into multiple inter-firm collaborations (*cf.* proposition #15). This observation is supported by an extensive literature which shows that traditional ERP systems (based in manufacturing) *do not* necessarily support the increasing scope of e-commerce requirements (Bond *et al*., 2000; Moller, 2005; Songini, 2002). In response, new functional modules are developed as 'add-ons' to form ERPII systems, i.e. an integral part of business strategy enabling multi-organisational collaborations through extension of operations to close and trusted partners (Bagchi *et al.* 2003); and thus, traditional ERP systems are slowly being usurped by ERPII systems. Further, a new generation of web-based enterprise information systems is gradually gaining ground, where the system structure is entirely modular, pluggable, and separable. Finally, this web-based solution is able to easily interoperate with the whole supply network entity, consisting what is usually referred as virtual (or extended) enterprises (Tarantilis *et al*., 2008).

Similarly, Sharif (2010) clearly states that monolithic ERP solutions will tend towards becoming a thing of the past, with many (ERP) vendors (such as SAP notably) beginning to struggle to address and achieve the aims of integrated, yet decoupled, non-monolithic enterprise systems (a.k.a. ERPII systems). This conforms to empirical findings from this research study that that future ERP systems should be designed based on web-based technologies by deploying service oriented architectures and cloud computing applications instead of being based on proprietary in-house enterprise information systems (*cf.* proposition #16). Such kind of future ERP deployment approach can be properly justified by the fact that 'on-demand' ERP (or cloud-based) solutions could benefit and enable (multi-organisational) *enterprise* members (particularly the SMEs) to access technologies without significant individual investment cost in inter-organisational systems integration (*cf.* proposition #17), as well as some existing research studies (Choy *et al*., 2004; Daniel and White, 2005). This is also because that there is a high degree of compatibility between cloud computing technologies and service-oriented architectures and hence the two will grow in unison (*cf.* proposition #18).

The technical innovations (e.g. EAI, SOA, and SaaS) that influence future ERP systems are abundant (Johansson and Bjørn-Andersen, 2007). All of these hold promises of vastly different architectures for the next generation ERP systems for supporting multi-organisational relationships and collaboration. However, the question remains on whether these are feasible and how these can be managed properly within the context of supply network; which has not been fully addressed by the extant literature. Firstly, in the context of (multi-organisational) *enterprise*-wide ERP, integration is a major source of expenditure for multi-organisational enterprises due to business software system complexity. External partners such as downstream customers and outsourcing vendors may demand access to information provided to internal ERP users (particularly the most influential/focal companies engaging in the multi-organisational enterprises), e.g. order status, inventory levels, and invoice data (Tarantilis *et al*., 2008). This is where web-based ERP technologies interfere, enabling seamless data access to the authenticated users at the right time from everywhere without the need of specific software clients; which exposes that successful ERP systems adoption and use in multi-organisational collaborations can *only* be achieved with superior information reliability, security, manageability, and effectiveness based upon flexible IT infrastructures. This is partly in line with the empirical findings from this research that information security and flexibility of ERP systems are key determinants in their adoption and use in multi-organisational collaborations (*cf.* proposition #19).

Secondly, this study proposes that within the context of multi-organisational collaboration, different individual *value members* – particularly the focal firms engaged in the same multi-organisational enterprises (to deliver complex products and services) are requested to not only use ERP systems but also use the *same* ERP systems to become highly integrated and flexible via real-time data/information exchange (*cf.* propositions #20, #21, and #22). Also, most existing literature exploring how ERP systems support inter-firm relationships and collaborative approaches (e.g. inter-organisational information systems (IOIS)) (Bala and Venkatesh, 2007; Rodon *et al*., 2011; Saeed *et al*., 2011) neglect the dynamic component of different ERP information system types (or capabilities), i.e. moving between quadrants in adaption to changes of multi-organisational enterprise structures and strategy (i.e. VIE, EE, and VE) (as in Sub-sections 7.6.5 and 7.6.6). As a consequence, this research proposes that the tighter multi-organisational collaborative structures and strategies become; the more integrated and flexible ERP systems also need to become (*cf.* proposition #22); which is based on a combination of elements from configuration theory and dynamic capabilities perspective.

Thirdly, Alshawi *et al*. (2004) present the feasibility of minimising the heavy customisation required by most ERP implementations by selecting the best modules from each (ERP) vendor and integrating them using enterprise application integration (EAI) technologies to form one integrated (ERP) systems; which assumes that it is feasible to purchase specific business software components from Oracle, SAP, Microsoft and even Apple and link them together via the cloud (thus also satisfying the inter-operability goals of EAI) (Sharif, 2010). These theoretical perspectives partly conform the empirical findings from this research study that multi-organisational collaboration can be facilitated best by integrating ‘best of breed’ functional modules from different ERP solutions (or vendors), rather than customising a single ‘one-size-fit all’ solution (*cf.* proposition #24). Also, in the context of this new complex cloud computing nirvana, (multi-organisational) *enterprise*-wide ERP information systems (including business rules across hetero/homogeneous software application and middleware) may be managed by packaged vendors (e.g. SAP or Oracle) or through solutions provided by third-party vendors (e.g. IBM and webMethods) (Gulledge and Deller, 2009). In comparison to this, empirical observations from this study argue that sophisticated third-party consulting organisations are becoming increasingly responsible for handling web-based ERP system adoption, which could make (traditional) non-web-based ERP vendors lost their influential positions over end-users (*cf*. proposition #23); which extends the existing literature on deploying and managing (web-based) ERP systems within the context of multi-organisational (enterprise) collaboration.

As a result, Figure 7.1 proposes correlations between ERP types and multi-organisational enterprise types, as shown by the arrows, from a comparison (between the empirical findings and relevant literature) discussed above. Overall a strong positive correlation is described between ERP and VIE, and between ERPII and EE. Emerging theoretical perspectives and empirical research on post-ERPII systems (a.k.a. ERPIII) were fewer but correlate ERPIII with VEs (see the two main columns in Figure 7.1 for the key works on which these correlations are based).

Other research makes weaker correlations between ERP and EE (Davenport, 1998; McAfee, 2002) and ERPII to VIE (Eckartz *et al*., 2009; Weston, 2002), as well as between ERPII to VE (Bala and Venkatesh, 2007; Bond *et al*., 2000; Ericson, 2001; Li, 1999; Tapscott *et al*., 2000) which discuss how a continuum of strategic operations, structural and ERP changes are observable in repond to factors in the business environment. Particularly interesting is the transition towards ERPIII and VE adoption, which is most likely due the expectation that ERPIII packages are cheaper in the short-term, quicker to implement and more flexible. This may be because technologies upon which they are based (e.g. SOA or SaaS) become more mature in terms of security, robustness and usability (Hofmann, 2008; Olsen and Sætre, 2007; Ponis and Spanos, 2009; Rodon *et al*., 2011; Vathanophas, 2007). Users of VEs and ERPIII systems are hoping for quick-to-create and quick-to-dismantle (multi-organisational) enterprise whose operations enable fast and accurate transactiosn in risky open environments (Browne and Zhang, 1999).

Figure 7.1. Correlations between ERP system types and multi-organisational enterprise type

* Op – Operational; S – strategic; M – Managerial; IT – IT infrastructure; Org – Organisational.
Strong links; Weak links; Potential strong links.

ERP types		Key characteristics of ERP types (extant littrature)	Correlations types	Key characteristics of (multi-organisational) Enterprise (eldant litteraturt)	CEG types
	Op	Promise internal business processes integration with seamless information (Parlt and Kus.Ak. 2006: Al .1 UhAri tt il., 2003)		Conventional hierarches with mufti-functional units and inflexible tnvionmtnt (\.yMh, 2003)	
		Product vity improvement (Palan swamy and Frank, 2000)		Decision regard ng bus ness coord nation and resource allocation	
		Cost and cycle time reduction {McAfee. 2002; Esteves. 2009)		is made by chief strategists (HJrrigan. 1Q84)	
1''Generation ERP systems	S	Autom11te internal data transfer and sharing (Chen, 2001)		Focus on large scale of economies rather than extended 1lnd virtual	VIEs
		Enable sales and ptocludion forecasts {Davenport, 1998)		collaboration (Clegg eta!., 2012)	
	M	Fteilt• sptdy dtcltion.making with rtal-timt opttng informlon (Nah tt		Rtquirt quick rtlponst 10 tht marktt dtmtmds to tnhanc. mttktt	
		200 ... 200)		l-pow... str egy {R-Charoscn. gg6: Josk – w-2002: ...	
		Better internal resource m1nagtmtnt (Scon and Veney. 2000)		and Wantrman. 10G0)	
	IT	Unify disparate functional systems (Hicks and Stecke. 19'95)		In-house development of propriearysystems (Binder and Clegg. 2007;	
		Streaml neinternal data flows {Markus and Tanis, 2000)		Clegg et al.. 2012)	
	O<g	Improv•inttrnal communteation and oooptration (Aistmt, 2007)		Emphuis on transaction costs (Harrigan, 1985)	
		Empowerment (lower bureaucracy) (Shang and Seddon, 2000)		rf-S- trong product quality control (Rolha; nnel e al.- 2006)	
	Op	Enablt tight InttgrAtion bttwttn 00,,. supply ch A n oompontnts (TtpJOOtt tt		Entirt stt of eontbor.Jting firms 1hrough v1lue ntwCHk (Oytr. 1000:	
		Provide consistent real-time inform3tion across inter-firm operations with gre3ter		el at. 2009)	
		-2-000: ... 2004)		Ch:lde... gg s O oz ...d Ham... ggs: D ... d So: km... 2003 Lym-	
		flexibility (Bond tt al.. 2000: Weston, 2002)		Strategically outsource external resource and core functions (Jagdev	
		Customer service improvement (Sharif et al., 2005)		and Browne, 1998; Sunon, 2006; Thun, 2010)	
		Optlml:.einttr-firm optrAtionol proctstts (Bond •t M.. 2000)		Require odvAnetd ITIIS (JAitwolond Kaushik. 200)	EE•
		Support global business processing ... (... 2003)		... tak... power and authority ... geographically distributed	
		More accurate and cost-efficient decision making (Weston Jr.. 2003)		structure (O'NeiJ and Sackett. ttXI4}	
		Adaptable and collaborative IS infrastructure (Ericson, 2001)		Reductions n costs and lead-times from interoperability (Clegg. 2003;	
		BPM. SCM. CRM, APS, t·blaintss (Callaway. 2000: Mol tr, 2005)		Triantaftllakis • al.. 2004}	
		Faclhate organizational change and learning (Eckanz et al., 200g)		Relatively stable: potential risks (Binder and Ctegg, 2007)	
		En1blt dynamic. IQilt And tvtnt-drlvtn optradon {Haustr tt 11., 2010)		Htavily utilzts b-butd ICT tools (HYt 1nd Jotl. 1000; MArtlntz t/	
		support reconfigurable virtual integration (Ponis and Spanos, 2009)		1. 2oo : Hyvon ... 1 2oos)	
		Manage .1nd integrate strategic .1lliances (Muscatello et at. 2003)		Facilitate innov.1tive .1gile operation (Cho et al.. 1QQ6; Sh.1rp el at.	
		Create synergy betwee-n innovation and customer-focus (Wood. 2010)		f- 999 coo and Dowl [Shah; .2005)	VEs
		Intonn... ns cunty... g overn nc (Kh oo e al. 2010)		tl-sho ... nn coua bo:on (e;nd and Clegg: c.2 D07).	
		Web-service, SOA (Hofmann, 2008; Ponis and Spanos, 2009)			
		Cloud computing with unhampered data transfer (de Maria et al.. 20 t1)			
		SuS.Pa.JS. Utility. SLA mgt. (Buco et •1.. 2004: Torbacki. 2008)		C.Jmarinha-Matos and Pantoja-Lima. 2001)	
	Org	Foster borderless organizational structure fY'/ood. 2010)		low trust; high risk {Kasper Fuehrer and Ashkanasy, 2001)	

7.5 Confronting findings on *organisational and people management* with relevant literature

The following discussion in this section will mainly draw on the confrontation of the issues regarding organisational and people management (within the context of ERP systems enabled collaborative enterprise governance (i.e. design and management)) with relevant theoretical perspectives in the extant literature.

The difficulties of ERP implementations (particularly in the context of multi-organisational collaboration) have been widely cited in the literature (Al-Mashari *et al*., 2003; Hong and Kim, 2002) and one of the most widely-cited critical factors is related to organisational and people issue management. On the one hand, given cultures and structures exert a strong resisting force after initial collaboration efforts, (*enterprise*) managers (or facilitators) (e.g. the most influential/focal firms) need to recognise that the "tension and discomfort" are just the system reacting to a change; and senior level executive commitment should create a safety zone, which enables decision makers to move forward without being subject to a "knee-jerk" reaction based on the initial system response (Fawcett *et al*., 2012; Krumbholz *et al*., 2000). Additionally, building a collaboration capability (along with the supporting ERP information systems) is really a process of building trust; and resistance can exert a fearful influence and reaction if trust is absent (Fawcett *et al*., 2012). On the other hand, ERP systems implementation will potentially affect the company's business functions and influence users directly; thus resistance to a change stems from change in the job content and uncertainty of the new system (Jiang *et al*., 2000). These theoretical perspectives partly concur with findings of this research in that among companies that have developed a dynamic collaborative capability and adopted (multi-organisational) *enterprise*-wide ERP systems, the key success factor has been a recognition that they need to proactively and simultaneously change both organisational structure and culture to remove fear and reward collaborative and IS risk taking; whilst properly managing trust issues, and people's resistance to change (*cf.* proposition #28).

Particularly, empirical findings of this study uncover that organisational behavior is a key challenge when designing, adopting, and managing web-based (or cloud-based) ERP information systems in multi-organisational collaborations (*cf.* proposition #29); because *value members* within the (multi-organisational) *enterprise* may not be ready (i.e. possess adequate capabilities) for governing (i.e. designing, developing and managing) the next generation of ERP IS based on the novel strategic concepts (e.g. open and dynamic network supported by cloud-ERP or SOA-based ERP). Nevertheless, ERP systems merged with cloud computing and other web-based technologies, if used and adopted properly can unite, identify, and create wholly new business sectors and industries (Sharif, 2010). Certainly for large scale and complex human-driven endeavours which require a multitude of systems and stakeholders to come together, such as where the introduction of electronic platforms are taking shape in local and central governments (based upon different multi-organisational *enterprise* paradigms), cloud-based ERP will have the most promise. These empirical findings strongly extend the extant literature on key factors enabling/facilitating

ERP systems configuration and adoption within the context of dynamic multi-organisational relationship and collaboration.

7.6 Development of the new conceptual framework – the Dynamic Enterprise Reference Grid for ERP (DERG-ERP)

Data analysis and validation exercise from Chapters 5 and 6 showed that *enterprise resource planning systems management and multi-organsiational enterprise governance* is generally regarded as an effective perspective to maintain and achieve competitiveness for the whole (multi-organisational) *enterprise* and its individual *value members* as well as the *enterprisation of operations* (Clegg and Wan, 2013) with long-term and short-term effects (*cf.* propositions #26 and #27). Each member of the (multi-organiational) *enterprise* is affected by a variety of industrial forces; thus different (multi-organisational) *enterprise* structure and strategies may change over time (*cf.* propositions #3 and #4) and should be supported by different ERP information system types under different circumstances (*cf.* propositions #15, #20, #21, #22, and #24), in order to cope with the challenges of dynamic globalisation, complex industrial changes, and shorter turnaround time required by the end consumers (*cf.* propositions #1 and #2).

In respect to the *(multi-organisational) enterprise structure and strategy design and governance*, managing core competencies is considered as a principal factor when making decisions to achieve the multi-organisational relationships and collaboration successfully as the competencies determine the role of the individual partners within the collaborative venture (*cf.* propositions #3, #14, and #25) via the value (or competitiveness) they are creating for the entire virtual value chain. Also, becoming more influential within (multi-organisational) *enterprise* also requires (the most influential/focal firms) managing competencies belonging to other member-companies. In addition, (multi-organisational) *enterprise design* may also be affected by the end (collaborative) products or service solutions being delivered by the (multi-organisational) *enterprise*, as well as different industry-specific contexts (*cf.* propositions #4, #5, #10, #11). This is reflected by the fact that any type of multi-organisational collaboration in the service industries (e.g. print-on-demand and logistics) will have greater propensity to become *virtual enterprises* by using web-based enterprise information systems than those production-based strategic alliances (e.g. concrete manufacture) (*cf.* proposition #6). This is because most service-oriented businesses (e.g. parcel delivery and banking) require more flexible and agile operational performance with quicker and more accurate responsiveness to unpredictable market demands, owing to their inherent nature.

Furthermore, the existence of multiplicity of dynamic multi-organisational relationships within an *enterprise* (in the sense of EC's definition) requires a differentiated management based on the respective relationship characteristics (*cf.* propositions #3, #4, #7, and #14). It also requires a leader or a 'broker' organisation (e.g. the most influential/focal companies) that has core competencies and responsibilities to clearly define each functional roles and boundaries (within an *enterprise*), as well as supervising, evaluating, and managing cooperation between the partners. This allows for a certain degree of autonomy within the collaborative venture (*cf.* propositions #8 and #12) and the ability to deploy (or even create) competencies (e.g. 'end-to-end' product-service solutions) through effective inter-firm (a.k.a. multi-organisational) collaboration (*cf.* proposition #26). Besides, in the opinion of most interviewees, any effective multi-organisational collaboration with external organisations would require internal business processes of each individual (*enterprise*) *member* to be re-engineered to accommodate new changes (*cf.* proposition #9), which is a big challenge for (multi-organisational) *enterprise* management. Hence, organisations – particularly the most influential/focal firms are more willing to collaborate with other organisations that have a proven track record of success within the multi-organisational enterprise business collaborations (*cf.* proposition #13).

With respect to *enterprise resource planning systems design and management*, firstly it was observed that the strategic role of ERP information systems in supporting operational business have evolved from intra-organisational optimisation and integration into multiple inter-organisational collaboration (*cf.* proposition #15). This consequently gives birth to new IT technologies including SOA, cloud computing, and web services applications instead of traditional proprietary or monolithic in-house enterprise systems, which promise to provide quicker and less expensive cloud-based ERP services – as the next generation ERP systems – in order to establish and sustain new business partnerships and network structures (*cf.* propositions #16, #17, and #18). Specifically, the configuration and development of ERP systems supporting (multi-organisational) *enterprises* are expected to be linked to the adoption and spread in the use of service oriented architectures, with the uptake and increased maturity in one driving increased uptake and maturity in the other in a virtuous cycle, on the one hand (*cf.* proposition #18); and the 'on-demand' solutions based on web-based technologies could benefit and enable organisations – particularly small and medium-sized companies to access innovative ERP systems without significant individual investment cost – in comparison to the 'on-premise' ERP solutions, in multi-organisational systems integration, on the other hand (*cf.* proposition #17).

In addition, it has been widely accepted that within the context of multi-organisational collaboration, different organisations (e.g. the most influential/focal companies) are requested to not only use ERP information systems but also use the *same* ERP information systems to become highly integrated and flexible via real-time information exchange (*cf.* propositions #20, #21, and #22). This may be facilitated by integrating 'best of breed' functional modules from different ERP solutions offered by different ERP vendors rather than customising a single 'one-size-fit all' solution (*cf.* proposition #24) which is more time and cost-consuming (e.g. Intel's SAP R/3 case). Moreover, information security, cost, and flexibility of ERP systems are considered as the most critical determinants in their adoption and use in multi-organisational enterprise collaborations (*cf.* proposition #19). Thus, sophisticated third-party consulting organisations are becoming increasingly responsible for handling web-based ERP system implementations, which could potentially make non-web-based ERP vendors lose their influential positions over end-users (*cf.* proposition #23).

The empirical findings of this research study also indicate that organisational cultural diversity, trust issues, and people's resistance to change have to be managed properly when adopting ERP systems in the context of multi-organisational enterprise (*cf.* proposition #28). Particularly organisational behaviour is regarded as a key challenge for the web-based ERP systems use (*cf.* proposition #29), because members within an *enterprise* (in the sense of EC's definition) might not be ready for the next generation of ERP IS based on the novel strategic concepts, i.e. the *extended enterprises*, *virtual enterprises*, and *cloud-ERP information systems* or *SOA-based ERP infrastructure* (a.k.a. ERPIII).

7.6.1 Extensions to Enterprise Matrix (contribution (i) to the existing literature)

The Enterprise Matrix tool (see the grey shaded boxes in Figure 7.2[q]) which was developed based on previous research studies (e.g. Clegg, 2003; Binder and Clegg, 2006) is used to map the multi-organisational *enterprise structure* for a collaborative activity by allocating *value members* to stages of the *value stream* (i.e. 'process start' to 'process end' in (multi-organisational) enterprises) on the basis of their value proposition (a.k.a. added value) to the whole (multi-organisational) *enterprise* (as determined by their specific competencies) (*cf.* propositions #3, #4, and #25). This task should be conducted by the *enterprise manager* (commonly the most influential/focal firms) who should have the competence to define the responsibilities of the boundaries between the *value members* (*cf.* propositions #8 and #12).

Although the Enterprise Matrix allows the analysis of the core competencies of a company (particulary the focal firms) and its ability to deliver them successfully to the whole (multi-organisational) *enterprises* in which it takes part; whilst indicating that the competence of governing, i.e. designing and managing, *multi-organisational enterprises* can also be considered as a meta-competence or interface competence, i.e. a competence that affects the capability to multi-organisational coordination. This tool can *only* be seen as an artefact helping to integrate knowledge through providing an architecture along which the *value members* can place their core competencies (e.g. collaborative product design, service solutions realisation, and engineering know-how) into a problem solving *value stream* (*cf.* propositions #3 and #25). In other words, the Enterprise Matrix concept is *only* drawing on the theoretical perspectives involving resource dependency theory, competence theory, transaction and cost economics, and value chain base aspects (given in Section 7.7 and Table 7.3); and *does not* consider the importance of ERP systems in integrating *value members* and collaborative activities in an *enterprise* (in the sense of EC's definition) (*cf.* propositions #2 and #22) grounded in IT and business alignment view (given in Section 7.7 and Table 7.3).

[q] A full picture of the Enterprise Matrix is not presented (e.g. the stages of value stream in which value members engage are not depicted)

In response to this shortcoming, as shown by Figure 7.2, this research study extends the Enterprise Matrix tool to examine ERP information systems adoption and management in the multi-organisational *enterprise* collaboration; and how it may affect the (multi-organisational) *enterprise structure and strategy design* as a result of re-allocating *value member* based on three criteria, i.e. (i) whether the *value member* uses ERP systems (*cf.* proposition #20), (ii) whether the *value member* uses the same ERP systems[r] as other members engaged in the same *value stream* (*cf.* proposition #21), and (iii) the extent to which ERP information systems are used to support (multi-organisational) *enterprise* performance (*cf.* propositions 22). Specifically, the initial concept of Enterprise Matrix argues that the degree of involvement of the *value members* (ranging from 'high' to 'low') in the collaborative activity is *only* dependent upon the value proposition of the competencies and the stages of the *value stream* of the collaborative activity the *value member* and its competencies are delivered to (*cf.* propositions #3, #4, and #25); which is criticised as **there is lack of considerations and contribution to the impact of ERP information systems on the configuration of an *enterprise*** (in the sense of EC's definition). This can also be justified by the facts that more and more established companies (particularly the most influential/focal firms) engaged in multi-organisational relationships and collaboration realise that they need to form alliances with their partners over the ERP systems which have the potential to facilitate the coordination among different functional activities, allowing the entire (multi-organisational) *enterprise* integration (Akyuz and Rehan, 2009; Markus *et al*., 2000).

Enterprise Matrix		ERP systems adoption and management in an enterprise				
Value member classification (competence based)		Re-allocating value members based on the criteria of using ERP systems			Final value member classification (competence + ERP use based)	
		Whether use ERP systems	Whether use the same ERP systems	The extent to which ERP systems are used to support enterprise governance		
High involvement ↕ Low involvement	Member 1	Yes	No	Partly	High involvement ↕ Low involvement	Member 2
	Member 2	Yes	Yes	Fully		Member 1
	Member 3	Yes	No	Incompetently		Member 3
	…					…
	Member n	No				Member n

Figure 7.2. Extensions to the Enterprise Matrix

As can be seen from the grey shaded boxes in Figure 7.2, n *value members* (e.g. the most influential firms, focal firms) within the same *value stream* are selected and classified (by (multi-organisational) *enterprise leaders and facilitators*) in the 1st round based upon the level of their core competencies, i.e. the value created for the whole (multi-organisational) *enterprise* (*cf.* propositions #3 and #12). As a result, they are listed in order of significance from the most important at the top to the least important at the bottom (see Figure 7.2). However, in the context of ERP systems enabled multi-organisational *enterprise* relationships and collaborations this initial allocation could (and should) be re-defined in terms of how well the ERP

[r] This means that the enterprise information systems used by value members are offered by the same ERP vendor; which can increases highly technological compatibility and intensive knowledge sharing

systems perform to meet multi-organisational enterprise requirements in the 2nd round. In the same cases (see Figure 7.2), for example, in comparison to 'member 2', 'member 1' does not use the same ERP systems as other *value members* although it has adopted its own ERP systems; which can negatively affect its ERP capabilities in supporting its *enterprise* features (e.g. technological incompatibility between ERP systems), as well as its operational abilities to better engage in the multi-organisatoinal collaboration (e.g. real-time information sharing, closer links with strategic partners) (*cf.* propositions #20, #21, and #22). In view of this, the degree of involvement of 'member 2' should become higher than 'member 1' in their *collaborative activities*.

The extensions to the Enterprise Matrix concept demonstrates a new insight into *ERP systems enabled (multi-organisational) enterprise structure and strategy design and management* by moving away from 'resource and competence-based' viewpoint to 'competence and ERP use-based' perspective; which, in turn, gives more intelligent practical decision support on selecting appropriate (multi-organisational) *enterprise strategies* and (corresponding) *ERP information systems* for the *engagement* with the *value members* (see Sub-sections 7.6.4, 7.6.5, and 7.6.6).

7.6.2 Extensions to Collaborative Enterprise Governance (contribution (ii) to the existing literature)

The concept of Collaborative Enterprise Governance (CEG) proposed by Binder and Clegg (2007) gives a sustainable approach which does not necessarily have to describe whole-company to whole-company relationships. Instead, it focuses on the value of each *enterprise module* (which is built up around particular highly specific core competencies (e.g. special design and engineering know-how) that belong to an individual company and give (part of) that company a unique and valued proposition (*cf.* propositions #3 and #25)) to the whole (multi-organisational) enterprise. Also, this methodological model summarises four *enterprise* types (see Section 2.4 in Chapter 2) classified by their current and future core-competence *engage-ability* (see the explanations in Sub-section 4.2.4); these structures are thought to be a continuum of an multi-organisational operations strategy manifesting itself as different paradigms in response to contingent factors in the complex business environment (*cf.* propositions #2, #3, #4, #5, and #7).

Drawing on aspects of (core) competence and resource dependency theory, CEG concept overcomes traditional thinking about internal sub-units being functions and departments and stresses a different perspective, i.e. connecting different *enterprise modules* within the (multi-organisational) *enterprise*. However, by dint of the CEG model being an iterative model of which deployment of Enterprise Matrix and DERG (see Figure 2.2 in Sub-section 2.6) are key parts, it is found that this concept *does not* make an attempt to information systems (e.g. ERP systems) strategy and management, which is imperative (*cf.* proposition #2). Therefore, **this research study offers opportunities to extend the CEG model by bringing the concepts of (multi-organisational) *enterprise structure and strategy governance* (i.e. design and management) into the domain of information strategy and management and *vice versa*** (e.g. how is DERG model planned for by configuring, managing, and developing ERP systems); which leads to the development of the novel DERG-ERP contingency framework (see Sub-section 7.6.7) and *enterprisation* concept (i.e. enterprise strategy, enterprise structure, and ERP systems use).

7.6.3 Extensions to IS Strategy Formulation Model (contribution (iii) to the existing literature)

The concept of IS Strategy Formulation Model (ISFM) (Galliers, 1994) illustrates the changing perceptions of the outcomes of, and process of formulating an information systems strategy. From a mere list of potential information systems (IS) development as the outcome from process, one can discern a transition in thinking that has gone on to include a portfolio of IS applications across the business and the issues associated with organisational impacts, e.g. redrawing organisational boundaries (Keen, 1991), information decision making (Zuboff, 1988), and redesigning business processes (Hammer, 1990) (*cf.* proposition #9). Specifically, ISFM summarises the argument which identifies that the (business) process itself was seen in the early days of business data processing primarily as an isolated task, associated with improved computer efficiency. Multiple (Earl, 1989) or eclectic methods (Sullivan, 1985) were seen to be required later, incorporating business-driven and creative approaches which include the search for new IS opportunities as well as dealing with matters of information systems efficiency and effectiveness (*cf.* Figure 2.3 in Sub-section 2.6).

Despite its insights into the shifting focus of information systems strategy formulation from technological efficiency to business competitiveness based upon *contingency* and *evolutionary* standpoints the ISFM model in its current form is limited, because it is still concerned with single organisational (or cross-functional) level and *does not* explicitly address multi-organisational enterprise strategy and structure. Hence this research study extends the ISFM model by highlighting the fact that a legal (or illegal) entity may have a variety of roles in an *enterprise* (or several enterprises (in the sense of EC's definition)) (*cf.* proposition #7); each of these scenarios present different collaborative business strategies (e.g. problem solving or strategy formulation) and operational requirements (reactive-effectiveness or proactive-competitiveness) to ERP information systems design and management (*cf.* propositions #15 and #22). This, in turn, identifies the need for explicit provision of management information systems (e.g. ERP systems) linked back to the multi-organisational enterprise design types and governance factors such as the dynamism of the current business environment, industry sectors, the pace of technological change (*cf.* propositions #2, #5, #6, and #16), and the need to manage information flows across operating units that may be parts of different (multi-organisational) enterprises (*cf.* propositions #15 and #20). Furthermore, the extension to IS Strategy Formulation Model shows complementarity to the DERG model (which *does not* explicitly explain IS strategy) and *vice versa*; which facilitates the establishment of the suitable decision-making framework (i.e. DERG-ERP) about how different ERP information systems fit to different (multi-organisational) enterprises types; and how they may be co-developed.

7.6.4 The new ERP Matrix (new theory/theoretical model generation (I))

Successful ERP systems enabled multi-organisational enterprise design and management not only needs tools (e.g. Enterprise Matrix) to regulate *collaborative activities*, i.e. connecting *enterprise modules* within the *enterprise* (*cf.* propositions #12 and #25); but also requires tools to determine how information systems and technologies (e.g. ERP systems) are being used in different functional areas which make up the whole *enterprise* (in the sense of EC's definition), i.e. connecting *ERP modules* within the (multi-organisational) enterprise (*cf.* propositions #22 and #24). Hence, drawing on the basics of virtual value chain (Rayport and Sviokla, 1995) and IT and business alignment concepts (as in Chapter 2) the new *ERP Matrix* tool was developed to illustrate the capabilities of different ERP systems (or functional modules) to accommodate varying (multi-organisational) enterprise coordination structures and strategy in a systematic manner; this is shown in Figure 7.3.

ERP capabilities supporting inter-firm relationships and collaboration					
Collaborative activity:		Value stream Process start → Process end			
ERP functional module classification		Stage 1	Stage 2	…	Stage n
High usage rate ↑	ERP module 1	Operational requirements in 'stage 1' of the value stream is supported by 'ERP module 1'			
	ERP module 2				
ERP module(s)	ERP module 3				
	…	Interface connection between 'stage 1' and 'stage 2' is supported by adjunct portals or links ↔			
↓ Low usage rate	ERP module n				Operational requirements in 'stage n' of the value stream is supported by 'ERP module n'

Figure 7.3. The ERP Matrix – A tool for determining how ERP systems capabilities support collaborative activities in enterprises by linking process, enterprise structure, and ERP systems use

Multi-organisational relationships and collaboration are based on transactions between heterogeneous *value members* (e.g. publishers, book printers, and channel distributors) that traditionally pursue diverse strategies but try to fulfil a common task (e.g. joint products or collaborative complex service solutions development and completion) by establishing a mutual *modus operandi* through sharing real-time knowledge and information, technical know-how, and core competencies (*cf.* propositions #3 and #4). Such integration of *collaborative activities* will require supporting enterprise information systems and technologies (e.g. inter-connected ERP systems, web-based EDI, and electronic portals) which are the greatest enablers towards forming an (multi-organisational) e-integration among *value members* (*cf.* proposition #22).

In this sense, **the new *ERP Matrix* tool helps to optimise the ERP information systems configuration and adoption within the whole (multi-organisational) enterprise operation (represented by the respective *collaborative activity*) through the allocation of the most suitable *ERP modules* to support the operational requirements in different stages of the *value stream* based on their capabilities; which are determined by their targeted enterprise paradigms, strategic roles, deployment approaches, and systems advancement** (*cf.* propositions #15, #16, #17, #19, #22, and #24) (see Chapter 6). Therefore, this kind of allocation bridges 'structural holes' between the *value members' information systems* in the (multi-organisational) enterprise through the establishment of common ground based on the *ERP modules* that consist of capabilities catering to the core competence-based unique tasks (in different stages of the *value stream*) and adjunct functionalities facilitating interface connections (*cf.* propositions #3, #15, #22, and #24). In other words, the *ERP Matrix* tool can be seen as an artefact that helps us better understand multi-organisational ERP systems design, implementation, and landscape transformation through providing an architecture along which the key capabilities of *ERP modules* can be placed into the required (corresponding) functional units (a.k.a. enterprise modules) to fundamentally support the entire *virtual value stream*; which, in turn, achieves the most optimised *enterprisation*. It is thereby important to realise that the *value stream*, as shown by Figure 7.3, is supported *only* by the (sub-) information systems (i.e. the *ERP modules*) of the *value members* that can actually facilitate or add value (value proposition) to the *collaborative activities* (*cf.* propositions #3, #17, #24, and #25); whilst the parts (i.e. different stages) of the entire value chain are actively managed by the (multi-organisational) *enterprise leader* or *governor* (e.g. the most influential/focal firms) (*cf.* proposition #12).

A *collaborative activity* (see Figure 7.3) is a joint business activity in the (multi-organisational) enterprises and can involve collaborative products (e.g. crane, smart phones production), complex service solutions (e.g. print-on-demand realisation), or a joint project (e.g. a construction project) that should be reasonably defined and circumscribed. This task should be conducted by a distinct leader or 'broker', e.g. focal manufacturer, (the most influential) service provider, or the joint project owner, who has the competence to i) evaluate the *enterprise modules* (i.e. specific competencies) of the *value members*, ii) allocate suitable core competencies to respective stages and tasks of the *value stream*, and iii) define the responsibilities of the boundaries between the *value members* (*cf.* propositions #8 and #12). Meanwhile, the corresponding *ERP modules* – as a set of powerful strategic weapons – need to be properly selected and implemented to facilitate multi-organisational communication and collaboration needs, laying the foundation for external integration (i.e. supply network connectivity), allow simultaneous access to same data, as well as automating *value stream* processes. To be more specific, in an *enterprise* (in the sense of EC's definition) ERP modules can be effective means of optimising planning applications, monitoring production constraints, managing demand forecasting, and keeping order delivery promises. In the cases of innovative print-on-demand service delivery, the *value stream* can be described as collaborative activities or processes right from the customer order placement (stage 1) to printing and packing books (stage 2), on towards the books distribution (stage 3), and ending up with establishing and managing relationships with the customers and end consumers (stage 4). In turn stage 1 may be supported by ERP module 1 with capabilities of electronic book storage; stage 2 may be supported by content management and manufacturing modules (i.e. ERP module 2); stage 3 may be supported by distribution management module (i.e. ERP module 3) that could be adopted by another *value member* (e.g. downstream channel partner); and stage 4 may be supported by customer relationships management systems (i.e. ERP module 4). However, in some cases, more than two *value stream* stages could be supported by a comprehensive ERP module or package (e.g. ERPII covering Data Warehouse, SRM, CRM, DSS, and e-business functionalities); and this indicates the necessity to rank the importance of different *ERP modules* by critically evaluating their usage rate (see Figure 6.3), i.e. how well the (ERP) module capabilities perform to support multi-organisational relationships and collaboration (*cf.* propositions #17, #19, and #22).

In addition, it is argued that the responsibilities of configuring and managing ERP systems within the context of multi-organisational collaboration do not necessarily need to be occupied by a single *value member* (e.g. the most influential/focal firm) (or ERP vendor) but can involve various partners. In the semi-conductor manufacturing industry it is, for example, often the case that the focal manufacturers (e.g. Intel) define the overall multi-organisational ERP systems infrastructure and implementation approach (e.g. incremental approach); and select the suitable functional modules and the adjunct systems such as web portals, electronic hubs, and EDI technologies to form external linkages between trading partners. Their strategic choices on (*enterprise*-wide) ERP design and management can be affected by targeted (multi-organisational) *enterprise* types (*cf.* proposition #22), IS deployment approach (*cf.* propositions #17 and #24), systems advancement (e.g. the intensity in use of web-based technologies) (*cf.* proposition #16), collaborative product attributes (*cf.* proposition #4), and partners' capabilities of using enterprise systems (*cf.* propositions #3, #20, and #21). The (multi-organisational) *enterprise governor* (normally the most influential/focal company) of this e-integration project that is developed on, for instance, RosettaNet EDI connections or SAP i6 ERPII architecture, will then delegate the actual systems implementation to ERP vendors or third-party consulting companies (*cf.* proposition #23); whilst the significant *value members* (e.g. first tier OEMs and ODMs) might get involved in setting up the whole ERP platform. This, however, requires *enterprise leaders* (or *facilitators*) to move away from their traditional roles as *tertius gaudens* and move towards *tertius iungens* (Obstfeld, 2005) or *primus inter pares* (Binder and Clegg, 2005b) (*cf.* proposition #29) whereas other key *value members* need to take more responsibilities for planning and managing (multi-organisational) *enterprise*-wide ERP project as well as establishing and integrating ERP systems (*cf.* propositions #20, #21, and #23).

As can be seen from Figure 7.3, the level of importance of ERP systems capabilities in the multi-organisational enterprise, described by the usage rate of *ERP functional module* (see vertical axis in Figure 7.3) in the *collaborative activity* (see horizontal axis in Figure 7.3) (*cf. value stream* processes in

ERP Matrix), can range from a high usage rate with the most strategic IS roles and effective IS capabilities in supporting multi-organisational relationships and cooperation (i.e. core modules) through the integrated backbone (e.g. SOA) (*cf.* propositions #16 and #24) to some sort of ancillary tools such as adjunct web-based portals and linkages for connecting the interfaces, which typically have less effect in facilitating (multi-organisational) *enterprises* integration. Therefore, the usage rate level of *ERP modules* is not only dependent upon their intrinsic IS functionalities and advancement (*cf.* propositions #16, #17, and #19) but also the stages of the *value stream* of the *collaborative activity* the *enterprise module* and its (core) competencies are delivered to (*cf.* propositions #3), as well as the targeted (multi-organisational) enterprise structures and strategy. For instance, during the concept phase of product research and development (R&D) *ERP modules* such as Product Content Management (PCM) and Product Lifecycle Management (PLM) that focus on centrally managing information about (joint) products and speeding up development processes can gain more influence within the *enterprise* (in the sense of EC's definition) by contributing highly to the multi-organisational cooperation than *ERP modules* (e.g. MES, VMI, and EDI) that *only* deliver capabilities to the later stages of *value stream* (e.g. production and distribution) or allow simultaneous interface connections. Additionally, once the overall strategic orientation of the whole *enterprise* (structure and strategy) changes, e.g. moving towards extended or virtual enterprise paradigm, a more integrated and flexible IS infrastructure (e.g. SOA or cloud-based ERP information system) will be adopted at the highest (usage) rate, in order to connect (or even replace) the previous diverse and dispersed *ERP modules* (*cf.* propositions #16, #17, #19, and #22). Thus the new *ERP Matrix* is a vehicle for mapping and linking the architecture of *ERP modules* with capabilities in supporting different *collaborative activities/stages* of the *value stream* and the structure of the (multi-organisational) enterprises (*cf.* proposition #15).

7.6.5 The ERP Reference Grid (new theory/theoretical model generation (II))

The crucial part of the *enterprisation* concept is to determine the appropriate ERP systems design and management strategy (in addition to multi-organisational *enterprise* structure and strategy design and governance) executed by focal companies or the most influential firms (i.e. *enterprise leaders*) and other *value members* in the *collaborative activities* based on the various situational contingencies discussed above. In other words, the biggest challenge of governing multi-organisational *enterprise*-wide ERP information systems is to design and manage the right ERP technologies, for the right (multi-organisational) enterprise structure and strategy, at the right time.

The Dynamic Enterprise Reference Grid (DERG) (Binder and Clegg, 2007), as defined in Figure 2.2, has demonstrated the basis of how dynamic changes in an *enterprise* (in the sense of EC's definition) may occur; it summarises three main (multi-organisational) *enterprise* types and their dependency on *core competencies* (a.k.a. *module* assets) (*cf.* propositions #3 and #25). However, from the IS strategy and management perspective, the empirical evidence of this research study suggests that a balance of different paradigms of ERP systems design and management, as well as their related capabilities of supporting different (multi-organisational) *enterprise* types at different stages of evolution should also be presented at all times to ensure competitiveness of the *enterprisation* (*cf.* propositions #2, #7, and #22). This reinforces the need for holistic *ERP* design and management strategies that aim to minimise commercial and IS-related risks whilst simultaneously facilitating the success of each individual *value member* participating within the (multi-organisational) enterprises through the use of ERP systems.

Based on the observations made during the study, three distinct *ERP systems types* for the governance of *collaborative enterprises* could be identified that partly equal *three ERP systems generations* identified in Tables 2.7 and 2.8 in Chapter 2 that have also been discussed in Section 7.4 in this chapter on a general level. Nevertheless, in order to avoid confusion associated with existing ERP terms the author decided to apply *ERPI*, *ERPII*, and *ERPIII* instead of other names (e.g. cloud ERP) for the three identified ERP IS types. The main characteristics of the three ERP system types are described in Figure 7.4 which is mainly based on empirical insights (*cf.* coded categories *(ERP systems design) motives*, *Capabilities supporting enterprise*, *(ERP systems management) implementations*, *(ERP systems management) outcomes*) but was also informed by the discussion of the literature in Chapter 2 (see Table 2.8) and Section 7.4.

It has been observed in this research that traditional *ERPI*, *ERPII*, and *ERPIII* are *not*, as some would believe, enterprise information system types resulting from completely different information management strategies. **This research study suggests that they are better thought of as a closed loop continuum of the same IS strategy focused on ERP systems enabled multi-organisational relationships and collaboration**. In addition, the number and usage rate of different *ERP systems types (or functional modules)* for any one company participating in an *enterprise* (in the sense of EC's definition) is closely aligned with the capabilities of supporting targeted (multi-organisational) *enterprise structure and strategy* and the feasibility of deploying their functionalities within the *collaborative activities* of the (multi-organisational) *enterprise* (*cf.* propositions #16, #17, #19, #20, #21, #22, #24, #28, and #29). This is referred to as *enterprise supporting ERP capability* of ERP information systems in the (multi-organisational) enterprises with regard to the respective *collaborative activity* (see Figure 7.3), i.e. the ability of an *ERP module* to be involved in the *value stream* due to its specific information systems competences (e.g. full collaborative commerce functionality, all internal functions supported plus core inter-company processes, and open network). In alignment with aspects of contingency theory, competence theory, and IT and business alignment view, this determination of an appropriate *ERP systems design and management* for the resulting (multi-organisational) *enterprise*-wide ERP information systems governance (i.e. design and management) was identified to be dependent upon four main dimensions; these are (i) (targeted) multi-organisational enterprise types, (ii) deployment approach, (iii) (ERP) strategic roles in supporting *enterprises*, and (iv) (ERP) systems advancement that are influenced by various technological and managerial factors.

In other words, the selection of an appropriate governance mode for ERP IS design and management within the multi-organisational enterprise is dependent upon various factors that influence the strategic capabilities (embedded in the *ERP module*) and implementation of ERP systems within the *collaborative activity* and ultimately in the *enterprises* (in the sense of EC's definition). The four identified dimensions, their related factors (derived from IT and business alignment view, competence theory, and configuration theory to provide an integrative perspective), and their impact on the *enterprise supporting ERP capability* – reflecting in two key aspects, i.e. *the intensity in use of web-based ERP information systems* and *the rate of change frequency of enterprise structure supported by ERP* – are outlined in Table 7.1; which, in turn, can be linked up with the corresponding multi-organisational enterprise forms (i.e. VIE, EE, and VE).

Table 7.1 Four dimensions influencing the enterprise supporting ERP capability in the enterprise

Four key dimensions	Related factors	Impact on enterprise supporting ERP capability (correlation)		Suggested (corresponding) enterprise strategy (correlation)
		The intensity in use of web-based ERP IS	The rate of change frequency of enterprise structure supported by ERP	
(Targeted) enterprise types	- Mature and well-integrated - Relatively stable across the product/service value chain - Large scale of economies - Strategic outsourcing - Dynamic and temporary co-operation	Low Medium Low Medium High	Low Medium Low Medium High	VIE EE VIE EE VE
Deployment (approach)	- On-premise (a.k.a. proprietary) - On-demand (a.k.a. SaaS) - Hybrid ERP solution - Feasibility and simplicity	Low High Medium High	Low High Medium High	VIE VE EE VE (or EE)
Information systems strategic roles	- Internal operational integration and optimisation - Multi-organisation participation - Internet-based full collaborative commerce	Low Medium High	Low Medium High	VIE EE VE
(ERP) systems advancement	- Flexibility and agility - Security (a.k.a. data protection) - Technological compatibility between different systems	High Low Low	High Low Low	VE VIE VIE (or EE)

For example, if the *value members* choose an **on-demand** ERP solution such as Software as a Service (SaaS) the enterprise systems deployment (approach) will be **simpler** than traditional ERP solution (i.e. **proprietary** or **on-premise**) since they do not have to purchase expensive equipment or make sure that they have sufficient infrastructure to handle the system. Rather, they just simply download a software application onto the computers and allow a hosting ERP vendors (or third-party consulting companies) to provide services (*cf.* propositions #16 and #17). This, therefore, gives stronger **flexibility**, **agility**, and accessibility for *value members* to adopt, access, and integrate different *ERP modules* within the (multi-organisational) *enterprises* resulting in **high** intensity in use of web-based ERP information systems that best serve the (multi-organisational) *enterprise structure* which has **high** rate of change frequency, i.e. the suggested *enterprise* (in the sense of EC's definition) paradigm is dynamic *virtual enterprise*. In contrast, if the *value members* aim at a **mature and well-integrated** (multi-organisational) enterprise type and **large scale of economies**, they aspire to deploy an ERP solution by hosting it internally on their own servers (i.e. **proprietary**) with great concerns about **internal operational integration and optimisation**, as well as **security issues** (e.g. data protection), in order to have total control. Consequently, this requires **low** intensity in use of web-based ERP information systems because they want to keep the business data close to the source (with the central control in hands) instead of relying too much on an external Internet connection; this can best serve the *enterprise structure* which has **low** rate of change frequency, i.e. the suggested *enterprise* paradigm is fully linked *vertically integrated enterprise*.

These examples show that the determination of an appropriate *ERP systems design and management* for the governance (i.e. design and management) of *enterprisation* (i.e. DERG-ERP) should not *only* based on the intensity in use of web-based ERP information systems but also on the rate of change frequency of *enterprise* structure supported by ERP (systems). Figure 7.4 summarises the findings in a concise reference grid which shows four prevailing current and future ERP information system types and their enterprise supporting capability (ranked simply as 'high' or 'low' in terms of the two key aspects). In each of the quadrants the best suited *ERP system type (or generations)* (i.e. ERPI, ERPII, and ERPIII) depending on the intensity in use of web-based technologies and the rate of change frequency of the targeted (multi-organisational) enterprise structure is given with some of its key characteristics. Additionally, each quadrant of the ERP Reference Grid will be characterised in more detail in Sub-section 7.6.7 and Table 7.2.

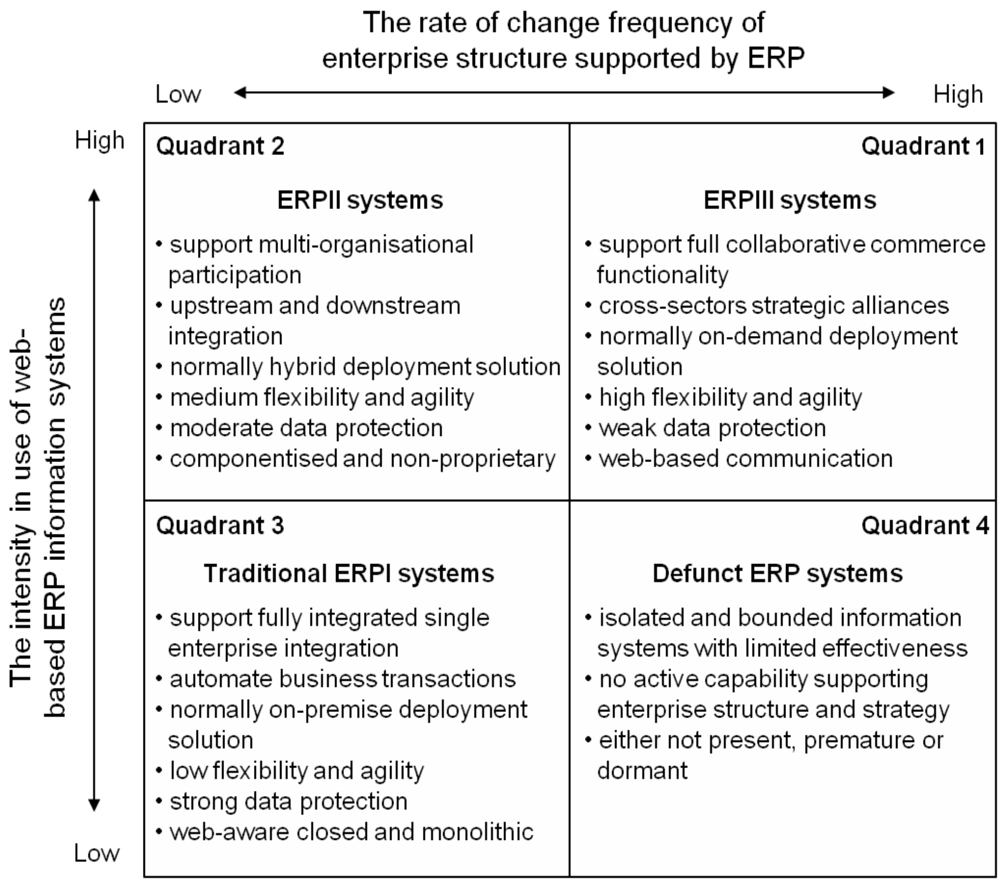


Figure 7.4. The ERP Reference Grid – determining appropriate ERP system types

7.6.6 The evolutionary ERP-CEG configuration (new theory/theoretical model generation (III))

The empirical findings show that, once established, multi-organisational relationships and their related governance (i.e. design and management) structures, i.e. (multi-organisational) enterprise structures, as well as the supporting ERP information systems will and have to change over time (*cf.* propositions #3, #4, #5, #15, and #16) depending on the varying significance of contingency factors acting upon it (e.g. core competence, delivered products, strategic roles of ERP systems) (*cf.* propositions #3, #4, #5, #6, #7, #17, and #22). This is in order to stay adaptive to constantly and rapidly changing industrial, multi-organisational relationships, and information systems management requirements which reflects basic ideas of contingency, CAS, and configuration theories in the sense that (multi-organisational) *enterprise structures and strategies* and the *supporting ERP information system types* are complex adaptive systems that evolve within the 'ecosystem'. For instance, web-aware closed and monolithic (traditional) ERPI systems could be used to enable fully linked and stable (multi-organisational) enterprise optimisation and integration whilst automating business transactions (Chen, 2001; Stevens, 2003). Alternatively, componentised web-based ERPII systems could be used to facilitate more flexible multi-organisational cooperation with some collaborative commerce potential whilst focusing on integrating upstream and downstream of *value stream* (Bendoly *et al*., 2004; Daniel and White, 2005; Monk and Wagner, 2009).

These changes of (multi-organisational) *enterprise*-wide *ERP information system design and management types* seem to be constantly reiterating and evolving, and occur partially (i.e. based on the reconfiguration of *ERP functional modules*) leading to a closed loop continuum of information systems strategy focused on ERP enabled multi-organisational relationships and collaboration. This is similar to Miller and Friesen's (1980) assumption that the complexity of adaption is a structured phenomenon in that the same adaptive scenarios keep recurring over time; which can be referred to as 'Partial Evolutionary Multiplicity' (Binder and Clegg, 2005a and 2005b). Figure 7.5 suggests the evolutionary configuration that *ERP IS types* may go through. According to the discussion in Sub-section 7.6.5, when ERP IS type evolves from (traditional) ERPI to ERPII and towards ERPIII, the *value members* engaging in the multi-organisational enterprises are required to increasingly adopt web-based information technologies to support more flexible and cloud-based enterprise systems. On the other hand, when the rate of change frequency of *enterprise structure* becomes higher (i.e. transforming from stable and inflexible *enterprise structure* to dynamic temporary *enterprise structure*), the corresponding ERP systems design and management strategies will be developed from (traditional) ERPI systems to ERPII systems and on towards web-based ERPIII architecture.

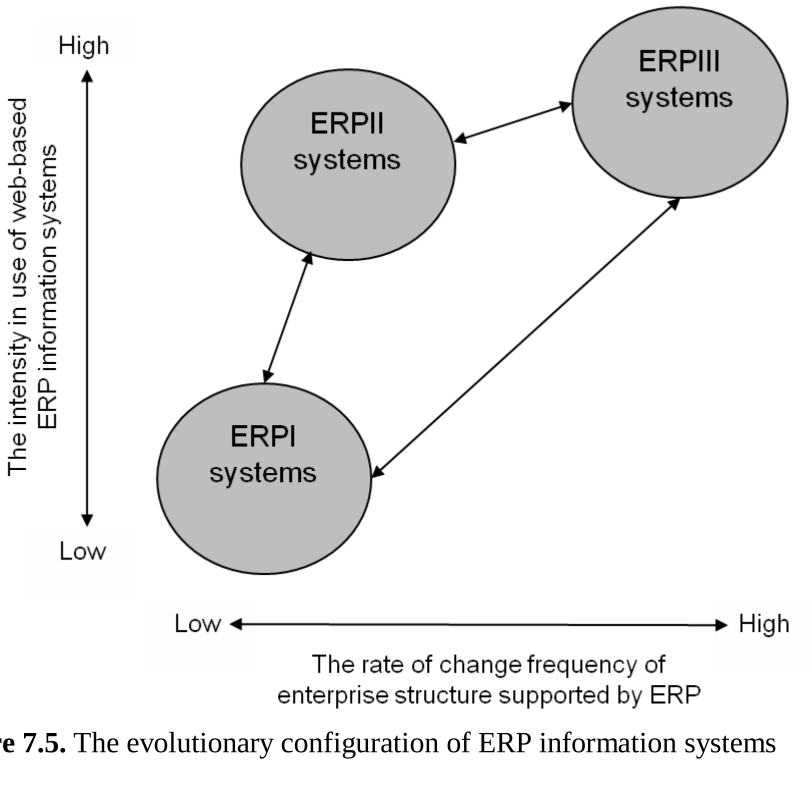


Figure 7.5. The evolutionary configuration of ERP information systems

This kind of adaptive IS strategy paradigm can be regarded as a 'dynamic (information systems) community'; each of these *ERP systems types* (*i.e. ERPI*, *ERPII*, and *ERPIII*) is considered to be a 'dynamic equilibrium' within the ecosystem '*multi-organisational enterprise-wide ERP strategy*' around which one *ERP system type* consisting of *ERP functional modules* is configured and implemented for a certain period until flipping over to another *ERP type* (bifurcation), in order to best serve the targeted (multi-organisational) *enterprise structures and strategies*. However, as opposed to the assumptions of mere quantum change of the (ERP) design and management applied in complexity theory this research study also reveals evidence for step-by-step adaptation and reconfiguration of *ERP information system types* to balance emergence and control between different *ERP functional modules* more in line with the argumentation of contingency and configuration theory (see examples for both in Table 7.2 in Sub-section 7.6.7). Moreover, these examples show that the bifurcation from one design and management type to another can follow a two-way pattern (hence the double sided arrows in Figure 7.5) although the clockwise cyclical pattern from *ERPI systems* through *ERPII systems* to *ERPIII systems* is the most common and likely evolution (or IS development) to be observed in practice (as in Chapter 4).

7.6.7 The Dynamic Enterprise Reference Grid for ERP contingency framework

The DERG (given in Figure 2.2) has demonstrates a picture of how one (multi-organisational) *enterprise structure* may change into another as a result of a changed predominance in the attributes of competence (and its *engage-ability*) that the multi-organisational relationship is built upon, which has been consolidated and extended (i.e. add 'uniqueness' as the fourth attribute of core competence; see coded category *(Competence and competitiveness as main contingency factors) attributes*) by the empirical findings of this research study; whereas the ERP Reference Grid (as shown in Figure 7.4) is intended to show a picture of how one *ERP design and management type* may change into another as a result of a changed (multi-organisational) *enterprise structure and strategy* supported by ERP information systems (*cf.* propositions #15 and #22). Thus the DERG-ERP contingency framework based on the *enterprisation* concept describes a tri-way relationship (between the core competence, the multi-organisational enterprise structures and strategy, and ERP information systems) as the *enterprise structure and strategy* will affect the development of future potential core competencies just as the development and deployment of core competencies will influence the emergence of *enterprise structure and strategies*; whilst the *enterprise structure and strategy* will also affect the development of future ERP systems just as the evolution of ERP IS will enable the emergence of new (multi-organisational) *enterprise structures and strategies*. Figure 7.6 puts the evolutionary change in *ERP system types* (from Figure 7.5) and their dependence on different types of *enterprise* structure (in terms of two key aspects) (from Figure 7.4) together along with the two-way relationships between the *enterprise* paradigms and the core competence (from Figure 2.2). It aims to give a simple consolidated overview of 'static' and 'dynamic' views of the concept of *enterprisation of operations* (i.e. DERG-ERP), i.e. effective *enterprise* strategy, *enterprise* structure, and ERP systems use.

It is argued that such reconfiguration actions (as shown in Figure 7.6a) are largely planned on controllable contingency aspects that influence the *enterprise supporting ERP capability* of ERP systems (or functional modules) and core competencies (e.g. the longevity of a planned relationship, the availability of resources, transaction costs, asset specificity, degree of collaborative process, and IS integration and advancement). Unplanned and reactive actions are represented by broken arrows from and to Quadrant 4 (as shown in

Figure 7.6b). These are predominately caused by adverse and uncontrollable contingency aspects influencing the *enterprise supporting ERP capability* and core competencies (e.g. industrial competition, limited information system capabilities, and organisational behaviour) and have not been covered in this research.

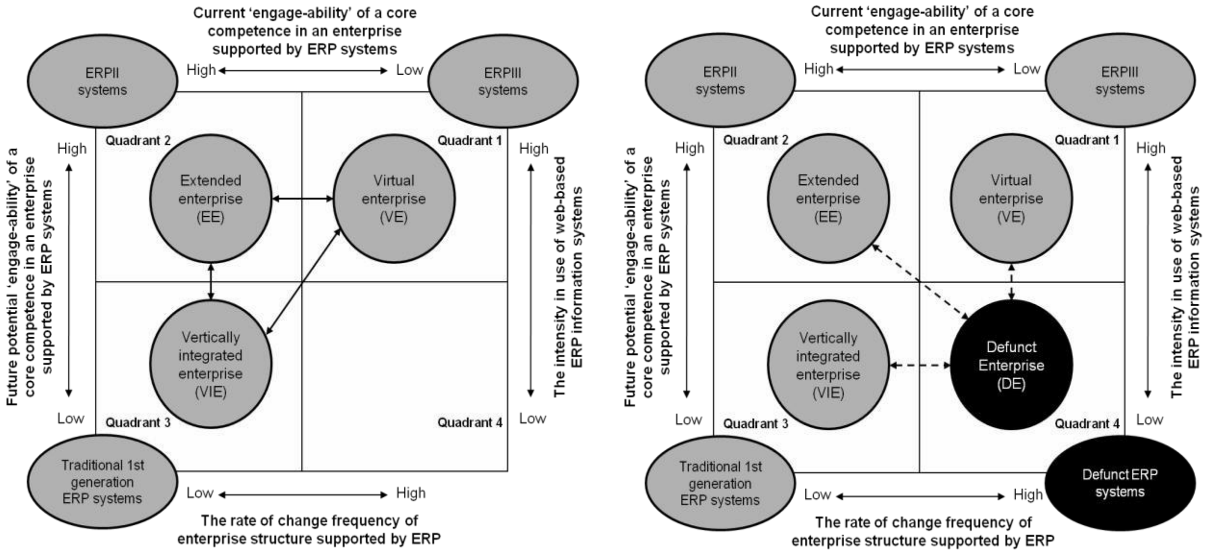


Figure 7.6. The Dynamic Enterprise Reference Grid for ERP – planned (a) and unplanned (b) reconfiguration of enterprise structures and strategies supported by ERP information systems

Figure 7.7 is a summary of the generalisable findings from the empirical case studies presented as the final contingency framework known as the dynamic enterprise reference grid for ERP (DERG-ERP) which demonstrates how to guide the interactions between ERP information systems and the management of multi-organisational *enterprises*; and how Binder and Clegg's (2007a, b) CEG and Galliers's (1994) ISFM have been combined to make a significant contribution to knowledge in the fields of information systems and multi-organisational enterprise management as well as for the application of this knowledge to practice. It also implies that the *expected competitiveness* (e.g. quick respond to the changing business environment) can significantly affect the governance (i.e. design and management) of *enterprises* (in the sense of EC's definition) and ERP information systems. Thus the author believes it is a valuable and significant generalisable conceptual deliverable from this research.

The DERG-ERP as shown in Figure 6.7 is now described generically quadrant by quadrant.

Traditional ERP(I) systems use in VIEs

In Quadrant 3 of the DERG-ERP in Figure 7.7 a VIE would be the most appropriate (multi-organisational) *enterprise form* using an (traditional) ERPI system which can support all core processes and provide some inter-departmental integration (within a single legal entity). Such systems are relatively good at long term issue based (or detailed problem solving) tasks and help accomplish business driven top-down goals, although they do not contribute directly towards the strategic forward vision of a company because they are usually operational and transactional in nature; and so therefore tend to entrench current practice and become relatively reactive to strategic and environmental business changes, rather than being the driver of flexibility or change. Traditional ERPI system performs best when core competencies of strategic partners (a.k.a. value members) – particularly the most influential/focal firms in the multi-organisational *enterprise* are currently highly engaged, e.g. due to their mature, well-established, and widely usable capabilities, but could decline in attractiveness in the future, e.g. because of fears that profit margins are eroding or that their technologies may become obsolete; thus allowing transaction costs to be minimised and scale of economy to be maximised.

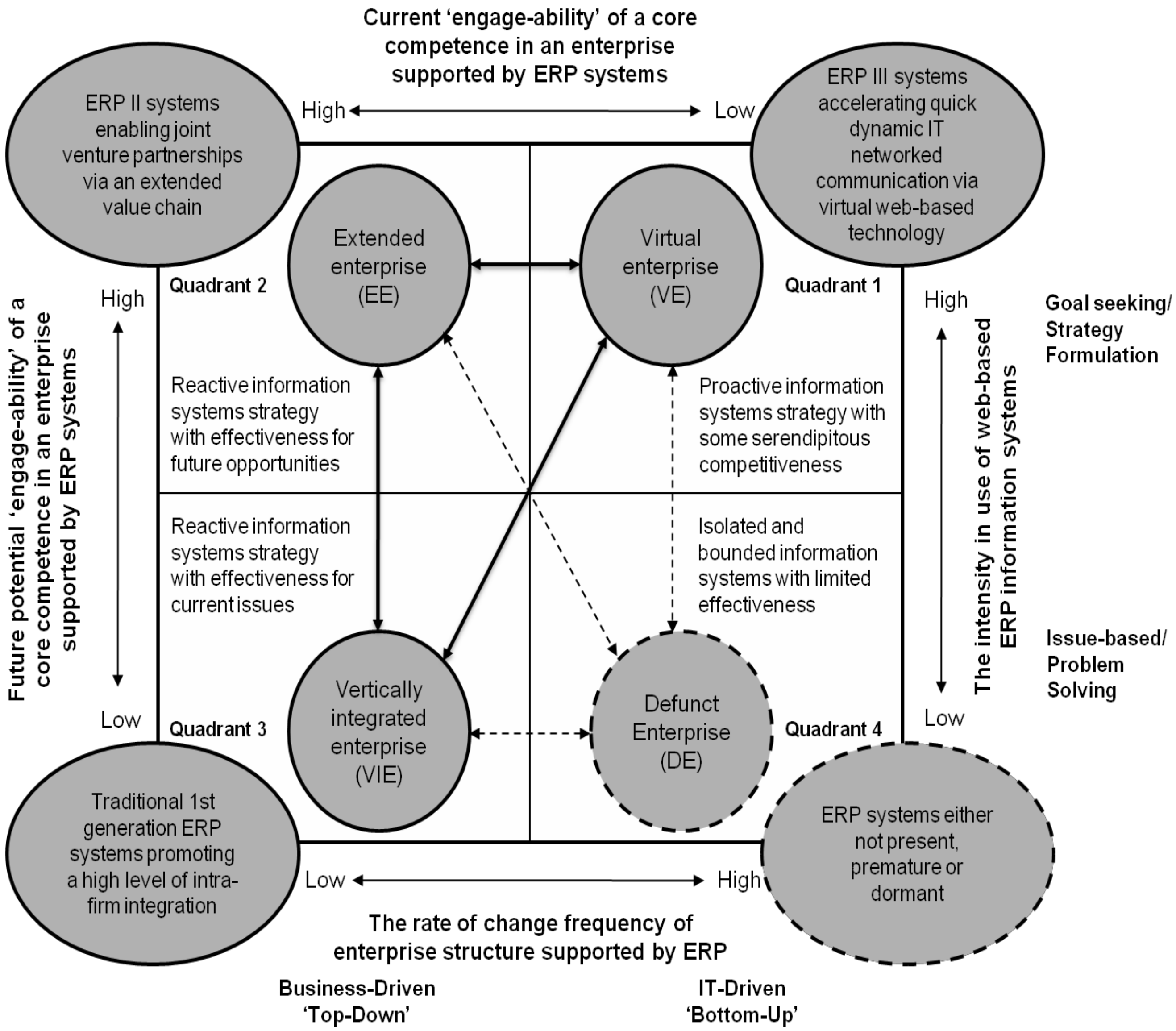


Figure 7.7. Dynamic Enterprise Reference Grid for Enterprise Resource Planning (DERG-ERP) contingency framework

ERPII systems use in EEs

In Quadrant 2 of the DERG-ERP in Figure 7.7 an EE is the most appropriate (multi-organisational) *enterprise form*. The EE best serves medium-to-large sized operations aspiring to form closer (joint venture) partnerships within an extended value chain. ERPII systems are able to extend ERPI capabilities to cover SCM, customer relationship functions, and some collaborative commerce potential to encourage active participation from other legal entities. ERPII systems can therefore drive business driven top-down tasks which can be directly used for achieving goals and formulating strategy across company boundaries (e.g. supply chain policies and collaborative forecasting with suppliers). ERPII is most effective when core competencies of strategic partners (a.k.a. value members) – particularly the most influential/focal firms in the multi-organisational *enterprise* are currently, and in the near future, highly engaging, e.g. owning to their relatively mature nature and market success; this makes them highly attractive to other (multi-organisational) *enterprise* members, and therefore highly likely to be needed in new collaborations, with new *modus operandi*.

ERPIII systems use in VEs

In Quadrant 1 of the DERG-ERP in Figure 7.7 a VE is shown. The VE best serves organisations (participating in the multi-organisational *enterprise*) which have aspirations for rapid growth (and so are likely to be relatively small) and see themselves as innovative and likely to be serial and parallel innovators or collaborators. ERPIII systems are able to facilitate temporary and highly agile operations using non-proprietary web-based technology for computer integrated manufacturing systems with decentralised operational control on a global scale and scope. ERPIII systems can therefore be used strategically to achieve strategic goals whilst still incorporating incremental IT driven changes required by bottom-up idiosyncrasies (Olsen and Sætre, 2007). ERPIII systems are considered to be pro-active IS with some almost serendipitous qualities (e.g. cloud-sourcing of innovative ideas) which fit well to this (multi-organisational) *enterprise* type as long as the required security and trust-levels can be attained. Simultaneously, ERPIII is most effective when core competencies of strategic partners (a.k.a. value members) – particularly the most influential/focal firms in the multi-organisational *enterprise* are currently lowly engaged but highly engaged in the future, e.g. because they usually have many newly emerging (core) competencies.

ERPIII applications are best used in (multi-organisational) *enterprise*-wide operations within and across different legal entities (i.e. parts of companies). Based on traditional ERPI and ERPII principles, ERPIII based *enterprises* (in the sense of EC's definition) will probably achieve the next level of business integration; namely to enable a strategic-level dialog between customers/potential customers, an *enterprise* integrator, and the extended supply chain using SOA, PaaS, SaaS technologies and SLA management tools; and will most likely be maintained by a strategic IT/IS partner. Moreover, ERPIII type solutions could create truly integrated and borderless *enterprises*; thus reaching near utopian levels of (multi-organisational) *enterprise* consciousness bringing about the simultaneous strengthening of operations, strategy, and IT interactivity, which the author refer to as the “enterprisation of operations”.

DEs and IS misuse

Quadrant 4 of the DERG-ERP in Figure 7.7 shows a Defunct Enterprise (DE). DEs occur when operations strategy, structural thinking, or information system policy have gone wrong or are premature; the challenge for operations and strategist in this business environment is to move to another more suitable type of (multi-organisational) *enterprise* (supported by corresponding ERP IS) as quickly as possible. In DEs ERP is often not widely used, used inappropriately or without any great effectiveness. Tasks are normally driven by bottom-up IT initiatives lacking strategic congruence.

Putting it all together: theory and practice into a usable concept

To illustrate the implications of the developed concept of *enterprisation of operations* and the DERG-ERP contingency framework a structured recapitulation of the research presented above is given in tabular format in Table 7.2 which describes the “static” typologies of (multi-organisational) enterprises and the supporting ERP systems, “dynamic” changes they may undergo, theoretical description (a.k.a. provenance from literature), relevant propositional findings, and qualitative empirical examples derived from 8 empirical case studies (i.e. an empirical illustration) (as in Chapter 6). Thus an illustration of the new DERG-ERP is based upon (i) a combination of conceptual interpretation of the empirical data (column 1 in Table 7.2) based on the characteristics of ERP and *enterprise* (in the sense of EC’s definition) types (see Tables 2.8 and 2.9 in Chapter 2) combined with Figures 7.3, 7.4, 7.5, and 7.6; (ii) the most relevant propositional findings (column 2 in Table 7.2); and (iii) empirical examples derived from the interviews (column 3 in Table 7.2). Thereby, different examples are used to explain the “static” and “dynamic” components of the concept because this has been a cross-sectional study and not a longitudinal one. However, at an aggregated level Table 7.2 demonstrates the connection between the concept of “enterprisation of operations” (i.e. DERG-ERP) and the empirical examples which is representative of inductive grounded reasoning.

Governing (i.e. designing and managing) multi-organisational enterprise structures and strategy and the supporting ERP information systems concurrently is like putting together a jigsaw where each bit of the jigsaw (e.g. *enterprise modules* and *ERP functional modules*) is owned and used by a different (part of) company. A potted account of how to apply the conceptual elements of the DERG-ERP contingency framework is given in Figure 7.8 followed by a step-by-step approach; which aims to (i) classify collaborative activities and information system modules, and analyse business environment, (ii) classify and analyse (multi-organisational) enterprise strategy and ERP system design criteria, (iii) determine appropriate (multi-organisational) enterprise paradigm and the supporting ERP IS configuration and management strategy, and (iv) develop action plans and managerial decision of ERP systems enabled (multi-organisational) enterprise strategy.

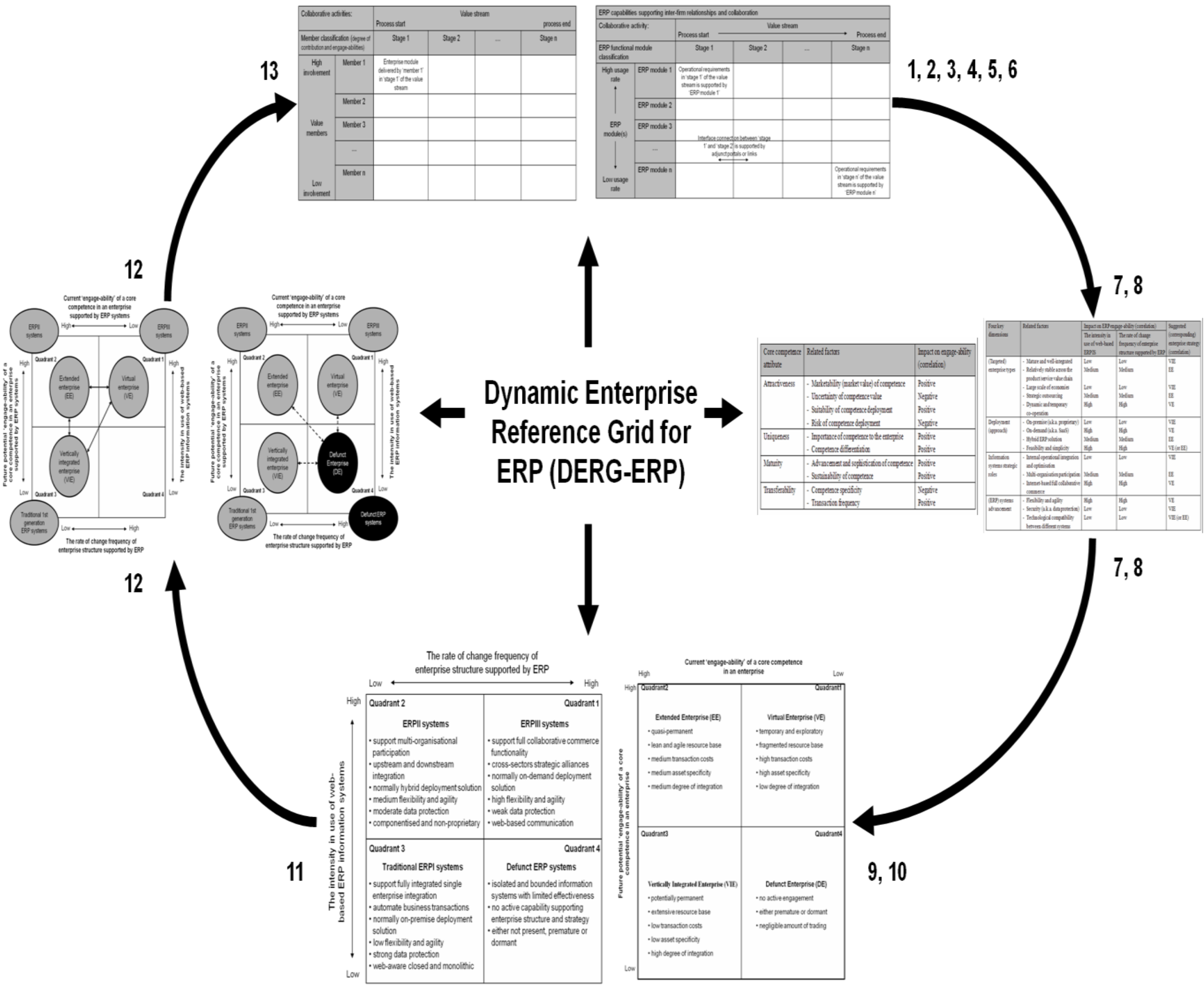


Figure 7.8. A step-by-step approach of applying the concept of DERG-ERP

1. Identification of *collaborative activities* to be performed within the (multi-organisational) *enterprise*.
2. Mapping out the *value members* (e.g. the focal firms) of the (multi-organisational) *enterprise* (in terms of their roles) that make an engaging value proposition to the *collaborative activities*.
3. Mapping out the *value stream* – the sequence of events from beginning to end that add value to joint products and services that the (multi-organisational) *enterprise* delivers.
4. Population of the cells in the *Enterprise Matrix* (Binder and Clegg, 2007) that deliver information about who (a *value member*) does what (stage of the *value stream*) based on their core competencies (a.k.a. value propositions) to the *collaborative activities*.

5. Mapping out the *ERP (functional) modules* (in terms of their capabilities of supporting inter-firm relationships and collaboration) that are used to meet operational requirements in different stages of the *value stream*.
6. Population of the cells in the *ERP Matrix* (see Figure 7.3) that deliver information about what enterprise information systems/technologies (an *ERP module*) support which stage of the *value stream* based on there IS capabilities supporting inter-firm relationships and collaboration.
7. Determine *engage-ability* of *value members* based on attractiveness, uniqueness, maturity, and transferability of their competencies.
8. Determine *enterprise supporting ERP capability* in the (multi-organisational) *enterprises* based on two key aspects, i.e. (i) the intensity in use of web-based ERP information systems and (ii) the rate of change frequency of *enterprise* structure supported by ERP IS.
9. Select appropriate (multi-organisational) *enterprise structure* (i.e. governance strategy) for the *engagement* with the *value members* (see Figure 2.2).
10. Select appropriate *ERP information system types* for the targeted (multi-organisational) *enterprise structures and strategies* (see Figure 7.4).
11. Manage the inter-firm relationships and the supporting ERP information systems according to the selected governance (i.e. design and management) modes (see Tables 2.8 and 2.9).
12. Adapt (multi-organisational) *enterprise paradigms* and the corresponding *ERP information systems design and management* to changing industrial, operational, and IS requirements as moving along the *value stream* based on active contingency planning to sustain competitiveness in the future (see Figure 7.6).
13. Re-populate cells in *Enterprise Matrix* and *ERP Matrix* according to changed contingency factors and repeat steps 7-13.
14. Repeating the above steps for each new *collaborative activities* supported by new *ERP modules* (or systems) in the *multi-organisational enterprises*.

The result is a disciplined approach for ERP systems enabled Collaborative Enterprise Governance (i.e. DERG-ERP) which concentrates on the criticalities of the *enterprise modules* (autonomous parts of collaborating companies) and *ERP modules* (IS capabilities catering to the core competence-based unique tasks) to the whole (multi-organisational) *collaborative enterprise* captured by a respective *collaborative activity* and its *value stream* and the resulting connectivity between the *value members* in appropriate (multi-organisational) *enterprise structure* supported by the corresponding ERP IS. Thereby, the concept of DERG-ERP (a.k.a. *enterprisation of operations*) ensures total system optimisation through the appropriate governance (i.e. design and management) of inter-firm relationships and collaboration, as well as ERP information systems configuration and adoption.

Table 7.2 An illustration of the new DERG-ERP concept using empirical examples and links to literature

(1) DERG-ERP conceptual element			(2) Most relevant propositional finding	(3) Illustration from empirical research (qualitative empirical examples)
Static	**Dynamic**	**Theoretical description (provenance from literature on theory)**		
Quadrant 1 Virtual Enterprise (VE) with ERPIII		▪ ERPIII contains a flexible, agent-based ICT architecture ▪ Quick and dynamic inter-firm collaboration through business process management ▪ Psychological issues such as trust and conflict are critical success factors ▪ Flexible, agility, loose, temporary, and dynamic project based collaborative venture ▪ ERPIII systems accelerate quicker and more dynamic business network communication ▪ Assisted by SOA, cloud computing, PaaS, SaaS, and other web-based tools ▪ Potential high risk with fragmented resource base ▪ High transaction cost ▪ High inter-enterprise integration	2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29	Both Lightning Source and Pinstripe were setting up on a small venture embracing large amount of inter-firm collaboration supported by web-based ERP information systems or EDI. This is the future enterprise management and IS strategy for Zoomlion, which could make them loosely linked with other partners' operations through more mature and flexible ERP functionalities. Lanye applied the VE strategy for integrating plants in different locations assisted by VPN (Virtual Private Network) and web-based ERP systems.
Quadrant 2 Extended Enterprise (EE) with ERPII		▪ Enterprise strategy changes into goal seeking rather than issue based ▪ Medium transaction cost with relatively lean resource base ▪ BPR for medium degree of intra-enterprise integration ▪ ERPII can enable high level integration of internal and potentially external operational processes ▪ Moderate supplier-customer relationships and collaborative alliances are managed by SCM/CRM systems approaching the virtual value chain concept ▪ More stable, strategic, close, and permanent collaborative venture focused	2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 19, 20, 21, 22, 25, 26, 27, 28	Intel was trying to integrate with upstream and downstream partners by connecting different ERP systems via RosettaNet EDI and B2B connections. Zoomlion adopted a new business strategy to re-position its value members: joint partners, suppliers, customers, and even competitors; which is realised by SAP ERPII systems. Meanwhile, lean management concept and strategic outsourcing from CIFA and Powermole is applied.

Quadrant 3 Vertically Integrated Enterprise (VIE) with traditional ERPI		▪ Proprietary ERP supposedly built upon real-time information ▪ High degree of functional units integration ▪ Involving predominantly production processes ▪ Potentially permanent with high degree of intra-integration ▪ Promotes business process re-engineering ▪ Extensive internal resource and low transaction cost ▪ ERP used reactively ▪ Business strategy is driven by "top-down" approach	2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14, 20, 21, 22, 24, 25, 26, 27, 28	After ERP systems launch Zoomlion had a high level of intra-integration. Also, large contributions are noted from value members who engaged within intra-enterprise activities. Wanghai had fully achieved an internal resource integration by adopting a full ERP(I) system package (e.g. Yonyou ERP systems) and ancillary tools such as RFID technology.
Quadrant 4 Defunct enterprise (DE) with limited IT/IS efficiency		▪ No profits achievable ▪ Rare IT/IS implementation or no ERP ▪ Fixed single company configuration ▪ No active engagement in a current collaborative activity ▪ IT driven strategy via "bottom-up" approach ▪ Company focuses on solving "issues-based" problems	3, 4, 5, 7, 9, 13, 15, 20, 21, 22, 25, 29	Zoomlion was initially founded on a high-tech academic institution without any explicit profitable or commercial purposes. Wanghai was a scrap recovery plant without any enterprise management and ERP IS strategy.
	Quadrant 1 to Quadrant 2 From VEs to EEs by changing ERPIII into ERPII	▪ Strategic move for successful joint ventures depending on the existing mutual relationships and experiences ▪ Effective partnership along with expertises, technology, and knowledge management is critical to establish common enterprise strategies regarding the culture, trust, and advanced IT/IS issues ▪ Changing ERPIII to ERPII for better governing medium-long term relationships with suppliers whilst predicting customer's demands	1, 2, 3, 4, 5, 7, 9, 12, 14, 20, 21, 22, 25, 26, 28	In order to offer a complete printing solution, Pinstripe moved from VE to EE based on its existing and successful partnerships whilst applying EDI with its trust partners. Lanye intends to apply EE to achieve a more stable organisational structure with medium-long term inter-firm relationships. In this enterprise context, ERPII could be used based on strategic alliances instead of web-based architecture.
	Quadrant 2 to	▪ Transformation of EE to VE can be adopted	1, 2, 3, 4, 5, 6, 7,	Intel planned to design and implement the

	Quadrant 1 From EEs to VEs by developing ERPII to ERPIII	incrementally ▪ Upgrading from ERPII to ERPIII would increase the companies' flexibility and adaptability for coping with a quick response to the business environment ▪ ERPIII, SCM, CRM, and e-business applications merged with SOA, SaaS, cloud computing, etc. can optimise global supply network integration ▪ Successful stable ventures trigger the creation of new temporary, agile, and dynamic ventures ▪ Requires open minded management with proactive IT/IS strategies ▪ Focus on temporary market opportunity through short-term collaboration ▪ Enterprise strategies shift from company centric into "borderless enterprises"	9, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 28, 29	SOA-based ERP systems to become more agile, flexible, and responsive to the customers. In the future Zoomlion may develop from EE into VE by upgrading ERPII to ERPIII to address cost-effectiveness, product uniqueness, business network optimisation, and short-temporary seamless issues with industrial third parties. Metrobank endeavored to be more responsive to dynamic market conditions; whilst new legal and regulatory requirements demanded greater transparency and more accurate and timely information. Thus it has transformed from EE to VE by upgrading ERPII to ERPIII NetWeaver.
	Quadrant 2 to Quadrant 3 From EEs to VIEs by changing ERPII into traditional ERPI	▪ The enterprise with predominantly medium asset specific content and information systems move to adopt 'lock-in' tactics to gain industrial dominance and market share ▪ For the purpose of achieving economies of scale; known as the 'shake-out' stage ▪ Shifting ERPII systems into traditional ERPI but still keep the intelligent ICT applications such as SCM, CRM, DSS, DW, etc.	1, 2, 3, 4, 5, 7, 9, 10, 12, 14, 19, 20, 21, 22, 24, 25, 26	Lightning Source has gained a large scale of economies by integrating and cooperating with different functional legal entities such as channel distributors and logistics (e.g. Amazon), publishers, and IT providers in a whole.
	Quadrant 3 to Quadrant 2 From VIEs to EEs	▪ Business processes are re-engineered and lean thinking must be adopted in parallel ▪ The most valuable members who engaged in the entire value chain have transferred from outside the company	1, 2, 3, 4, 5, 7, 9, 12, 14, 15, 20, 21, 22, 25, 26	Intel has developed its ERP systems by extending the functional modules to include SCM, CRM, and EDW to address the real business-to-business integration, as well as manage and control

	by developing traditional ERPI to ERPII	boundary to inside the enterprise boundary ▪ A new strategic partnership has revived an existing and proven enterprise module by deploying it in an EE context ▪ ERPII replaces traditional ERPI with SCM and CRM tools to gain medium inter-integration rather than merely intra-integration ▪ Shifting from issue-based problem solving into goal seeking strategy formulation via business driven "top-down" approach		suppliers better. By re-classifying the value members and re-designing business processes, Zoomlion's new production line is based on collaborative alliances with ERPII information systems.
	Quadrant 3 to Quadrant 1 From VIEs to VEs by developing traditional ERPI to ERPIII	▪ Traditional VIE or M&A strategies try to seek new innovative ventures to remain competitive ▪ ERPIII replaces traditional ERPI towards a more flexible and agile information systems ▪ Web-based technologies and other ICT tools will assist this new enterprise management pattern	1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 28, 29	By re-classifying the value members, Lanye has transformed from VIE into VE by setting up its own 'Virtual Private Network' (VPN) and ERP-GPS infrastructure for achieving agile or even the leagile manufacturing in response to the dynamic complex marketing demands.
	Quadrant 1 to Quadrant 3 From VEs to VIEs by changing ERPIII into traditional ERPI	▪ In the case of highly asset specific can be controlled or influenced by former partners internally ▪ Try to extend business portfolio and product/service differentiation to cover whole supply chain cycle via 'forward (vertical) integration' or 'backward (vertical) integration' strategies ▪ Changing ERPIII to traditional ERPI aiming at in-house IT/IS development, in order to reduce the transaction cost	1, 2, 3, 4, 5, 7, 9, 10, 12, 14, 20, 21, 22, 24, 25, 26	As soon as completing the virtual business network across intra- and inter-organisational scopes, Lanye gradually changed its enterprise structure from VE into a more stable and fully linked VIE to gain more market profits and bargain power against its competitors within the same industry; whilst web-based ERP solutions need to be replaced by in-house ERP solutions.

7.7 DERG-ERP – an interdisciplinary body of knowledge

The discussion of empirical findings indicates that the applied theoretical perspectives on DERG-ERP vary greatly across academic disciplines. Thus the polyvalent body of knowledge providing relevant insights for the DERG-ERP framework needs to be identified. In the following each discipline namely: *IT and business/organisational strategy, economics, strategic management, sociology and organisational science, and industrial marketing management* (together with two *a priori* frameworks identified in Chapter 2), their associated perspectives and relevance in the context of designing and managing ERP systems enabled multi-organisational enterprises are briefly described. The discussion of these fields will have to be limited to the most prominent and relevant theoretical approaches due to the profundity of these different disciplines.

7.7.1 IT and business/organizational strategy

The IT and business/organizational strategy should be of high interest for DERG-ERP as it has a potential to yield some interesting insights surrounding the alignment of ERP technologies and multi-organisational enterprise management.

IT and Business Alignment (a.k.a. IT and Organisational Capabilities)

In the context of IT and business, alignment alignment has been considered from the point of view of matching the company's strategy (or organisational capabilities) and its IS in order to take advantage of IT capabilities and IT-based business opportunities (Huang and Hu, 2007; Tarafdar and Qrunfleh, 2009). Thus, this theory could be particularly utilised to explain and assess the alignment of ERP capabilities and multi-organisational enterprise paradigms within which ERP systems are set.

In the DERG-ERP framework, different angles of alignment (e.g. strategy, process and infrastructure) can be compared and analysed in terms of ERP integration and multi-organisational enterprise integration, whereby the degree of ERP integration is measured with respect to the intensity in use of ERP and web-based technologies; and the degree of multi-organisational enterprise integration is measured with respect to the extent to which different organisations are integrated. IT and business alignment theory also implies that different multi-organisational enterprise forms can be aligned with different corresponding ERP systems in order to support the pursued competitiveness and improve the collaboration with value chain partners (Thun, 2010). Further, it is suggested that ERP capabilities and implementation should be dealt with to both support and shape the business strategies (i.e. their strategic fit is critical for organisational development and new ventures establishment) (Chen, 2009).

7.7.2 Economics

The DERG-ERP is is basically associated with social economic which results in a certain responsibility of organisational economics in analysing and governing ERP information systems and multi-organisational relationships and collaboration.

Transaction Cost Economics

Transaction Cost Economics (TCE) traces the existence of firms and the structure of firm to the efficiency of organising transactions (Hart, 1989; Williamson, 1979); which has a number of important premises including asset specificity and uncertainty (e.g. exogenous environmental forces). Theories relying on TCE postulate that relationship-specific resources enhance value creation within multi-organisational relationships (Subramani, 2004). Also, Pateli and Lioukas (2011) and Williamson (2008) argue that firms are best seen as a bundle of contracts in which decision making must align collaborative transactions with multi-organisational enterprise governance structures which have different competencies. This may help in answering the question of *whether and to what extent multi-organisational integration would make sense*. For instance, while traditional TCE implies that arm's length transaction might be replaced by vertical integration (VI), because asset specificity causes the 'hold-up' problem, VI does not always occur in the real world (Ono and Kubo, 2009). In turn, owing to the economics of specialisation available in the market, applications of TCE assume that a more efficient mechanism for exchange rather than does hierarchy is needed (Duan *et al*., 2009); which gives birth to strategic outsourcing, extended and virtual enterprises.

With respect to the DERG-ERP, TCE suggests that the impact of ERP on multi-organisational enterprise management decisions is determined by the degree to which ERP systems change the economic costs of internal and external coordination, and production (Jean *et al*., 2010). Specifically, using ERP technologies can enable interaction within and between organisations reducing costs incurred in information processing (Berthon *et al*., 2003), potentially leading to reductions in transaction costs (Zhu and Kraemer, 2002); and thus enabling more efficient flows of information (Zeng and Pathak, 2003). However, reducing transaction costs may increase information processing and coordination costs. This therefore raises questions as to what the real impact of ERP information systems can be within the multi-organisational enterprises context; and the extent to which firm boundaries should be altered through ERP technology investment – which has been addressed by the DERG-ERP concept.

Agent-Based View

An agent is an encapsulated system situated in some environment and capable of flexible, autonomous action in that environment in order to meet its design objectives (Wooldridge, 1997); it acts either on behalf of individuals or companies or as part of some wider initiative (Jennings, 2001). Thereby, the Agent-Based View (ABV) is well suited to the nature of multi-organisational collaboration which is more flexible with a certain degree of autonomous (e.g. VEs). ABV could stress innovation processes and interactions among economic agents within different typical multi-organisational enterprise contexts (e.g. VIE, EE and VE). Thus, detailed specifications of multi-organisational structural conditions, institutional arrangements, and behavioural dispositions are required (Tesfatsion, 2006). Drawing on ABV, the multi-organisational consortium – particularly the EE and VE represents a complex system consisting of a set of agents that are independent and loosely coupled. The multi-organisational enterprise structure involving information integration, communication and coordination in the community should be designed to be more open and modular for easy reconfiguration (Yu and Krishnan, 2004). These attributes require the corresponding ERP systems to be deployed through mobile agent-based and distributed infrastructure; which allows the enterprise to cope with the uncertainty and complex decision-making by offering flexibility and agility (Aerts *et al*., 2002; Kaihara and Fujii, 2002).

7.7.3 Strategic management

Strategic management is mainly concerned with the strategic positioning of a company in its environment to gain competitive advantage by using IT/IS, therefore, could be used to explain and facilitate the design and management of DERG-ERP in terms of the competitiveness of different ERP system types and different multi-organisational enterprise types.

Resource-based View & Resource Dependency Theory

According to the Resource-based View (RBV), the entity of the firm is seen as a "collection of productive resource" which can be the firm's capabilities (Grant, 1991), competencies (Heene and Sanchez, 1997; Prahalad and Hamel, 1990), or strategic assets (Amit and Schoemaker, 1993). Drawing from this view, competitive advantage is created and sustained endogenously by configuring firm's heterogeneous resources or by developing firm's capabilities that are not easily transferred or imitable (Eisenhardt and Martin, 2000; Mata *et al*., 1995; Oliver, 1997). However, RBV has been criticised as it tends to ignore exogenous factors that may undermine otherwise advantageous capabilities (Lewis *et al*., 2010). As a result, more recent interesting studies hold that both internal and external capabilities are important to performance (Das and Teng, 2000); and consider the development of competitive advantage in situations where resources and capabilities are held beyond the boundary of the single firm (Lucas *et al*., 2002). This change in emphasis has led to the term "Extended Resource-based View" (ERBV) and "Resource Dependency Theory" (RDT).

Grounding within the ERBV and RDT, this research extends the focus to include multi-organisational relationships and the joint resources (e.g. information systems resources) incorporated and co-developed by multiple organisations to facilitate the (multi-organisational) enterprise collaboration; and consider how an organisation's strategy and structure affect its partners' survival. This extension coincides with the DERG-ERP principles and has been resonated by researchers (Rai and Tang, 2010; Squire *et al*., 2009; Tsou and Chen, 2012) who assert that firms are increasingly dependent on external resources and are establishing portfolios of multi-organisational relationships to leverage external resources and IT capabilities for competitive advantages and innovation. Additionally, the information systems literature has demonstrated the RBV and RDT's potential in analysing the effects of IT on business performance (Bhatt and Grover, 2005), which involves IT capability and technology orientation (Lai *et al*., 2008). The RDT could therefore explain why ERP systems integration between trading partners can be enhanced by concurrent and complementary opportunities for accessing, sharing and leveraging resources, as well as building dependencies with collaborative partners (Leiblein, 2003; Mudambi and Mudambi, 1995).

Competence Theory

The Comptence-based Approach (CBA) derived from the RBV implies that focus on competition is no longer the short-term aim of the company's price and performance policy for current products. Long-term competitiveness is rather associated with building core competencies at a lower cost and faster pace than competitors (Prahalad and Hamel, 1990, p. 81). This is supported by Binder and Clegg (2006), and Li and Williams's (1999) observations that firms within any type of collaborative **enterprise** should focus on their core competences and simultaneously outsource their own peripheral (i.e. non-core) activities in order to develop multi-organisational collaboration in strategic processes. With respect to the DERG-ERP, CBA could explain how partner's competence (e.g. knowledge absorptivity, openness perception) influence organisations to share information and the use of ERP-related resources (Ibrahim and Ribbers, 2009). Also, CBA justifies that different ERP systems (e.g. ERPI, ERPII and ERPIII) hold different competences which can support the corresponding multi-organisational enterprise paradigms (e.g. VIE, EE and VE) to achieve the desired competitive advantages.

Configuration Theory & Dynamic Capabilities View

A Configuration Theory (CT) is widely accepted in the field of strategy and is applied accordingly to a number of operations management and IS management studies (Ahuja and Carley, 1999; Ramrattan and Patel, 2010). This approach fits in term of "gestalts" (i.e. strategic combinations) and argues that when elements are consistent with each other, a holistic analysis should be applied (Ward *et al*., 1996). Consequently, CT is very useful in handling the co-alignment or fit among multiple variables; and is appropriate for handling complex relationships (Flynn *et al*., 2010). The DERG-ERP presents a taxonomy in the fields of ERP systems and multi-organisational collaboration by delimiting and classifying different patterns and profiles of ERP system and multi-organisational enterprises; and in turn establishes different types of ERP-CEG approach *a posterior* through an inductive configuration approach driven by empirical data. This taxonomy is dependent upon the intensity in use of web-based ERP systems, the degree of multi-organisational enterprise integration, and the value member's core competence 'engageability'.

Consistent with RBV and CT assumptions, more recent works stress that a firm's competitive advantage lies in resource deployment and capability building in accordance with dynamic market demands as opposed to the traditional focus on resource identification (Reuter *et al*., 2010). Owing to dynamics in the business environment, competitive advantage can only be achieved when firms develop and apply capabilities "sooner, more astutely, or more fortuitously" (Eisenhardt and Martin, 2000, p. 1117) than competitors. This stream of reasoning is referred to as the Dynamic Capabilities View (DCV) which is defined as a firm's capacity to integrate, build and reconfigure the structural patterns of internal and external resources to achieve congruence with changing business environments and to design new value creating strategies (Eisenhardt and Martin, 2000; Teece, 2007). Drawing on DCV, the role of DERG-ERP in strategic formulation is dynamic to respond to ever-changing competitive environments (e.g. quality, innovation and shorter turnaround time pressure). Further, DERG-ERP could use DCP to explain how firms create new core competences by developing multi-organisational enterprise structures to leverage multi-organisational relationships assets over time; and how firms continuously upgrade or reconfigure their ERP systems to cater for the corresponding multi-organisational collaboration patterns.

Value Chain & Virtual Value Chain

The value chain has been developed and used as a systematic tool or mechanism for analysing the sources of competitive advantage of a firm by portraying and examining the chained linkage of its activities (Porter, 1985). Also, it frames the thinking about value stream and value creation of the activities during the business transaction (Peppard and Rylander, 2006). However, the DERG-ERP claims that different multi-organisational collaborations and information processes cannot be properly explained by traditional value chain theory; rather, they can be seen as a virtual value chain (Jones and Womack, 2002; Rayport and Sviokla, 1995) or a value constellation/net (Normann and Ramirez, 1993) which is a business model describing the dissemination of value-generating information services throughout the extended or virtual enterprises. This novel concept is applied to DERG-ERP to investigate the emergent multi-organisational enterprise paradigms and ERP system capabilities by redesigning the business processes using dynamic digital value chain concepts. In comparison to the traditional value chain theory, the marked change is that virtual value chain is focusing on managing multi-organisational value streams supported by information systems (e.g. ERP) rather than intra-organisational value chains towards the governance and leveraging of core competencies of the partner companies (Cox, 1996) in appropriate value configurations (Stabell and Fjeldstad, 1998), in order to create superior value and hence competitive advantages.

Critical Successful Factors-based View

The Critical Successful Factors (CSF)-based View is one of the best known approaches used to define and measure ERP implementation success (Nour and Mouakket, 2011; Somers and Nelson, 2001). CSFs have been heavily used by information systems research, but mainly in intra-organisational information systems (Poon and Wagner, 2001). There are still knowledge gaps regarding key factors in the development, implementation and operation of inter-organisational systems that enable multi-organisational collaboration – as indicated in the DERG-ERP framework. However, this research does not use the CSF to analyse and propose a classification framework by identifying different key factors on different stages of ERP systems project lifecycle. Rather, the CSF approach is used to guide the development of ERP implementation strategy in the collaborative enterprise environment and will help (multi-organisational) enterprise managers make better decisions by understanding the impact of the different critical factors on designing and managing multi-organisational ERP systems.

7.7.4 Sociology and organisational science

Sociology and organisational science basically stresses organisations and human society as ever-changing phenomena based on the business circumstances in which they exist. The early work on organisation and human behaviour addressed the design of mechanisms for integrating activities across units within firms (i.e. inter-functional integration). More recent work has extended this view to include mechanisms for integrating activities across the organisations such as multi-organisational relationships and collaboration and inter-organisational information systems design and management, which is related to the DERG-ERP.

Contingency Theory

The author has found no conceptual (decision-making) framework to best design and manage ERP systems enabled multi-organisational enterprises; and Contingency Theory Contingency Theory (Lawrence and Lorsch, 1967; Van de Ven and Drazin, 1985) argues that there are no universal solutions to management decision-making. Additionally, the structural contingency theory emphasises both external and internal fit (Peteraf and Reed, 2007). Accordingly, companies should strive for achieving a strategic fit between their strengths/weaknesses and the environment's opportunities/threats (Thun, 2010); and a fit between strategy and internal structure (Bourgeois and Astley, 1979). For this reason, the author uses contingency theory to examine the effects of related contingencies on the DERG-ERP performance; and posits that (multi-organisational) enterprise managers should choose the most appropriate multi-organisational enterprise structures, collaborative business processes and (ERP) information systems strategies that reflect the circumstances because the salient aspects of a firm's integration mechanisms and ERP IS capabilities account for the effects of multi-organisational collaboration behaviours and realisable core competences. Specifically, this research uses two *a priori* concepts – collaborative enterprise governance (Binder and Clegg, 2006) and IS strategy formulation model (Galliers, 1994) to help explain correlations between ERP information systems and multi-organisational enterprise management (as described in Section 2.6).

Complex Adaptive Systems

This research draws upon the Complex Adaptive Systems (CAS) as a kernel theory and proposes it is *not enough* to recognise the DERG-ERP as a simple system – but is a complex, evolving and adaptive system. With roots in many disciplines such as evolutionary ecology and non-linear dynamical systems, modern theories and models of CAS focus on the interplay between a system and its environment and the co-evolution of both the system and the environment (Choi *et al.*, 2001). Phenomena such organisational change and transformation (Dooley, 1997) and strategy (Levy, 1994) have been examined using concepts from CAS theory. The author seeks to extend this application stream to issues on how different ERP system types and different multi-organisational enterprise types should be managed concurrently if they are recognised as CAS. By thinking of this, in the DERG-ERP framework, theories concerning CAS can be imported to aid the interpretation of the DERG-ERP behaviour and dynamics, which in turn, recognises factors that generate the complexities associated with ERP information systems and multi-organisational governance (e.g. organisational and functional dimensions) and helps describe DERG-ERP evolution as a path-dependent change. For example, complex behaviour might arise from the inter-relationships and information systems adoption within a system (e.g. collaboration and cloud-based ERP deployment within multi-organisational network) and between a system and its environment which affects the structure, relationship and information systems configuration of the entities and the system. Moreover, it has been acknowledged that CAS theory complements the view of the contingency approach by emphasising the importance of the internal consistency of structure, IT/IS or organisational culture for the efficiency of an inter-organisational paradigm.

7.7.5 Industrial marketing management

The essence of industrial marketing is the voluntary exchange process of value between trading parties, internal and external boundaries of a firm, and technology usage to create customer satisfaction.

Relational View & Network Theory

Multi-organisational relationships and collaboration combined with information systems application should be originated from the customer or consumer's perspective in order to prosper in the dynamic marketplace (Svensson, 2003) and electronic marketspace (O'Reilly and Finnegan, 2010). This is conceptualised in the marketing literature as marketing concept (Kotler, 1997) and market orientation (Slater and Narver, 1995) which drive firms to establish, maintain and enhance relationships within and outside the firm via a relationship marketing approach (Min and Mentzer, 2000) supported by information technology and systems (Fawcett *et al*., 2011). This indicates that relational view and network theory involve the restructuring of the organisation into a border-less enterprise (Wood, 2010) through the elimination of boundaries between internal functions and the blurring of firm boundaries to the external environment which links to an open system approach (Borys and Jemison, 1989) or federated environment. This clearly puts emphasis on close inter-organisational relationships and collaboration within the multi-organisational enterprises as strategic source of customer value (e.g. through collaborative forecasting (Poler *et al*., 2008), mutual trust and commitment (Bordonaba-Juste and Cambra-Fierro, 2009), and interoperability (Chen *et al*., 2008)). In this context, ERP information systems should also be configured and managed across inter-organisational boundaries rather than intra-organisational scope (Triantafillakis *et al*., 2004), in order to support the requirements of different multi-organisational enterprise structures and strategy.

In general the above discussion shows that none of the outlined disciplines and its theoretical perspectives can sufficiently explain the sustainable governance of complex correlations between ERP systems and multi-organisational relationships and collaboration. However, these underpinning theories (and two *a priori* frameworks as explained in Chapter 2) can be regarded as complementary tools for explaining the DERG-ERP. Hence, a summary of the body of knowledge covering the main disciplines, their theoretical perspectives, key issues and their relevance for the DERG-ERP framework is presented in Table 7.3.

Table 7.3 Multidisciplinary knowledge founding and explaining the DERG-ERP framework

Discipline	Theoretical Perspective	Key Issues	Relevance for the DERG-ERP framework
IT and business & organisational strategy	IT and business alignment (IT and organisational capabilities)	▪ Aligns the IT/IS strategy with business strategy ▪ Aligns the IT/IS strategy with organisational capabilities	Explains and assesses the alignment of ERP capabilities and enterprise paradigms within which ERP systems are set
Economics	Transaction cost economics	▪ Traces the existence and structure of firm to the efficiency of organising transactions ▪ Important premises including asset specificity and uncertainty ▪ A more efficient mechanism for exchange rather than does hierarchy is needed	Answers the question of whether and to what extent inter-firm integration would make sense; and suggests that the impact of ERP on enterprise is determined by the degree to which ERP systems change the economic costs of internal and external coordination
	Agent-based view	▪ An agent acts either on behalf of individuals or companies or as part of some wider initiative ▪ An agent is capable of flexible with a certain degree of autonomous ▪ Stresses innovation processes and interaction among economic agents	The collaborative enterprise represents a complex system consisting of a set of agents that are independent and loosely coupled; ERP systems are required to be deployed through mobile agent-based infrastructure
Strategic management	Resource-based view and resource dependency theory	▪ Competitive advantage is created and sustained by configuring internal resource and capabilities ▪ Firms are interdependent to leverage external resources and capabilities for competitive advantage development ▪ Collaboration reduces autonomy but enables access to resources ▪ Analyses the effects of IT capabilities on performance	DERG-ERP performance can be reinforced or even enhanced by building dependencies between collaborative partners for accessing and sharing resources, and integration ERP information systems, in order to gain competitive advantage
	Competence theory	▪ Firms should be conceived as a portfolio of core competencies ▪ Competence is largely determined by internal resources which are	Firms applying the DERG-ERP should focus on core competences and outsource non-core activities; partner's

		heterogeneous and imperfectly mobile	competence influences the use of ERP-related resources
	Configuration theory and dynamic capabilities view	▪ Fits in term of "gestalts" and assert a holistic analysis application ▪ Handles the co-alignment among multiple variables ▪ Firms should have capacity to integrate, build and reconfigure their structure and resources to meet changing business environment	DERG-ERP presents a taxonomy of approaches by delimiting and classifying different ERP types and different enterprise types; explains how firms create core competences by dynamically developing the DERG-ERP approach over time
	Value chain and virtual value chain	▪ Firms conceptualised as a set of chained linkage of activities ▪ Virtual value chain focuses on managing inter-firm value streams supported by information systems	Investigates the emergent ERP capabilities and enterprise forms by redesigning the business processes using dynamic digital value chain concepts
	Critical successful factors-based view	▪ Defines and measures ERP implementation success ▪ Neglects the key factors regarding the inter-organisational ERP adoption	Guides the ERP implementation within the multi-organisational enterprises context and explores the impact of CSFs on designing and managing inter-organisational ERP systems
Sociology and organisational science	Contingency theory	▪ There are no universal solutions to management decision-making ▪ Emphasizes both external and internal strategic fit	Examine the effects of related contingencies on firm's DERG-ERP performance
	Complex adaptive systems	▪ Focuses on the interplay between a complex adaptive system and its environment and their co-evolution ▪ Emphasizes the importance of internal structural consistency, IT/IS and organisational culture	Interprets the DDERG-ERP behaviour and dynamics, and recognising factors that generate the complexities associate with DERG-ERP design and management
Industrial marketing management	Relational view and network theory	▪ Restructures the organisation into border-less enterprise through the elimination of boundaries ▪ Close inter-firm relationships and collaboration create strategic source of customer value	DERG-ERP should be configured and managed across the inter-organisational boundaries to create customer value
Established conceptual framework	DERG	▪ Summarise each enterprise type in detail and explains how changes occur ▪ A continuum of an operations strategy in response to contingent factors	Describe the VIE, EE and VE and their current and future potential *engageability* through a contingency perspective
	ISFM	▪ Presents the IS transformations shifting from technological efficiency to business competitiveness and collaboration	Illustrates the changing perception of (ERP) information systems (IS) strategy which is used to extend the DERG

7.8 Revisiting the propositions

As argued above, the discussion in Sections 7.1 to 7.5 (along with a critical review in Chapter 2) revealed shortcomings of the existing literature on ERP systems enabled multi-organisational relationship and collaboration governance (i.e. design and management) because often only small parts of existing concepts and their theoretical perspectives could be used to explain the empirical observations made. Hence, the validated propositions from Chapter 6 together with general theoretical perspectives identified in Chapter 2 (and Section 7.7) mainly guided the development process for the new concept as shown in Section 7.6 above. Although the validated propositions have thereby been incorporated in the developed concept they need to be revisited in order to establish internal validity through a conceptual iteration. This is achieved by iteratively confronting the study's analytical generalisations with the observed phenomena in the form of the validated propositions to determine what the concept does explain and where it does not hold the explanatory power. The results are shown in Table 7.4.

Table 7.4 Revisiting the validated propositions

Proposition(s)	Theoretical Perspective	Conceptual framework
#13, #15, #20, #21, #26, #27	IT and business alignment (IT and organisational capabilities) Competence theory Relational view and network theory	A company is conceptualised as nexus of enterprise modules that consist of specific core competences within the enterprises; each partner's specific IT/IS competences could influence the use of ERP related resources. This also indicates that ERP systems enabled CEG should be configured and managed across the inter-organisational boundaries to develop new competencies via their absorptive capacity (**Sub-sections 7.6.1 to 7.6.3**).
#3, #17, #24, #25	IT and business alignment (IT and organisational capabilities) Agent-based view Value chain and virtual value chain	ERP matrix and enterprise matrix conceptualise a collaborative activity as (virtual) value stream of tasks that is covered by value members whilst being supported by different ERP systems. Thus it serves as tool for optimising and regulating deployment of core competencies (via enterprise modules) and information systems capabilities (via ERP modules) in collaborative activities (**Sub-section 7.6.4**).
#1, #2, #3, #8, #12, #17, #19, #24	IT and business alignment (IT and organisational capabilities) Resource-based view and resource dependency theory Competence theory Value chain and virtual value chain Critical successful factors-based view	The enterprise-wide ERP governance requires a distinct enterprise leader or facilitator who possesses the competence of evaluating the enterprise modules of the value members, the ERP functional modules, as well as allocating (or establishing) suitable core competences and ERP capabilities to respective stages and tasks of the value stream; whilst defining both operational and IS responsibilities of and boundaries between the value members (**Sub-sections 7.6.1 and 7.6.4**).
#3, #7, #13, #16, #17, #19, #22, #24, #25, #28, #29	Resource-based view and resource dependency theory Competence theory	The number of different ERP system engagements for any one enterprise module participating in an enterprise is closely aligned with the capabilities of supporting targeted enterprise structure and strategy and the feasibility of deploying their functionalities within the collaborative

		activities of the enterprise. Also, the number and degrees of involvement of value member are determined by the engage-ability of its competencies (e.g. sharing resources, integrating different ERP information systems) (**Sub-sections 7.6.4 and 7.6.5**).
#3, #4, #5, #6, #10, #11, #16, #17, #18, #19, #23	Transaction cost economics Competence theory Contingency theory Critical successful factors-based view	The selection of an appropriate governance mode for ERP information systems design and management within a collaborative enterprise is dependent upon various factors (e.g. value member's IS competence and strategic IS decision-making) that influence the strategic capabilities (embedded in the ERP module) and ERP systems adoption within the enterprises (**Sub-section 7.6.5**).
#3, #4, #5, #7, #9, #14, #15, #16, #20, #21, #22	IT and business alignment (IT and organisational capabilities) Configuration theory and dynamic capabilities view Contingency theory Complex adaptive systems DERG ISFM	A portfolio of constantly re-configuring ERP information system types (evolutionary ERP life cycle) and their corresponding inter-organisational relationships and collaboration (evolutionary enterprise life cycle) is suggested in order to be adaptive to changing industrial and operational requirements; and at the same time minimise commercial risk, i.e. simultaneously exploit advantages of in-house and on-demand ERP IS or stable and flexible inter-organisational relationships (**Sub-sections 7.6.6 and 7.6.7**).

The comparison of the propositions and the conceptual framework in Table 7.4 suggests that the derived and validated propositions on the subject of sustainable governance (i.e. design and management) of ERP systems enabled multi-organisational relationships and collaboration can be thoroughly explained by the developed concept of *Dynamic Enterprise Reference Grid for ERP* (a.k.a. enterprisation of operations). However, for the purpose of methodological rigor it needs to be mentioned that **the support for internal validity is somewhat limited because the concept has been developed in the specific context of ERP systems enabled multi-organisational collaboration in the UK and Chinese manufacturing and service-oriented industries**.

On a more abstract level the concept of *enterprisation of operations* (i.e. DERG-ERP) can fulfil two purposes. Firstly, it can be used for *ex post* analytical reasons in order to analyse and evaluate different multi-organisational relationships and collaboration approaches and their corresponding ERP information systems use concurrently. Secondly, it can serve as *ex ante* model to determine the appropriate (multi-organisational) *enterprise* strategy and the supporting ERP systems design and management for innovative decision-making in *enterprisation of operations*, i.e. how ERP IS and enterprises may be co-developed. A structural model of *Dynamic Enterprise Reference Grid for Enterprise Resource Planning* for potential future testing is suggested in Figure 7.9.

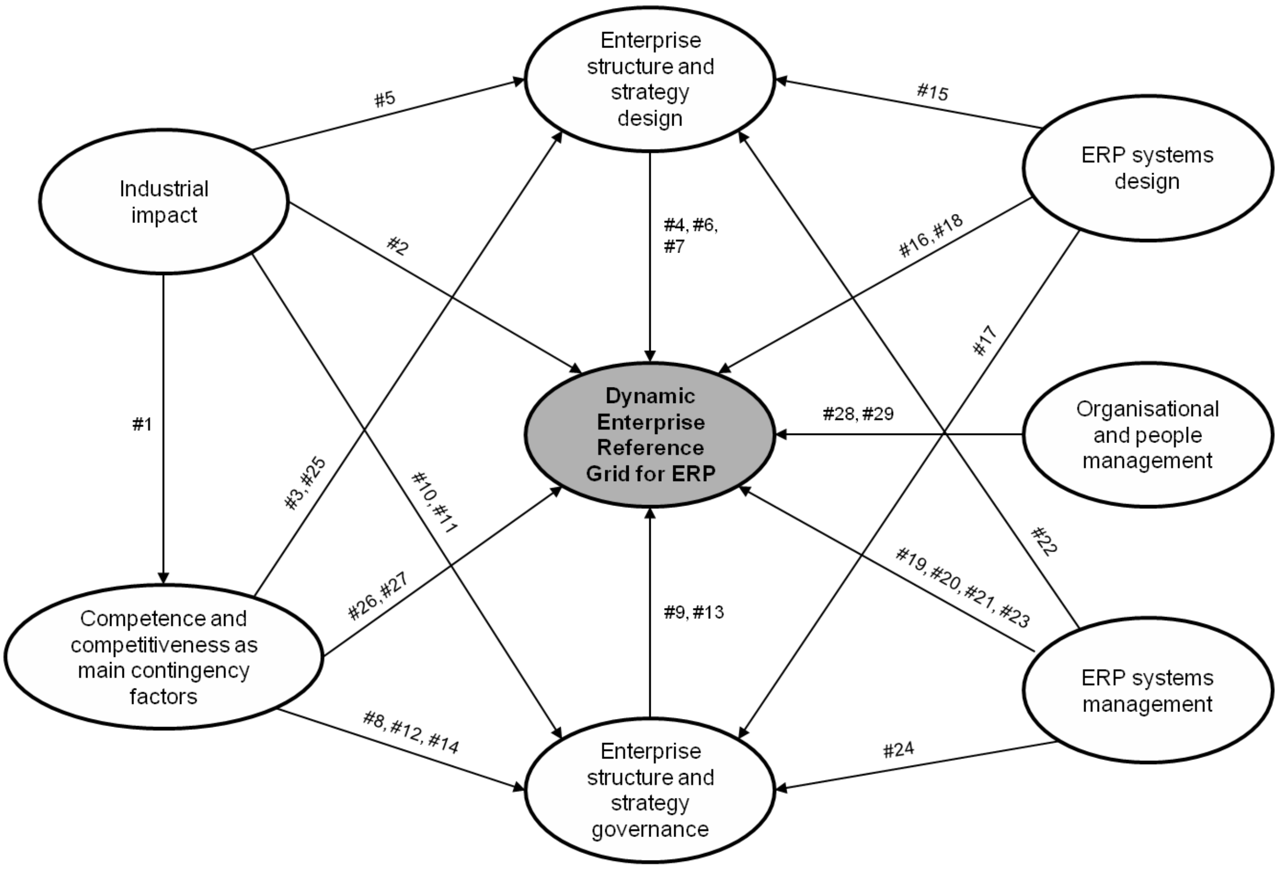


Figure 7.9. A structured model of Dynamic Enterprise Reference Grid for ERP

7.9 An graphical illustration of the new DERP-ERP concept using 8 empirical cases

This section illustrates how was the new contingency framework, the DERG-ERP (see Figure 7.7), applied to 8 different empirical cases. Each subsection graphically discusses and summarises the transformational route experienced by 8 different companies; which serves as a guide (or practical implications) for ERP vendors, information systems management and operations managers hoping to grow and sustain their competitive advantages with respect to effective enterprise strategy, enterprise structure, and ERP systems use based upon a contingency perspective.

7.9.1 Summarising Lightning Source's transitions using the DERG-ERP

Figure 7.10 summarises the transformational route experienced by Lightning Source as it shifted from a DE (at T1) with isolated information systems (i.e. only interfaced rather than properly integrated ERP systems), into an EE (at T2) as the ERP system was initially approached and developed from traditional ERP type based upon Oracle Content Management platform into an ERPII system by rolling out e-commerce portals, which in turn assisted the company to better concentrate on its (currently and in the near future) highly engaging core competencies (e.g. high quality services, lean manufacturing, speed) whilst gaining more competitive advantages through an extended inter-organisational integration strategy and a fully integrated system-to-system linkage (i.e. 'order and request' systems) between Lightning Source and its collaborators.

Finally to further improve its virtual inter-organisational integration, as well as creating newly emerging core competencies that are highly engaged in the future (e.g. virtual book warehouse, holding e-book titles) Lightning Source is currently (*circa* 2012) developing VE concepts supported by web-based ERPIII type systems (i.e. a move from T2 towards T3) to enhance the ***enterprisation*** of their operations.

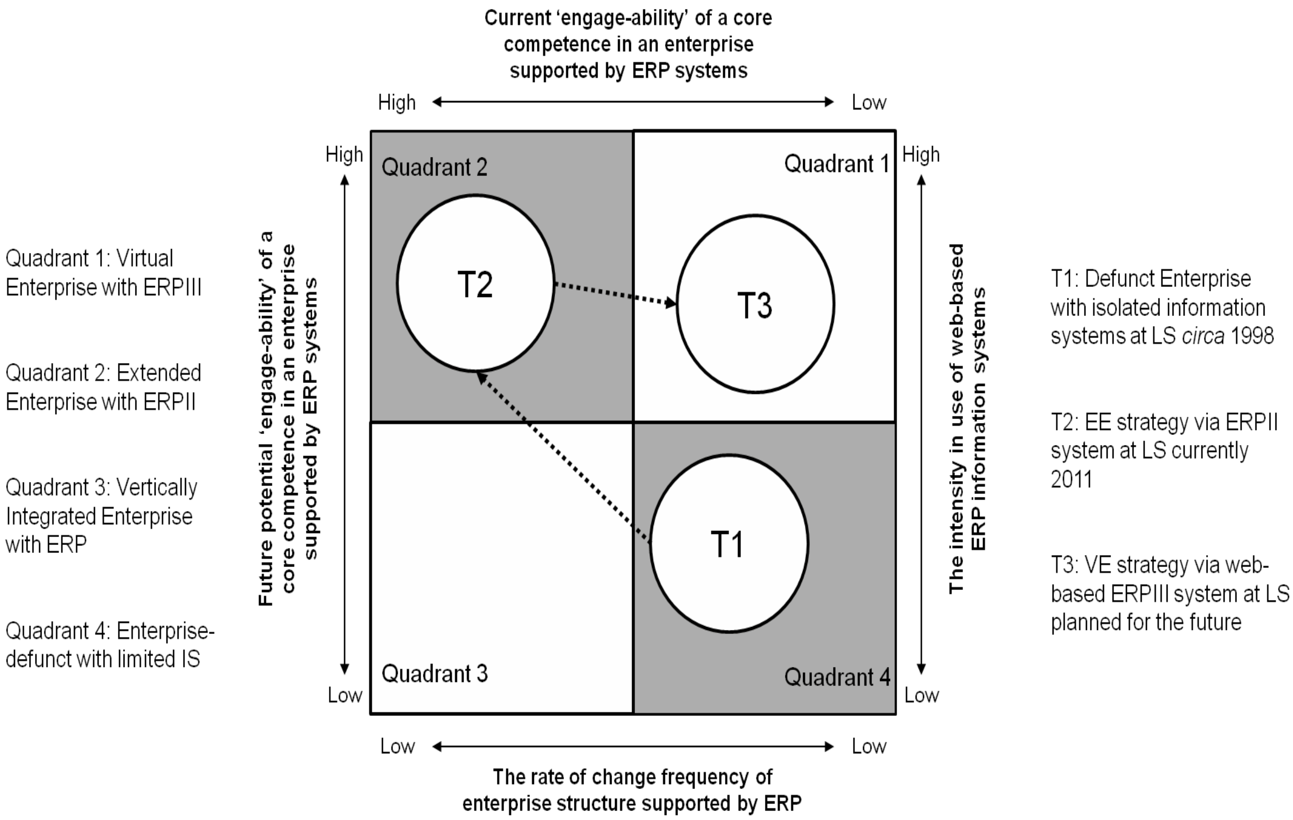


Figure 7.10. The DERG-ERP showing the transformational route of Lightning Source

7.9.2 Summarising Pinstripe's transitions using the DERG-ERP

Figure 7.11 summarises the transformational route experienced by Pinstripe as it shifted from a DE (at T1) with limited information technologies/systems usage (e.g. excel-based spreadsheets), into a virtually integrated business, i.e. a VE (at T2) by working on a variety of legal "framework agreements" whilst sitting on the British Printing Industries Federation (BPIF). Simultaneously, a modular and industry specific management information system (i.e. MIS-ERP) was adopted to support virtual print and pack operations. Finally, the intra-enterprise (a.k.a. inter-firm) operations strategy evolved the VE (at T2) to an EE (at T3) as the Enterprise Resource Planning system upgraded from MIS-ERP into an ERPII systems consisted of interoperable and production-based project IS and Electronic Data Interchange (EDI) (a move from T2 towards T3) (*circa* 2012), which in turn assisted the company to enhance the ***enterprisation*** of their operations and gain more competitive advantages through more stable, medium-to-long term inter-organisational relationships and collaboration, as well as better focusing on its core competencies that are (currently and in the near future) highly engaging in an enterprise.

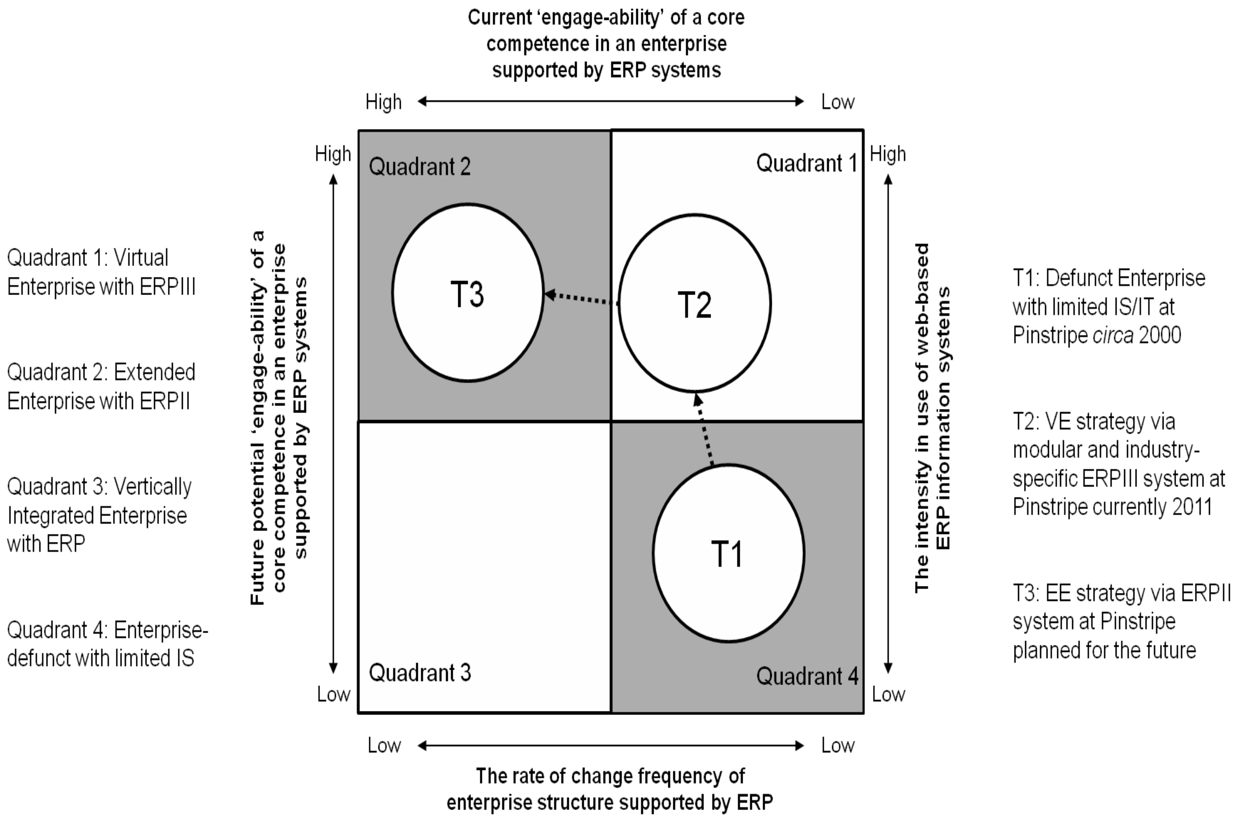


Figure 7.11. The DERG-ERP showing the transformational route of Pinstripe

7.9.3 Summarising Intel's transitions using the DERG-ERP

Figure 7.12 summarises the transformational route experienced by Intel as it shifted from a DE (at T1) with limited IT/IS usage, into a VIE (at T2) using a traditional 'Star' ERP system which was then upgraded to SAP R/3 ERP systems. Subsequently, the intra-enterprise (a.k.a. inter-firm) operations strategy evolved the VIE (at T2) to an EE (at T3) as the ERP system developed from traditional ERP into an ERPII system that was initially based upon RosettaNet electronic data interchange (EDI) and then subsequently replaced by current SAP i6 ERPII systems covering a wider set of functionalities (e.g. SCM, CRM, EDW, DSS, B2B integration), which in turn assisted the company to better concentrate on its (currently and in the near future) highly engaging core competencies whilst gaining more competitive advantage (e.g. surety of supply, flexibility, quick responsiveness) through a more agile extended inter-organisational relationships and collaboration. Finally to improve its virtual co-operations and interoperability within the virtual value chain, as well as developing the very best and new (meta) core competencies that are highly engaged in the future Intel is currently (*circa* 2012) developing VE concepts to accompany the adoption of future cloud-based ERPIII type systems (i.e. a move from T3 towards T4) to enhance the ***enterprisation*** of their operations.

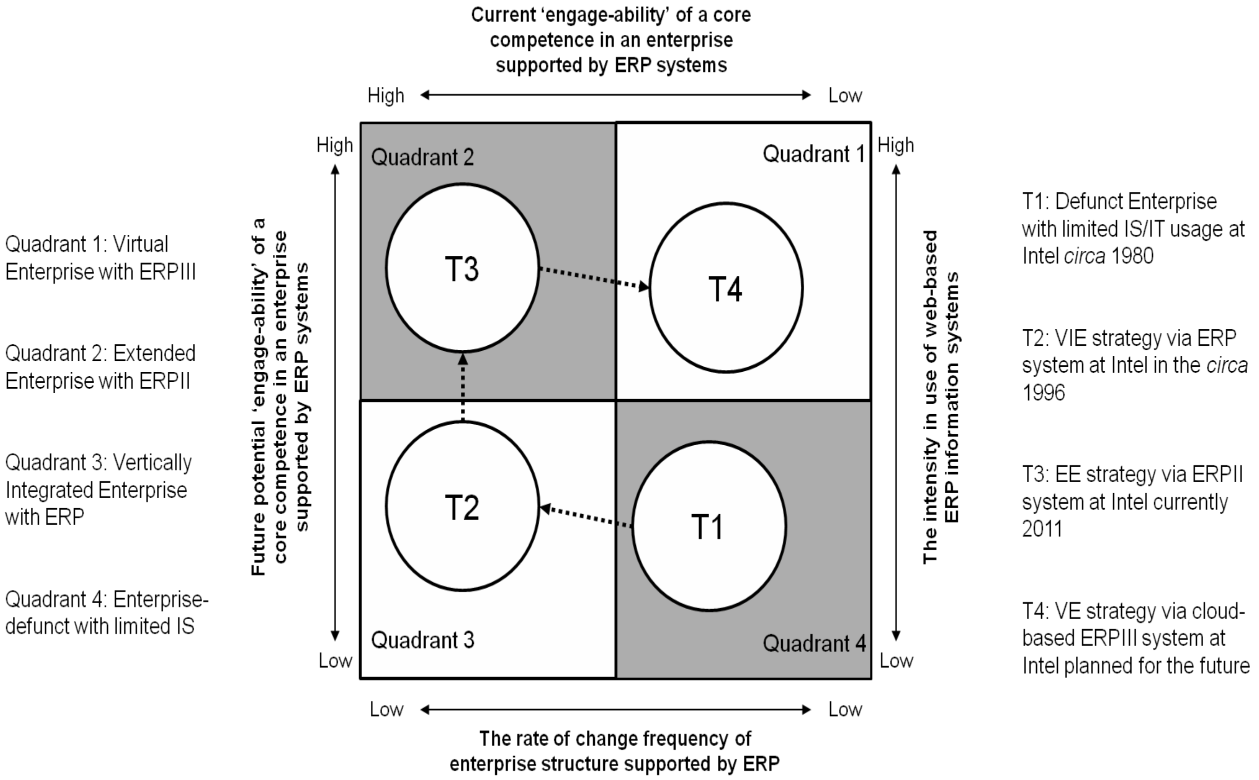


Figure 7.12. The DERG-ERP showing the transformational route of Intel

7.9.4 Summarising TNT Post's transitions using the DERG-ERP

Figure 7.13 summarises the transformational route experienced by TNT Post as it shifted from a DE (at T1) with limited IT/IS usage (e.g. excel-based spreadsheets), into an EE (at T2) as the ERP system was initially approached and developed from traditional ERP type systems based upon a set of 'best of breed' functional modules (e.g. Sage ERP, Northgate, TruckStops that were subsequently integrated and streamlined by SAP ERP platform) into an ERPII by rolling out CRM and EDI modules, which in turn assisted the company to better concentrate on its (currently and in the near future) highly engaging core competencies (e.g. effective collaborative decision-making environment) whilst gaining more competitive advantages through strategic outsourcing and mutual partnerships. Finally to further improve its virtual inter-organisational integration while better handling dynamic information across the virtual enterprise collaboration, as well as creating newly emerging core competencies that are highly engaged in the future TNT Post is currently (*circa* 2012) developing VE concepts supported by web portals-based ERPIII type systems (i.e. a move from T2 towards T3) to enhance the ***enterprisation*** of their operations.

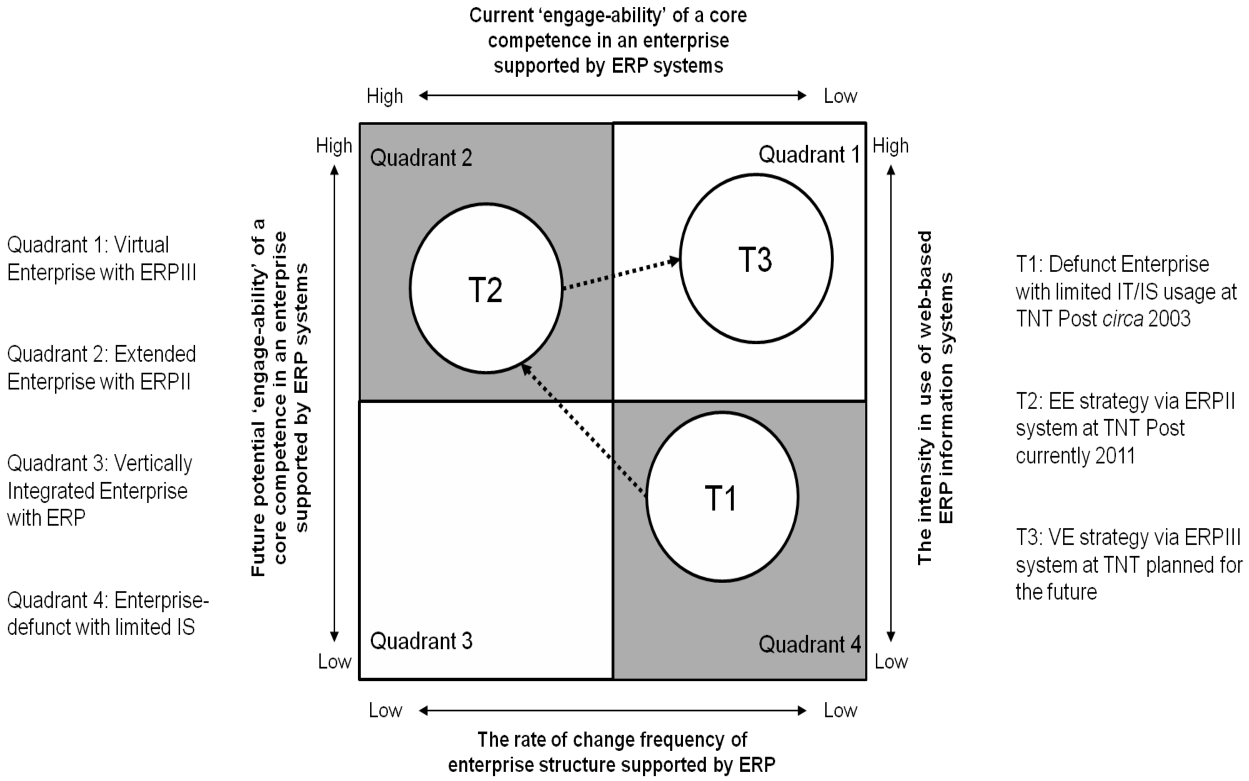


Figure 7.13. The DERG-ERP showing the transformational route of TNT Post

7.9.5 Summarising Zoomlion's transitions using the DERG-ERP

Figure 7.14 summarises the transformational route experienced by Zoomlion as it shifted from a DE (at T1) with limited IT usage, into a VIE (at T2) using a traditional Kingdee ERP software – a financial management solution-focused ERP system which was then upgraded to a single integrated SAP ERP system. Subsequently, the intra-enterprise (a.k.a. inter-firm) operations strategy evolved the VIE (at T2) to an EE (at T3) as the ERP system developed from traditional ERP into an ERPII system consisted of SCM, CRM, and BI functionalities, which in turn assisted the company to focus on greater integrative potential with its external business partners whilst increasing inter-organisational communication and efficiency through moderately lean and agile resources and new embryonic alliances forming with other companies intending to develop similarly. Finally to further improve its virtual inter-organisational interoperability and integration, as well as creating newly emerging core competencies that could be highly engaged in the future (e.g. collaborative dynamic responsiveness) Zoomlion is currently (*circa* 2013) developing VE concepts to accompany the use of future ERPIII type information systems (i.e. a move from T3 towards T4) to enhance the ***enterprisation*** of their operations.

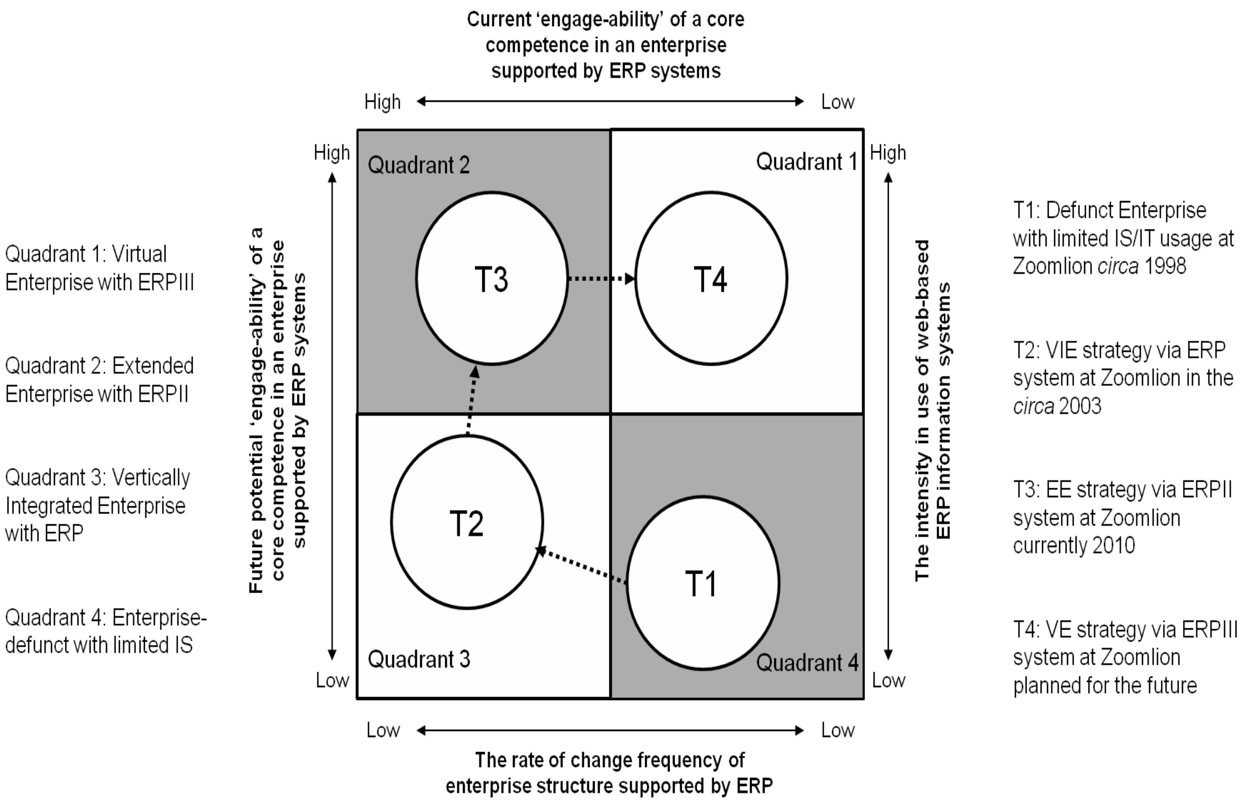


Figure 7.14. The DERG-ERP showing the transformational route of Zoomlion

7.9.6 Summarising Lanye's transitions using the DERG-ERP

Figure 7.15 summarises the transformational route experienced by Lanye as it shifted from a DE (at T1) with amount of commercial active engagement and limited information systems maturity, into a vertically integrated enterprise (at T2) using a traditional Alutex ERP system. Subsequently, the intra-enterprise (a.k.a. inter-firm) operations strategy evolved the VIE (at T2) to a VE (at T3) as the Enterprise Resource Planning system developed from traditional ERP(I) into a new web-based ERPIII system that was comprised of PushSoft and GPS together with a Virtual Private Network (VPN), which in turn assisted the company to increase the efficiency and flexibility of virtual co-operations whilst creating newly emerging core competencies that could be highly engaged in the future through agile resources and dynamic partnerships. Finally to achieve a more stable, medium-to-long term inter-organisational relationships and collaboration, as well as better focusing on its core competencies that are (currently and in the near future) highly engaging in an enterprise Lanye is currently (*circa* 2011) developing EE concepts to accompany the adoption of future ERPII types information systems (i.e. a move from T3 towards T4) to enhance the ***enterprisation*** of their operations.

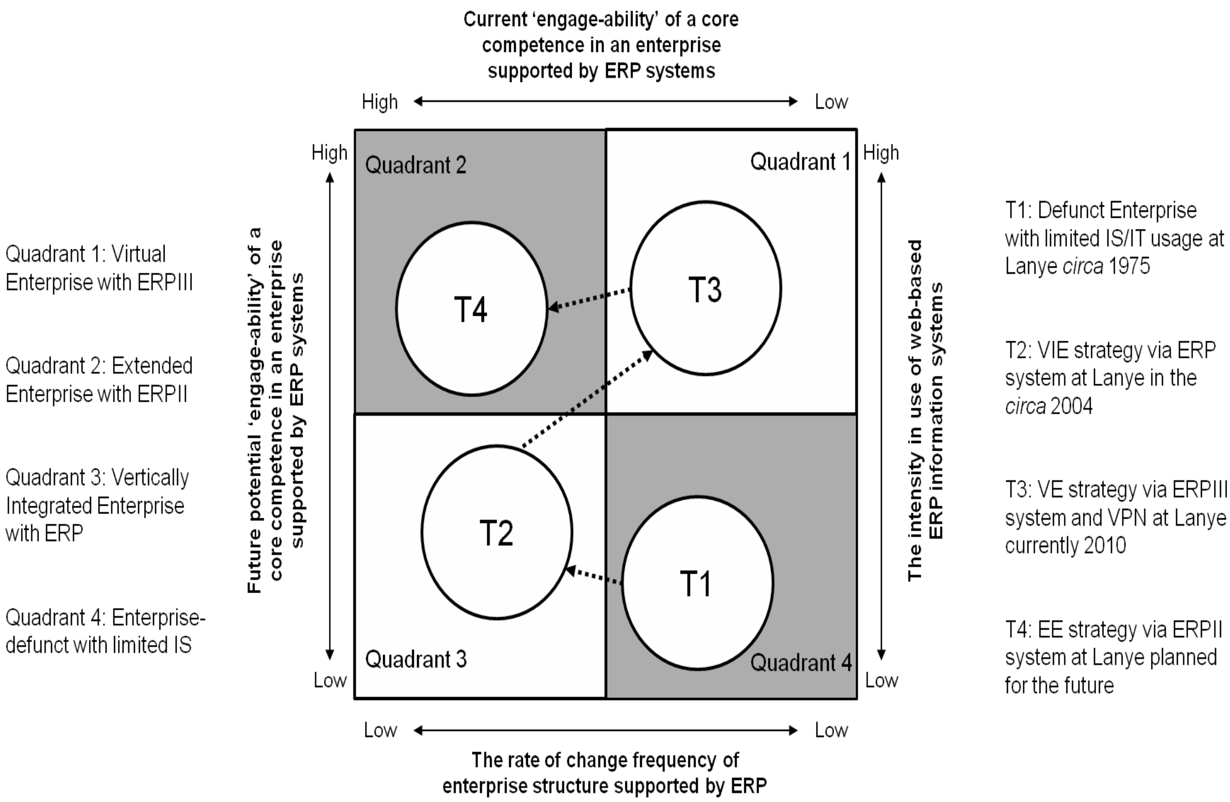


Figure 7.15. The DERG-ERP showing the transformational route of Lanye

7.9.7 Summarising Wanghai's transitions using the DERG-ERP

Figure 7.16 summarises the transformational route experienced by Wanghai as it shifted from a DE (at T1) with limited information systems/technologies usage, into a VIE (at T2) using a traditional Yonyou ERP systems consisted of finance, production, human resource, inventory management functional modules, and Radio Frequency Identification (RFID) technologies; which in turn assisted the company to better concentrate on its (currently) highly engaging core competencies (e.g. reduced cycle time, sales forecast) whilst gaining more competitive advantages (e.g. operational integration with seamless information) through a vertically integrated inter-organisational integration strategy. Finally to further approach the lean manufacturing strategies, cope with uncertainties around customer demands, improve its extended inter-organisational integration, as well as strengthening and creating core competencies that are (currently and in the near future) highly engaging in an enterprise Wanghai is currently (*circa* 2012) developing EE concepts supported by e-commerce platform-based (Three-Prosper Technology) ERPII type systems (i.e. a move from T2 towards T3) to improve its business performance across the inter-organisational borders whilst enhancing the ***enterprisation*** of their operations.

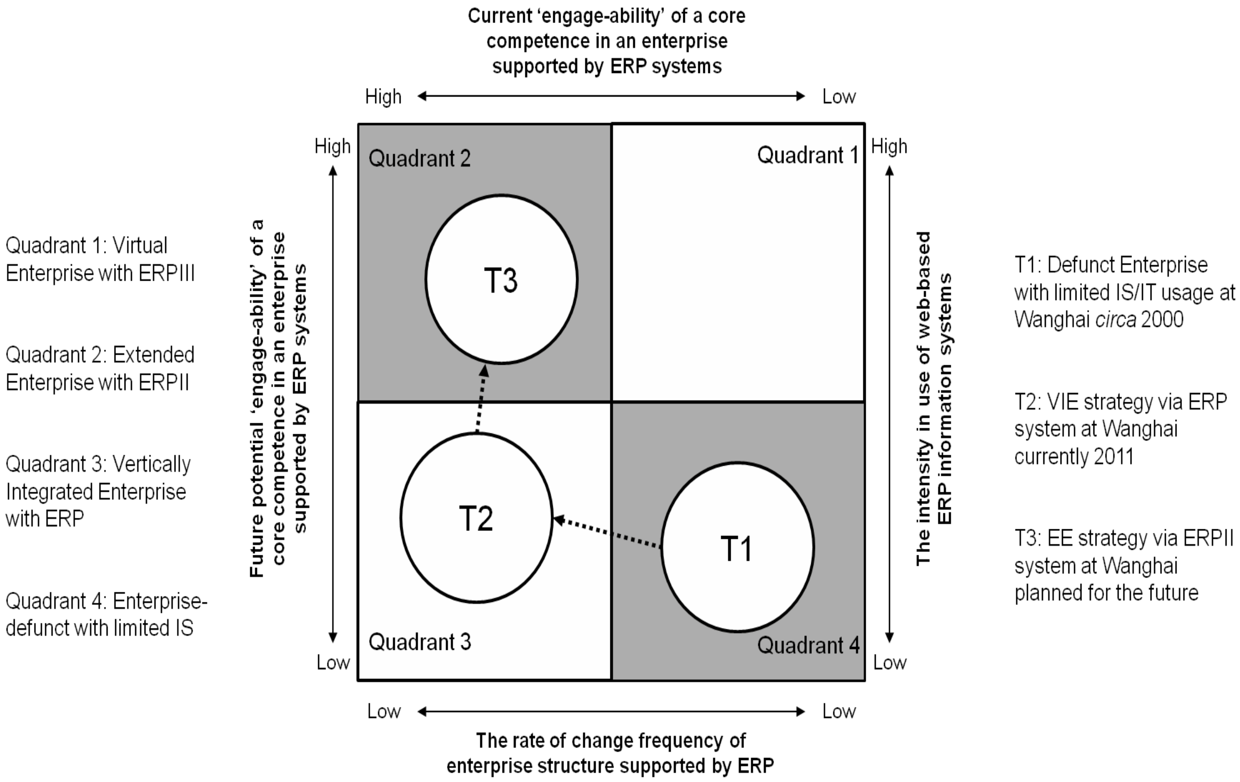


Figure 7.16. The DERG-ERP showing the transformational route of Wanghai

7.9.8 Summarising Metrobank's transitions using the DERG-ERP

Figure 7.17 summarises the transformational route experienced by Metrobank as it shifted from a DE (at T1) with limited IT/IS usage, into a VIE (at T2) using a traditional SAP ERP system – a banking solutions – focused ERP system consisted of financials, human capital management, analytics, and self-services functional modules. Subsequently, the intra-enterprise (a.k.a. inter-firm) operations strategy evolved the VIE (at T2) to an EE (at T3) as the ERP system developed from traditional ERP into an ERPII system covering CRM and inter-bank linkages, which in turn assisted the company to better concentrate on its (currently and in the near future) highly engaging core competencies whilst increasing the competitive advantage (e.g. diversified product portfolio, 'combo' services) through an extended inter-organisational collaboration and strategic outsourcing. Finally to improve its virtual co-operations and interoperability within the virtual value chain based upon more transparent, accurate, and timely information, as well as developing the very best and new core competencies that are highly engaged in the future Metrobank is currently (*circa* 2012) developing VE concepts to accompany the adoption of a uniform ERPIII NetWeaver infrastructure (i.e. a move from T3 towards T4) to enhance the ***enterprisation*** of their operations.

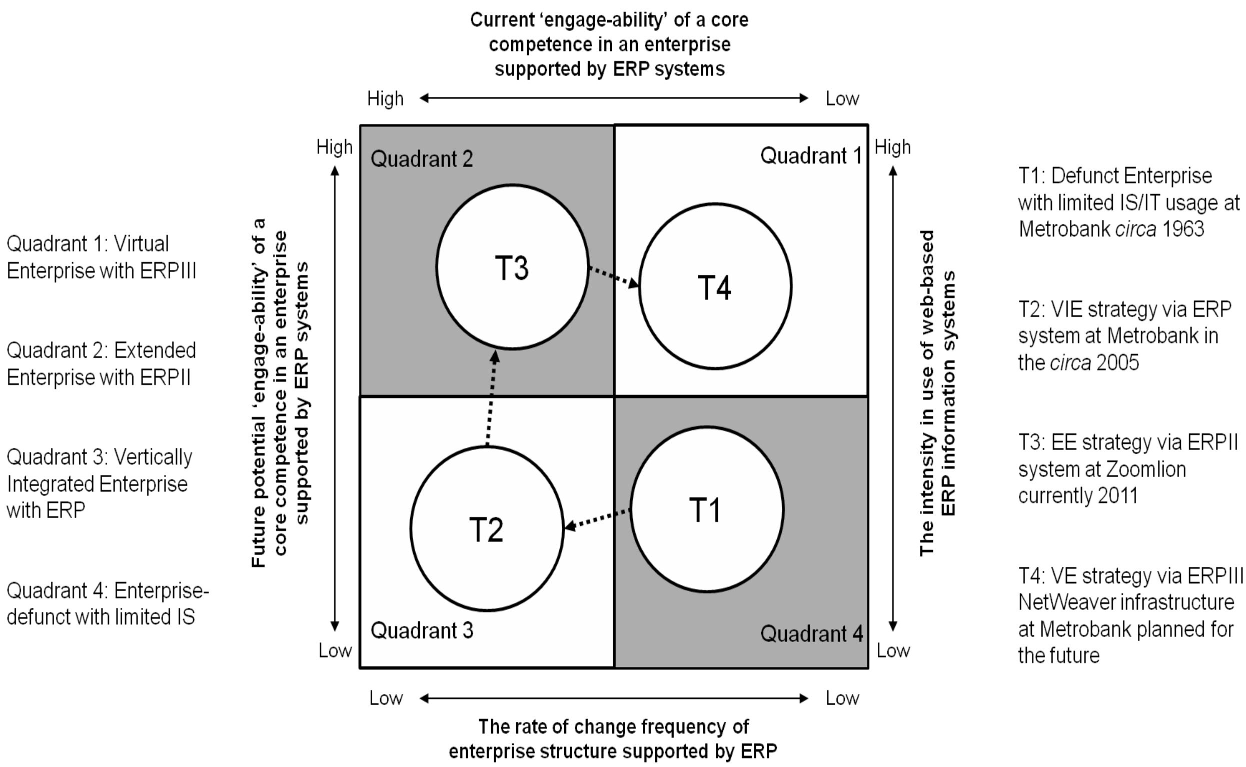


Figure 7.17. The DERG-ERP showing the transformational route of Metrobank

7.10 Strategic insights: a contrast between the Chinese and the UK cases

This section critically discusses the contrast between the Chinese and the UK cases through the lens of reflecting how companies from developing and developed economies design and manage ERP information systems and multi-organisational collaboration differently. Each subsection is structured around its related core category, which is in line with Chapter 6. For brevity, however, 7 core categories from Chapter 6 are parsimoniously regrouped into 4 main aspects, namely i) industrial and governmental impact, ii) (multi-organisational) enterprise design and management, iii) ERP systems design and management, and iv) organisational and people management on which the theoretical discussion and empirical observation are founded.

7.10.1 Industrial and governmental impact

It is widely recognised that recent Chinese economic growth has shot the country into the global economy at full speed. However, the empirical findings present indicative evidence that most Chinese companies are still experiencing the difficulties which are characterised by high requirements surrounding collaborative product quality, delivery times, and intellectual property protection since the collaborative capabilities of domestic partners still seems to be limited. In addition to a lack of basic process and project management skills, problems are particularly apparent in the shortage of research & development (R&D) capabilities. As a consequence, recent developments in various Chinese industry sectors show the adoption of more strategic global sourcing policies towards vertically integrated partnerships (i.e. vertically integrated enterprise structure) based upon a stronger strategic focus on merging and acquiring core competencies (e.g. specific know-how, R&D capabilities, advanced technologies) and long-term collaborative decision making in order to cope with the emerging challenges of industrial change in China. In comparison to this "opportunistic" type tactics or behavior (i.e. swiftly integrating companies that possess the necessary knowledge and competencies rather than incremental development through extended and virtual enterprise structure), most UK companies in today's manufacturing and service industries are under pressure from more demanding customers to move away from the traditional adversarial model based on the 'linear supply chain' fashion (e.g. "make-to-stock" model) towards a dynamic relation model based on the 'virtual value chain' concept (e.g. "build-on-demand" model). This implies that the UK companies are more prone to apply the extended and virtual inter-organisational partnerships leading to more outsourcing that is less vertically integrated, i.e. most UK companies will contract out more and more non-core activities and retain core-performing activities which will result to a more dependency to a networked of business partners.

The empirical findings also indicate that in China's social system, the government regulation has a huge impact on the Chinese companies' multi-organisational collaboration strategies, decision-making, and the supporting ERP systems use; whilst this phenomenon is inconspicuous in the UK context. Many Chinese companies engaged in multi-organisational partnerships are often encouraged or even forced to design and implement specific ERP modules in response to the government's advocacy (i.e. policies, regulations, and recommendation), e.g. accounting software generates reports that are uniquely formatted in accordance with China's National Accounting Regulations. Additionally, as the dominant organisations in China are still state-owned enterprises, the government may proactively take actions to hold back re-engineering efforts (e.g. trigged by strategic 'enterprises' concept) if they affect employment negatively; which heavily influences the practices of (multi-organisational) ERP information systems adoption.

7.10.2 (Multi-organisational) enterprise design and management

It has been observed from this research study that most UK companies decide to maintain internal core competence in relation to the outsourced activities in order to avert the risks of 'lock-in' situations and interface problems whilst developing new meta-competencies in the multi-organisational relationships. By contrast, most Chinese companies are prone to embrace a tighter collaborative integration; because such a 'lock-in' allows the dominant/focal companies to manipulate the business partners' operations to optimise the performance of the multi-organisational enterprises, as well as effectively blocking a similar inter-firm collaboration of the business partners with other rivals.

The empirical findings also indicate that most UK companies, in comparison to most Chinese companies, are more willing to pragmatically establish *real-time* cooperation in multisite operations and joint decision making across different tasks (i.e. collaborative activities), functional areas, and organisational boundaries, in order to deal with (multi-organisational enterprise-wide) problems and uncertainties. Some respondents from the UK companies (e.g. Lightning Source, Intel) advocate that the inter-firm collaboration should be designed and managed through mutual negotiation instead of single authority (i.e. central management and control) over all the multi-organisational enterprise (value) members. By contrast, most Chinese companies cannot fully address this although some industrial experts from Chinese cases felt that "dependency" is a key driver for setting up and maintaining "strategic" (multi-organisational) enterprise relationships. In fact, such "dependency" (with Chinese characteristics) manifesting itself as (negative) one-sided relationships (i.e. unilateral relations rather than mutual relations) is often viewed as a "strategic weakness" by both the most influential/focal firm and its business partners engaging within the *enterprises*, i.e. a power imbalance exists within the multi-organisational relationship and collaboration (e.g. a level of arrogance has built up within the most powerful players). This perception is more than likely due to the Chinese culture and governmental impact (as in Sub-section 7.10.4), as well as the historical adversarial relationships that existed in Chinese industries (*cf.* propositions #5, #28 and # 29), which can lower the efficiency when optimising the overall (multi-organisational) enterprise structures and strategy.

Further observations transpire that most UK companies prefer to establish sparse (i.e. loosely integrated) inter-firm network by spanning structural holes within the multi-organisational enterprises, in order to obtain rich information including environmental changes, opportunities for market growth, rivals' moves in the market, new possibilities for creating new products and services (e.g. Pinstripe, Lightning Source). On the one hand, increased awareness of changes in the customer preferences and technological possibilities enables them to discover opportunities for offering superior value to customers by initiating a wide range of competitive actions (e.g. print-on-demand, end-to-end product-service solutions through the ecosystem). On the other hand, they can act proactively and preempt rivals from gaining market share or to respond quickly to rivals' actions and neutralise the related impact (e.g. Pinstripe works on a variety of legal "framework agreements and BPIF). As the counter-example, most Chinese companies are prone to establish dense (i.e. tightly integrated) inter-firm network by having direct relationships among close-knit partners, which increases their capabilities of coordinating moves with partners to undertake many competitive actions in a fast and efficient manner, as well as being better able to orchestrate joint effort and deploy resources of the (multi-organisational enterprise) value members. However, dense inter-firm network can decrease the Chinese companies' motivation to undertake competitive actions in an innovative manner that deviates from (Chinese) industry norms or well-accepted conventions; and thus are likely to delimit the awareness of (multi-organisational) enterprise members from seeing new opportunities for new product/service creation. These findings are also in line with the observations in Sub-section 7.10.1, i.e. most Chinese companies adopt vertically integrated enterprise partnerships whilst most UK companies build extended and virtual enterprise partnerships.

7.10.3 ERP systems design and management

Fierce competition and pressures from Western corporations force Chinese companies to vigorously pursue ERP information technology and systems. Nevertheless, due to in its early stages of ERP adoption, lack of ERP experience (i.e. the level of proficiency in (multi-organisational) ERP systems use is low), and low IT maturity (as compared with the counterparts in the UK), Chinese companies are less likely to succeed in ERP implementation.

It has been observed from this research study that most industrial experts (e.g. IT managers and ERP end users) from the UK companies did emphasise that the ERP systems capability derives its value from the size of its user base – not from its superior functionality. New (ERP) functional module(s) should be added (e.g. change ERPI to ERPII) only when it truly needed, and the original ERP capability (e.g. traditional ERPI systems) obtains new adoption level so that the proposed ERP capability (e.g. ERPII systems) will have enough users willing to cover the extra cost of design and learning (Intel and Pinstripe are regarded as positive examples). In contrast to this, most Chinese companies embrace the principle of “functionality before users” by installing new ERP systems accompanied by business processes reengineering prior to persuading heterogeneous users to (continue to) participate in the ERP systems use. In other words, one of the major hurdles to successful ERP systems design and management for the Chinese companies is that most of them regarding implementing ERP as a means to achieve modernisation rather than to replace legacy systems and realise organisational change – particularly for achieving multi-organisational enterprise structures and strategy.

The empirical findings also show that most Chinese companies attempt to mix the components of different vendors (particularly the native ERP vendor) when implementing an ERP solution for the multi-organisational enterprise structure and strategy (*cf.* proposition # 24). In fact, by doing so, they will be able to achieve a holistic IT solution, gain maximum functionality and with equal or probably less cost as compared with the counterparts in the UK (Zoomlion and Lanye are regarded as positive examples). By contrast, although most UK cases stop using cost savings as their sole motivation and instead focus on the operational benefits to be gained by adding enhanced ERP functionality; some make mistake of over-customising their application modules in attempt to appease the ERP end users within the context of intra- and inter-organisational enterprises, which can consume internal and external (enterprise) resources (e.g. Intel as a negative example).

Finally, some practical implications from this research study indicate that as the UK cases – particularly the most influential/focal firms have more rigorous criteria on adopting and promoting the integration of the ERP information systems with their trading partners (i.e. *enterprise* value members), the need for multi-organisational collaboration is amplified by the breadth and depth of application, and by the comparative ease of inter-organisational ERP systems adoption. Successful UK companies engaging within the (multi-organisational) enterprises have recognised the importance of "clean up" their operations, which allow them to implement traditional EDI, "vanilla" SAP with minimal customisation, and RosettaNet's Web-based open industry standards to cope with the challenges of e-business processes and over-customising as mentioned above. Most Chinese companies, in comparison to the counterparts in the UK, prefer to deploy specific enhanced functional modules such as SCM and CRM along with web portals to establish the business network which is usually owned and managed by a focal company and perform more complex transactions than classical IOIS used by the UK cases. This headquarters control-oriented schemes leads to higher efficiencies but may also lead to reduction in innovative collaborative activities; which is in line with some observations in Sub-section 7.10.2.

7.10.4 Organisational and people management

Not unexpectedly, successful multi-organisational ERP systems project requires attention to both technical and *social* dimensions and their interaction within an environment of managed change. In this respect, Chinese companies – particularly the larger, more global corporations which have merged/acquired foreign companies (e.g. Zoomlion, Metrobank), cite their (culture) diversity as a significant obstacle to the success of inter-firm collaboration and the supporting ERP systems use (*cf.* proposition # 28), i.e. they have more complicated culture types than the counterparts in the UK; individual branches of the same *enterprises* have their own ways of doing things, and each functional unit operates with different procedures and business requirements while do not wish to be assimilated into one corporate culture (a.k.a. silo mentality). Therefore, most Chinese companies have to make more effort to strongly reengineer their business processes, both on the "organisational" level and the "people" level in addition to the (inter-)operational level (*cf.* proposition #9). On the contrary, most UK companies engaging within the multi-organisational relationships and collaboration have relative simple and concordant culture. This is because i) they can fully share definition of business processes across the entire (multi-organisational) enterprises, and of component interfaces within collaborative product/service families, ii) they possess stronger capabilities of handling technical complexity, and iii) they can adequately conquer specific obstacles (e.g. ERP infrastructure readiness, well-trained workers, preferred culture), which may lead a more sustainable competitive advantage within the context of ERP systems-enabled multi-organisational relationships and collaboration.

Additionally, it has observed from this research study that although some industrial experts from Chinese cases claimed that short-term orientation may destroy the cooperative relationships and the corresponding ERP systems adoption, a salient feature of Chinese *enterprisation* practice is the presence of business networks based on personal relationships or "guanxi" as a result of the particular culture patterns or social institutions. The empirical findings also uncover the fact that many Chinese management use data from ERP systems (or functional modules such as DSS and BI) as a power resource rather than as a basis for information-led decision-making. In comparison to this "opportunism, power play, and soft coercion" type

ERP-enabled (multi-organisational) enterprise strategy in China, most industrial managers from the UK cases pointed out that as (enterprise) partners learn to trust one-another, they may be prone to commit a larger amount of resources to an innovative collaborative venture (e.g. Lightning Source, TNT). Doing so, they can increase their expected pay-off, but also assure control over the alliance's outcome. This further demonstrate that the joint leadership established by the UK companies, built on mutual trust and commitment, is commonly used to create direction and facilitate ERP system-enabled (multi-organisational) enterprise design and management instead of power control as with Chinese cases (*cf.* proposition # 28).

The final issue being raised by the UK industrial experts (e.g. Pinstripe) is that behavioral integration should be considered as a critical factor to the success of (multi-organisational) enterprise design and management, and the supporting ERP systems use (*cf.* proposition # 29). However, change management and organisational transformation as a result of setting up new inter-firm relationship and collaboration can be very difficult and sensitive issues to most Chinese companies as they cannot properly manage the redistribution of roles and responsibilities among *enterprise* members. This is also exacerbated by the fact that the majority of Chinese companies simply want finished products/services from the trading partners instead of fully tapping into their expertise and resources. By contrast, most UK companies seek to develop their dynamic collaborative capabilities by proactively and simultaneously changing both structure and culture to remove fear/people resistance and reward collaborating risk taking, and therefore, have more confidence from the business partners and critical ERP end users in the new form of (multi-organisational) enterprise structures and strategy.

7.11 A contrast between companies in manufacturing (i.e. production) and service industries

This subsection critically discusses the contrast between companies working in manufacturing and service industries through the lens of reflecting how production-based and service-based companies design and manage ERP information systems and multi-organisational collaboration differently.

7.11.1 Industrial impact

With respect to the industrial impact on, and the motivations of designing and managing ERP systems-enabled multi-organisational enterprise design and management, it has been observed that production-based industries (e.g. semi-conductor manufacturing, printing, crane manufacturing) are relatively stable and have a few well-established players (i.e. enterprise value members). In such concentrated industries (i.e. high entry and low exit barriers), firms are more inclined to increase revenue and capture more of the value-added and margins by integrating vertically whilst the specialised assets, operational efficiency, and market power are key. By contrast, service-based industries (e.g. parcel delivery, banking) are less concentrated (i.e. low entry barriers) and may have many players with very different specialised assets that compete aggressively to increase their market share in ways that often require greater flexibility. Such unstable (service-oriented) industry structures increase the risk of vertical integration as the higher overhead cost and asset commitments are exacerbated by the aggressive price, turnaround time, and response to the customer demands; thus, firms (i.e. *enterprises* value members) engaging in the service-based industries are better off specialising in a narrow range of activities whilst coordinating more with external specialists, in order to strengthen their flexibility and agility to respond to any competitive moves. Accordingly, it can be suggested that in production-based industry, vertically integrated enterprise structure and strategy should be used preferentially; traditional integrated end-to-end ERPI systems should be adopted to enable information sharing, cost reduction, and market position consolidation. On the other hand, in service-based industry, extended and virtual enterprise structures and strategies should be used preferentially; more flexible, cheaper, and reconfigurable ERPII and ERPIII systems should be adopted to improve inter-operable processes, data connectivity, and help the most influential/focal companies monitor other (enterprise) participants in the virtual value chain (*cf.* propositions #6, #10, and #11).

7.11.2 Strategic management (multi-organisational enterprise design and management)

In general, the types of multi-organisational relationships and collaborative practices between (enterprise) value members can change over time, which is not only determined by an industry-specific context (*cf.* proposition #5) as discussed above, but also dependent upon individual core competencies and the end (collaborative) products or services being delivered. This indicates that production-based and service-based companies should use different (multi-organisational) enterprise patterns (and the supporting ERP information systems); whilst a clear definition of management responsibilities must be well understood by both internal and external stakeholders (*cf.* proposition #8). Specifically, the empirical findings from this research study show that in the case of production-based industry, there is commonly a dominant (value) member who has more power than other small trade partners and may substitute coercion for inter-firm cooperation with them. In other words, such focal firm (normally the ones engaging in the upstream of supply network) will exercise its power to determine market strategy, multi-organisational enterprise paradigms, and network partners so that the other value members coordinate their collaborative activities to achieve common objectives. In contrast to this, in the case of service-based industry, firms are more willing to establish cooperative type (multi-organisational) enterprise paradigm by focusing exclusively on the extended or virtual enterprise operations management and coordination with none of the (enterprise) value members prevailing over the others, i.e. network relationships are more loosely coupled compared to hierarchical relations (e.g. cases in the production-based industries), therefore, stay market sensitive.

7.11.3 IT and Business Alignment (ERP systems design and management)

There is a consensus that the roots of ERP lay in the need of the manufacturing (i.e. production-based) industries to effectively manage the resources for better operations and planning, which indicates that most production-based companies still hold “inward facing monolith” as the entire value proposition of ERP systems. As a consequence, they commonly choose to use traditional ERPI to support vertically integrated enterprises (as discussed above) that are capable of enhancing operational efficiency, standardisation of business processes, as well as improving portfolio and quality of collaborative products (*cf.* proposition #10); and they may also use ERPII systems (e.g. SCM, CRM functional modules) to meet collaborative commerce needs. By contrast, most service-based individual firms engaging within the context of multi-organisational collaboration commonly focus on their core competencies whilst offering adequate flexibility and agility to respond to business uncertainties and fluctuations in the type (and volumes) of service (or product-service solutions) the market demands. Meanwhile, mutual adjustment between (enterprise) value members in terms of sourcing, distribution, logistics, etc. should be facilitated by more flexible and reconfigurable ERPII or even web-based ERPIII systems consisted of more "outward facing elements" that are capable of connecting various (extended or virtual) enterprise participants in a seamless, near-real-time manner. Further to this observations, it can also be argued that ERP systems (combing with SOA, cloud computing, and open source technologies) which could be reconfigured in a short time and at less cost should be of interest for service-based multi-organisational enterprise structures and strategies; since business requirements in service-oriented industries change more quickly than production-based industries (i.e. unstable versus stable), and thus, requires the corresponding ERP infrastructure to be highly flexible and adaptable. These findings are in line with propositions #17, #18, and #22.

7.11.4 Complex Adaptive Systems (ERP development supporting multi-organisational enterprises)

Additionally, most manufacturing and service companies engaging in the context of multi-organisational relationships and collaboration (to deliver complex products and services) have indicated the most expected impacts/benefits to be achieved by adopting next generation ERP systems (a.k.a. ERPIII (Clegg and Wan, 2013)). For example, new ERP system is required to support the pace of change in the business rather than a business that is designed around the features and the best practices imposed by a rigid traditional ERP system – particularly for the service-based virtual enterprises. Also, the ERP system of the future should be able to streamline processes whilst extending beyond purely financial and back-office functions and encompassing multi-organisational operational processes to improve inter-firm collaboration. With the new ERP systems, production-based and service-based companies can (i) rapidly get external partners on board, (ii) quickly integrate new and legacy applications, and (iii) change ERP capabilities on demand with no impact to other applications. In response to these multiple challenges, ERP vendors seek to develop new enterprise information systems that can deliver the concept of *enterprisation* (Clegg and Wan, 2013); typical examples include SAP Business ByDesign, Microsoft Dynamics NAV, QAD On-Demand ERP, and Exel Computer Systems Mobile ERP – the ones deployed as a virtual application over the cloud (or SOA) and streamlined by mobile and social technologies – will enable manufacturers and service providers to operate in real time over an intelligent (virtual) value chain.

7.12 Chapter summary

This chapter has engaged in the discussion of the empirical findings in the context of conflicting and supportive literature (see Appendix A – Table IV) thereby drawing on a broad body of theoretical perspectives (as shown by Section 2.2.2 in Chapter 2) until the point where a further discussion of extant literature *does not* add to the explanation of the empirical observations on ERP information systems enabled multi-organisational relationships and collaboration governance (i.e. design and management). The discussion was structured around the seven core categories and their related validated propositions from Chapter 6 to avoid major redundancies. It has been shown that existing theories, models, models and frameworks lack of comprehensiveness in the context of ERP-Collaborative Enterprise Governance and empirical observations could only be explained on their individual level by drawing on a large and fragmented body of knowledge. Thus, in alignment with the extant literature gaps identified in Chapter 2, this chapter forms the ultimate goal of this research to present a comprehensive concept (or a framework that links the main elements of ERP enabled multi-organisational relationship and collaboration governance) which addresses the empirical observations and challenges in *enterprisation of operations*. This was accomplished by the development of the concept *Dynamic Enterprise Reference Grid for ERP* with the following key characteristics:

- *ERP systems enabled collaborative enterprise design and management* should be configured and managed across the multi-organisational boundaries to develop new competencies. Individual companies are conceptualised as nexus of *enterprise modules* that deliver specific core competencies within the *collaborative enterprises*; whilst each *value member*'s specific IS capabilities could influence the use of ERP related resources (see Sub-sections 7.6.1 to 7.6.3).
- The coordination of *collaborative activities* can be facilitated by the *ERP Matrix* tool (see Figure 7.3) (in addition to the *Enterprise Matrix*) that helps to allocate, optimise, and integrate the most suitable *ERP (functional) modules* along the *value stream* of the *collaborative activities* (see Sub-section 7.6.4).
- The decision of ERP IS involvement in a *collaborative activity* of the multi-organisational *enterprise* depends on the *enterprise supporting ERP capability* of the respective *ERP modules*, i.e. the capabilities of supporting targeted *enterprise structure and strategy* and the feasibility of deploying their functionalities within the *collaborative enterprise*. Therefore, the selection of an appropriate (multi-organisational) *enterprise*-wide ERP information systems governance structure, i.e. *ERP IS design and management*, is contingent upon two main aspects (*the intensity in use of web-based ERP information systems* and *the rate of change frequency of enterprise structure supported by ERP*). These has been parsimoniously summarised in the *ERP Reference Grid* (as in Figure 7.4) identifying three major ERP system types, i.e. *traditional ERP(I) systems*, *ERPII systems*, and *ERPIII systems* (see Sub-section 7.6.5).
- Different ERP information systems design (or configuration) and management strategies are, however, constantly changing and reiterating (*Evolutionary ERP Information Systems Configuration*) in order to

stay adaptive to changing industrial and operational requirements; and hence sustain competitiveness (see Figure 7.5) (see Sub-section 7.6.6).

- This requires a unified, dynamic, and flexible *ERP-CEG governance* (i.e. design and management) based on the active contingency planning of controllable factors (see Figures 7.6 and 7.7) (see Sub-sections 7.6.7).

Empirical examples were given to illustrate the ‘static’ and ‘dynamic’ elements of the DERG-ERP conceptual framework (a.k.a. enterprisation of operations concept) explaining how and why (multi-organisational) *enterprise structures* and the supporting *ERP information systems* change (see Table 7.2). This was finally merged into a potted account of how the elements of the concept should be applied in a step-by-step approach (see Figure 7.8) before the propositions were revisited by iteratively confronting them with the development framework to establish internal validity through adhering to methodological rigor (see Table 7.4). This could potentially facilitate the empirical evaluation of the concept with industrial experts in the future. Additionally, how the new DERG-ERP framework was applied to 8 empirical cases are graphically illustrated; whilst the contrast between the Chinese and UK companies, and between manufacturing and service industries are critically discussed, in order to enhance the contributions of this research study.

Chapter 8 – Conclusions

The aim of this final chapter is to provide the big picture of this research study. Therefore, in Section 8.1 the logical stream of argumentation and the resulting findings of this research project will be summarised. In the subsequent Section 8.2 the novel contribution of this research in terms of three generic dimensions (i.e. theoretical, methodological, and empirical) is discussed before the limitations of this study and the resulting future research issues are outlined in Sections 8.3 and 8.4.

8.1 Thesis summary

This study focuses on the fundamental choice of how to create sustainable competitive success. The required operational competencies and IS capabilities are usually not existent under one single roof and thus need to be developed and managed both internally and externally via multi-organisational (enterprise) collaboration. This implies that companies must adopt a new way of looking at integration and coordination of inter-firm relationships with sustainable collaborative partners whilst designing and managing proper ERP information systems (or the best-fit ERP solutions) for supporting the 'enterprisation of operations' (Clegg and Wan, 2013); this topic has gained increasingly attention within the business world for various reasons (as described in Chapter 1). In this context, several specific research objectives were identified to address the general purpose of a sustainable ERP system enabled inter-firm relationships and collaboration governance:

- Explore developing *trends* in ERP systems and the principles of multi-organisational enterprise governance.
- Examine the *relationship* between ERP systems design and management within multi-organisational enterprise structures and strategies; and *vice versa*.
- Develop a new *conceptual contingency framework* to explain how different ERP system types fit into different multi-organisational enterprise structure types.
- Illustrate the new conceptual contingency framework using *empirical case studies* from the UK and China.

A critical review of the relevant ERP and multi-organisational enterprise governance literature revealed 4 gaps in the extant literature regarding a sustainable ERP system enabled inter-firm relationships and collaboration governance. Consequently, this led to the research aim of **investigating and theorising about how different types of ERP systems fit into different multi-organisational enterprises, and *vice versa*; and developing a framework and practical guidelines on how to design and manage these ERP information systems and multi-organisational relationships in a sustainable way to grow competitive advantage through an innovative strategic and contemporary operations thinking**. This research study thereby uses two *a priori* established frameworks (i.e. DERG and ISFM) leading to the integration of their complementary theoretical perspectives in the form of a grounding of the research in extant literature (as described in Chapter 2).

Because of an identified lack of explicit and testable hypotheses the study adopted an exploratory nature by engaging in qualitative theory-building (or generation) research using inductive Grounded Theory based methodology (GTM) as the main research methodological approach (given in Chapter 3), together with a pre-study literature review (given in Chapter 2) and narrative pilot case studies (given in Chapter 4). The subsequent research process was designed to be consistent with the two key operations of GTM, i.e. constant comparison and theoretical sampling. It led to an empirical research processes with four main phases (i.e. research setting and design, data collection, data coding and analysis, data validation) and a triangulated design involving 48 semi-structured interviews for data collection and a self-administered questionnaire survey (N = 116) and focus groups for data validation purposes along with pre-study literature review and narrative (pilot) case studies ensuring the quality of this research and its data (as described in Chapter 3).

The narrative pilot case studies were conducted by applying the Collaborative Enterprise Governance methodological concept along with template analysis technique, in order to explore relationships between ERP systems and enterprise strategies, which initially uncovers the potential transformational routes between different ERP types and different *enterprise* types; and in turn proposes the tentative contingency framework as a “straw man” (in Chapter 4). This chapter together with ‘pre-study literature review’ in Chapter 2 properly justifies the importance of doing this research topic from both empirical and academic viewpoints; and increases focus, i.e. identifies the gaps and areas under investigation) for doing the fieldwork based upon Grounded Theory based method (given in Chapters 5 and 6).

Initial observations in 8 empirical cases were presented in terms of (i) case background, (ii) the nature of the complex product-service systems, (iii) multi-organisational collaboration strategies and strategic repositioning, (iv) collaborators, (v) ERP systems capabilities, and (vi) the effects on business performance. This serves as a prior study of the grounded theory-based methodological approach, in order to facilitate the data coding and analysis (within each case), and further theoretical and practical discussion (given in Chapters 6 and 7).

The coding and analysis of the interview data (53 hours and over 800 pages transcript) was done by applying theoretical coding as structured and hierarchical coding paradigm involving open, axial, and selective coding (see Chapter 6). Subsequently, this led to the identification of seven core categories related to ERP systems enabled inter-firm relationship and collaboration governance (i.e. industrial impact, enterprise structure and strategy design, enterprise structure and strategy governance, ERP system design, ERP systems management, competence and competitiveness as main contingency factors, organisation and people management) that were summarised in a set of 29 tentative propositions to be validated in a second empirical phase using the questionnaire survey technique (given in Chapter 6). Thus, each theoretical proposition was assessed on two dimensions (*agreement* and *importance*) involving a 7-point Likert scales. This exercise proved the accuracy and reliability of the codification and analysis (all propositions were agreed on) and revealed the importance of the academic debate framed in this research study (all propositions were considered highly important) (see Section 6.2 in Chapter 6).

The analyses provide the ground for the confrontation of these emerging empirical findings with specific extant literature which is an important feature of hypothesis generating research which ultimately leads to theory extension (see Sections 7.1 to 7.5 in Chapter 7). The basic ERP and collaborative enterprise governance literature to be enfolded by confrontation with the specific propositions on ERP information systems enabled inter-firm relationships and collaboration governance (organised into five main parts covering the seven core categories) consisted of a broad body of theoretical perspectives. The detailed discussion revealed that existing theories, models, concepts, and frameworks lack of comprehensiveness in the context of sustainable ERP-Collaborative Enterprise Governance (i.e. design and management) and empirical observations could only be explained by drawing on a large and fragmented body of knowledge. This created the necessity for developing a novel conceptual framework that merges the main elements of *enterprisation of operations* with respect to effective enterprise strategy, enterprise structure, ERP systems use, and sustainable success, and their various theoretical perspectives into a compact and comprehensive model that is consistent with the empirical findings.

This subsequently led to the development of the novel concept of *Dynamic Enterprise Reference Grid for ERP* (DERG-ERP) based on a competence-based and information systems capabilities-based contingency framework (see Section 7.6 in Chapter 7). Four different enterprise resource planning (ERP) system types and four different *enterprise* structure and strategies built upon four different types of core competencies, as well as the apparent correlations between them have been parsimoniously characterised and a two-way dependency based on the *engage-ability* of the core competencies and ERP capabilities of supporting *collaborative enterprise governance* was proposed between each respective pairing (as in Section 7.6). This has been consolidated in a step-by-step approach of how to use the various elements of the concept to govern ERP information systems enabled enterprise management (see Figure 7.8 in Chapter 7). How the DERG-ERP was applied to 8 cases are graphically illustrated in order to increase the validity and generalisability of this contingency model (see Section 7.9). Furthermore, the contrast between the UK and Chinese companies, as well as between manufacturing and service industries are critically discussed to strengthen the outcomes from this research study (see Sections 7.10 and 7.11).

Summarising, the conceptual foundations of *Dynamic Enterprise Reference Grid for ERP* (DERG-ERP) applied in this research study are illustrated in Figure 8.1.

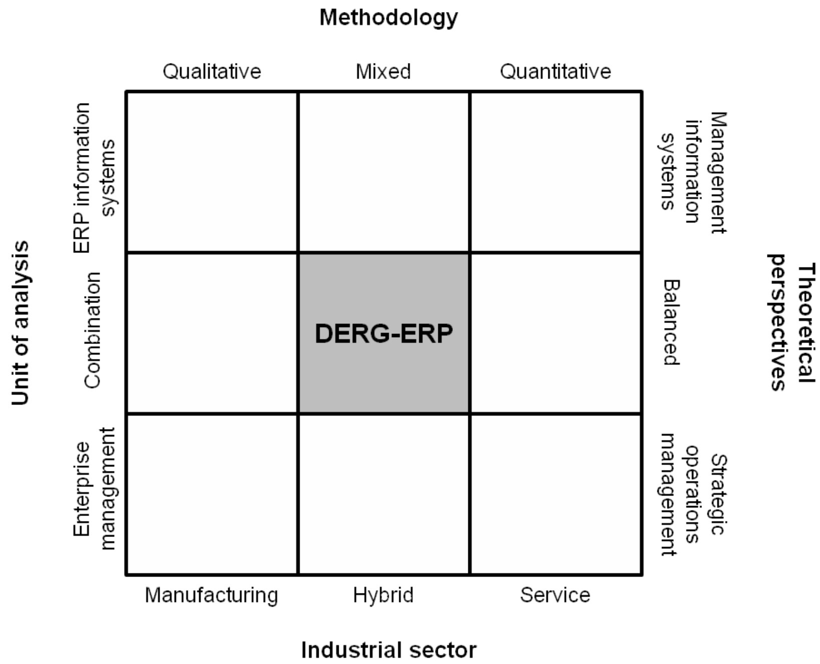


Figure 8.1. Conceptual foundation of this research study

Unit of analysis and industrial sector issues were discussed formally in Chapters 1 and 2 of this thesis. The methodological concept was described in detail in Chapter 3 (with resulting empirical findings in Chapters 4, 5 and 6). The theoretical perspectives were addressed in Chapters 2 and more specifically in Chapter 7 (see Sections 7.1 to 7.5) of this thesis. The concept itself (and its practical implications) has been described in Chapters 7 (see Sections 7.6, 7.9, 7.10 and 7.11) and 8.

8.2 Contribution to knowledge

This research study makes a contribution to two general knowledge areas. Firstly, due to its qualitative and inductive hypothesis generating nature it was able to extend existing theory on ERP information systems enabled inter-firm relationships and collaboration governance in a theoretical sense. Secondly, this research study makes an empirical contribution by offering guidelines for ERP vendors, information systems management and operations managers hoping to grow and sustain their competitive advantage with respect to enterprise strategy, enterprise structure, and ERP systems through the effective use of *Dynamic Enterprise Reference Grid for ERP* (DERG-ERP) concept. In addition, through the sound use of Grounded Theory based methodological (GTM) approach (along with structured and systematic literature review and narrative pilot case study research methods) this study has made GTM more usable in the areas of Operations Management (OM) and Information Systems Management (ISM) (particularly ERP systems and multi-organisational enterprise management).

8.2.1 Theoretical contribution

The main aim that was set out in this research study was to **investigate and theorise about how different types of ERP systems fit with different multi-organisational enterprise paradigms; and develop a framework and practical guidelines on how to govern (i.e. design and manage) these ERP information systems and multi-organisational relationships in a sustainable way to grow competitive advantage through an innovative strategic and contemporary operations thinking**. Therefore, it aims at making a knowledge contribution in the specific area of management information systems and strategic operations management (particularly inter-firm relationships and collaboration) by drawing on a multi-disciplinary body of knowledge. In alignment with the identified gaps in the extant literature this research makes the following theoretical contributions:

- *Dynamic Enterprise Reference Grid for ERP* concept presents a holistic and integrated concept of sustainable ERP information systems enabled inter-firm relationships and collaboration governance (Section 7.6).
- *The new ERP Matrix* tool establishes the important link between process, enterprise structure, and ERP systems use to determine how ERP systems capabilities support collaborative activities in the (multi-organisational) enterprises (Sub-section 7.6.4).
- At the core of *Dynamic Enterprise Reference Grid for ERP* lies a portfolio model which builds on value based thinking by drawing on core competencies, expected competitiveness, and IS strategic capabilities as main contingencies. Therefore, the contingent fit between different ERP system types and different (multi-organisational) *enterprise* types built upon different types of core competencies has been parsimoniously characterised and a two-way dependency based on the *engage-ability* of the core competencies and ERP capabilities of supporting *collaborative enterprise governance* was proposed between each respective pairing (Sub-section 7.6.5).
- *Dynamic Enterprise Reference Grid for ERP* concept considers dynamic aspects of adapting and reconfiguring relationships and governance structures, as well as the supporting ERP systems design and management based on active execution of management roles and activities (Sub-sections 6.6.6 and 7.6.7).

8.2.2 Methodological contribution

Although the use of qualitative theory building or hypothesis-generating approaches, such as grounded theory, get more accepted and acknowledged in the general management information systems and strategic operations management disciplines, they are still not very widespread and rigorously applied; which makes the sound use of GTM in this research study a contribution in itself. Therefore, it helps to establish qualitative theory building/generation research in the field:

- This study *does not* ignore the existing literature but rather used the identified themes and gaps (Sections 2.1 to 2.5) as guiding principles for the data collection and analysis procedure.
- This study did not just present raw data but used a triangulated research design (Sub-section 3.3.4 in Chapter 3) to ensure theoretical saturation. It engaged in a rigorous coding procedure (Chapter 6) to ultimately bridge the abstract gap between the subjective experience of the actors and the generation of theoretical statements that lift the data onto a conceptual level (Sub-section 6.1.5 in Chapter 6).
- Despite the adherence to the theoretical coding paradigm the study also demonstrates theoretical sensitivity by abstracting from a too formulaic approach to data by including creative components more adaptable to the tacit elements of the data by producing a Coding Master Table (Sub-section 6.1.4 in Chapter 6).
- This research study claims to use Grounded Theory based Method based research approach more in a pragmatic and adaptive sense (rather than in its purist form) as a practical approach to understand complex phenomenon such as ERP systems enabled multi-organisational enterprises governance.
- Although positivistic techniques such as word count and questionnaire survey were applied in a complementary manner this research study *does not* engage in methodological slurring using GTM for theory testing. Rather, it was appropriately embedded in the ontological paradigm of constructive realism (Section 3.1 in Chapter 3) drawing on a balanced epistemological approach (Sub-section 3.2.3 in Chapter 3) using a triangulated research design (Sub-section 3.3.4 in Chapter 3).
- This study offers a very detailed and clear description of its research concept (Chapters 3 and 6).

8.2.3 Empirical contribution

The new DERG-ERP framework gives some practical decision support and serves as a guideline to practicing information systems and enterprise managers. This study is also important to those companies grappling with the ‘right’ approach to steer their collaborative agile enterprise strategies and improve their company performance by adopting ERP systems, whilst seeking greater profits and efficiency by increasing their levels of multi-organisational collaboration. Besides this, the research will also be of interest to those interested in the development of inter-organisational systems and application of the new IT platforms and services designed to extend ERP modules and functionalities.

8.3 Research limitations

The main limitation to this research study is its cross-sectional character. The ERP information systems enabled multi-organisational enterprise governance aspects in the UK and Chinese manufacturing and service industries have been studied at certain discrete points of time which can only provide static snapshots rather than dynamic longitudinal insights (although two longitudinal cases were studied in Chapter 4 the empirical findings were still limited). This particularly limits the causal predictions of the concept in the sense that no deterministic causality can be derived on how ERP-Collaborative Enterprise Governance structures re-configure over time but only a probabilistic dependency can be proposed.

A second limitation to this study can be seen in the nature of its empirical context and research sample. Because part of this research focused on the Chinese manufacturing and service industries the data had to be collected in Chinese language whereas the (data) coding and analysis was done in English, which can affect the validity and reliability of the research results. However, the author tried to diminish this limitation by adhering to a rigorous methodological approach in data collection and analysis.

A third limitation to this study involves the use of only a few key informants as representatives of the participating companies in the semi-structured interviews. This can pose a potential limitation in terms of the validity of the obtained (empirical) data since potentially extreme subjective positions of individual interviewees are less likely to be balanced. Nevertheless, this was partly neutralised by the validation of the propositions in a larger scale questionnaire survey (see Chapters 3 and 6).

A fourth and final limitation to this study is the translation of interview transcripts and questionnaire survey. Since the focus of this research study covers both the UK and Chinese cases, the interview transcripts and questionnaire survey have to be translated into Chinese, which was done by limited bilingual speakers – due to limited time and this research project did not have access to the resources of using several translators.

8.4 Future research

One issue for future research resulting from the limitation discussed above is the generalisability of the developed concept. Although this study has covered multiple industrial sectors (e.g. printing, semi-conductor manufacturing, crane manufacturing, concrete production, logistics, and banking) further research is still necessary to identify the transferability of the concept to other industries and organisational areas. In this context, the structured contingency model of DERG-ERP suggest in Chapter 6 (see Figure 7.7) could be used for further quantitative testing in other empirical contexts.

Another major issue is the resulting necessity for a longitudinal in-depth case study in the context of ERP information systems enabled inter-firm relationships and collaboration governance. Since an in-depth research study would allow for a richer and more detailed investigation of how ERP systems can be configured, adopted, managed, and developed to support the corresponding (multi-organisational) enterprise structures and strategy, e.g. identify characteristics of the bifurcation point for the re-configuration from one governance mode to the other.

A final suggestion for future research is that there is a necessity for more research on the dark side of relationships through the study of unsuccessful ERP systems enabled multi-organisational enterprise management. Because people actually learn better through mistake it might be sensible to draw on unsuccessful cases and demonstrate reasons for their failure in addition to guidelines on how to improve the situation m order to create awareness for the necessary ingredients of good and sustainable ERP information systems enabled multi-organisational enterprise governance.

REFERENCES

Achrol, R. and Kotler, P. (1999), "Marketing in the network economy", *Journal of Marketing*, Vol. 63, Special Issue, pp. 146-163.

Aerts, A.T.M., Szirbik, N.B. and Goossenaerts, J.B.M. (2002), "A flexible, agent-based ICT architecture for virtual enterprises", *Computers in Industry*, Vol. 49, pp. 311-327.

Ahuja, M.K. and Carley, K.M. (1999), "Network structure in virtual organizations", *Organization Science*, Vol. 10 No. 6, pp. 741-757.

Akkermans, H., Bogerd, P., Yucesan, E. and Van Wassenhove, L. (2003), "The impact of ERP on supply chain management: exploratory findings from a European Delphi Study", *European Journal of Operational Research*, Vol. 146 No. 2, pp. 284-294.

Akyuz, G.A. and Rehan, M. (2009), ""Requirements for forming 'e-supply chain'", *International Journal of Production Research*, Vol. 47 No. 12, pp. 3265-3287.

Aladwani, A. (2001), "Change management strategies for successful ERP implementation", *Business Process Management*, Vol. 7, No. 3, p. 266-275.

Aláez-Aller, R. and Longás-García, J.C. (2010), "Dynamic supplier management in automotive industry", *International Journal of Operations & Production Management*, Vol. 30, No. 3, pp. 312-335.

Albani, A. and Dietz, J.L.G. (2009), "Current trends in modeling inter-organizational cooperation", *Journal of Enterprise Information Management*, Vol. 22 No. 3, pp. 275-297.

Al-Mashari, M., Al-Mudimigh, A. and Zairi, M. (2003), "Enterprise resource planning: a taxonomy of critical factors", *European Journal of Operational Research*, Vol. 146, pp. 352-364.

Al-Mudimigh, A., Zairi, M. and Al-Mashari, M. (2001), "ERP software implementation: An integrative framework", *European Journal of Information Systems*, Vol. 10, pp. 216-226.

Alsene, E. (2007), "ERP systems and the coordination of the enterprise", *Business Process Management Journal*, Vol. 13 No. 3, pp. 417-432.

Alshawi, S., Themistocleous, M. and Almadani, R. (2004), "Integrating diverse ERP systems: a case study", *Journal of Enterprise Information Management*, Vol. 17, No. 6, pp. 454-462.

Amit, R. and Schoemaker, P.J.H. (1993), "Strategic assets and organizational rent", *Strategic Management Journal*, Vol. 14, No. 2, pp. 33-46.

Amrani, R.E., Rowe, F. and Geffroy-Maronnat, B. (2006), "The effects of enterprise resource planning implementation strategy on cross-functionality", *Information Systems Journal*, Vol. 16, pp. 79-104.

Anderson, E. and Weitz, B. (1986: spring), "Make-or-buy decisions: vertical integration and marketing productivity", *Sloan Management Review*, Vol. 27 No. 3, pp. 3-19.

Andrews, M., Squire, C. and Tamboukou, M. (2009), *Doing narrative research*, London: Sage.

Anussornnitisarn, P. and Nof, S.Y. (2003), "E-work: the challenge of the next generation ERP systems", *Production Planning & Control*, Vol. 14 No. 8, pp. 753-765.

Argyres, N.S. (1996), "Capabilities technological diversification and divisionalization", *Strategic Management Journal*, Vol. 17, pp. 395-410.

Argyris, C. (1979), "Using qualitative data to test theories", *Administrative Science Quarterly*, Vol. 24 No. 4, pp. 672-679.

Arnold, V., Benford, T., Hampton, C. and Sutton, S.G. (2010), "Competing pressures of risk and absorptive capacity potential on commitment and information sharing in global supply chains", *European Journal of Information Systems*, Vol. 19, No. 2, pp. 134-152.

Ayres, L., Kavanagh, K. and Knafl, K. (2003), "Within-case and across-case approaches to qualitative data analysis", *Qualitative Health Research* Vol. 13, No. 6, pp. 871–883.

Arya, A. and Mittendorf, B. (2008), "Pricing internal trade to get a leg up on external rivals", *Journal of Economics and Management Strategy*, Vol. 17 No. 3, pp. 709-731.

Ash, C.G. and Burn, J.M. (2003), "A strategic framework for the management of ERP enabled e-business change", *European Journal of Operational Research*, Vol. 146, pp. 374-387.

Auerbach, C.F. and Silverstein, L.B. (2003), *Qualitative Data: An Introduction to Coding and Analysis*, New York University Press, New York.

Ayal, M. and Seidmann, A. (2009), "An empirical investigation of the value of integrating enterprise information systems: the case of medical imaging informatics", *Journal of Management Information Systems*, Vol. 26 No.2, pp. 43-68.

Bagchi, S., Kanungo, S. and Dasgupta, S. (2003), "Modeling use of enterprise resource planning systems: a path analytic study", *European Journal of Information Systems*, Vol. 12, pp. 142-158.

Baines, T.S., Lightfoot, H.W. and Smart, P. (2011), "Servitization within manufacturing: Exploring the provision of advanced services and their impact on vertical integration", *Journal of Manufacturing Technology Management*, Vol. 22, No. 7, pp. 947-954.

Baker, P. (2008), "The design and operation of distribution centers within supply chains", *International Journal of Production Economics*, Vol. 111, No. 1, pp. 27-41.

Baki, B. and Cakar, K. (2005), "Determining the ERP package-selecting criteria: the case of Turkish manufacturing companies", *Business Process Management Journal*, Vol. 11, No. 1, pp. 75-86.

Bala, H. and Venkatesh, V. (2007), "Assimilation of inter-organizational business process standards", *Information Systems Research*, Vol. 18, pp. 340-362.

Bancroft, N., Seip, H. and Sprengel, A. (1998), *Implementing SAP R/3: How to introduce a large system into a large organization*, Manning Publications Co., Greenwich, CT.

Banker, R.D., Chang, H. and Kao, Y. (2010), "Evaluating cross-organizational impacts of information technology – an empirical analysis", *European Journal of Information Systems*, Vol. 19, pp. 153-167.

Baramichai, M., Zimmers Jr, E.W. and Marangos, C.A. (2007), "Agile supply chain transformation matrix: an integrated tool for creating an agile enterprise", *Supply Chain Management: An International Journal*, Vol. 12 No. 5, pp. 334-348.

Bass, T. and Mabry, R. (2004), "Enterprise architecture reference models: a shared vision for Service-Oriented Architectures", *Proceedings of the IEEE MILCOM*, pp. 1-8.

Bauer, M.W. (2000), "Classical content analysis: A review", in: Bauer, M.W. and Gaskell, G. (eds.), pp. 131-151. *Qualitative Researching with Text, Image and Sound: A Practical Handbook*, 3rd ed., London, Sage.

Bayo-Moriones, A. and Lera-López, F. (2007), "A firm-level analysis of determinants of ICT adoption in Spain", *Technovation*, Vol. 27, pp. 352-366.

Beatty, R.C. and Williams, C.D. (2006), "ERPII: Best practices for successfully implementing and ERP upgrade", *Communications of the ACM*, Vol. 49, No. 3, pp. 105-109.

Beck, R.N. (1979), *Handbook in Social Philosophy*, McMillan, New York.

Beheshti, H.M. (2006), "What managers should know about ERP/ERPII", *Management Research News*, Vol. 29 No. 4, pp. 184-193.

Benbasat, I., Goldstein, D.K. and Mead, M. (1987), "The case research strategy in studies of information systems", *MIS Quarterly*, Vol. 11, No. 3, pp. 369-386.

Bendoly, E., Soni, A. and Venkataramanan, M.A. (2004), *Value Chain Resource Planning (VCRP): Adding Value with Systems Beyond the Enterprise*, available at: http://www.fc.bus.emory.edu/~elliot_bendoly/VCRP_BH.pdf (accessed 17 January 2010).

Benlian, A. and Hess, T. (2011), "Comparing the relative importance of evaluation criteria in proprietary and open-source enterprise application software selection – a conjoint study of ERP and Office systems", *Information Systems Journal*, Vol. 21, pp. 503-525.

Bennis, W. and O'Toole, J. (1993), "Large vs small", *Executive Excellence*, Vol. 10, No. 6, pp. 3-5.

Beretta, S. (2002), "Unleashing the integration potential of ERP systems", *Business Process Management Journal*, Vol. 8, No. 3, pp. 254-277.

Berg, B. and Stylianou, A.C. (2009), "Factors considered when outsourcing an IS system: an empirical examination of the impacts of organizational size, strategy and the object of a decision', *European Journal of Information Systems*, Vol. 18, pp. 235-248.

Berger, J.B., Cohen, B.P. and Zelditch, M. Jr. (1996), "Status characteristics and expectation states", in Berger, J. and Zelditch Jr. M. (eds.), *Sociological Theories in Progress*, Vol. I. (pp. 26-46), Boston: Houghton-Mifflin.

Berthon, P., Ewing, M., Pitt, L., and Naudé, P. (2003), "Understanding B2B and the web: the acceleration of coordination and motivation, *Industrial Marketing Management*, Vol. 32, No. 7, pp. 553−561.

Bhatt, G.D. (2000), "An empirical examination of the effects of information systems integration on business process improvement", *International Journal of Operations & Production Management*, Vol. 20, No. 11, pp. 1331-1359.

Bhatt, G.D. and Grover, V. (2005), "Types of information technology capabilities and their role in competitive advantage: An empirical study", *Journal of Management Information Systems*, Vol. 22, No. 2, pp. 253-277.

Binder, M. and Clegg, B.T. (2005a), “The modular enterprise: a new governance architecture for inter-firm collaboration”, *Proceedings of the 12th International Annual EurOMA Conference*, Corvinus University, Budapest, 19-22 June, pp. 1385-1394.

Binder, M. and Clegg, B.T. (2005b), “Partial evolutionary multiplicity: an approach to managing the dynamics of supply structures”, *Proceedings of the 18th International Conference on Production Research*, Universita de Salerno, Fisciano, 31 July – 4 August.

Binder, M. and Clegg, B.T. (2006), “A conceptual framework for enterprise management”, *International Journal of Production Research*, Vol. 44 Nos 18/19, pp. 3813-3829.

Binder, M. and Clegg, B. (2007a), “Designing and managing collaborative enterprises in the automotive industry”, *International Journal of Logistics Research and Applications*, Vol. 10 No, 2, pp. 135-152.

Binder, M. and Clegg, B.T. (2007b), “Enterprise Management: a new frontier for organisations. *International Journal of Production Economics*. Vol. 106 No. 2, pp. 409-430.

Binder, M. and Edwards, J.S. (2010), “Using grounded theory method for theory building in operations management research”, *International Journal of Operations & Production Management*, Vol. 30, No. 3, pp. 232-259.

Bingi, P., Sharma, M. and Godla, J. (1999), “Critical issues affecting an ERP implementation”, *Information Systems Management*, pp. 7-14.

Bititci, U., Martinez, V., Albores, P. and Parung, J. (2004), “Creating and managing value in collaborative networks”, *International Journal of Physical Distribution and Logistics Management*, Vol. 34, Nos. 3/4, pp. 251-268.

Blackstone, J.H. Jr. and Cox, J.F. (2005), *APICS Dictionary*, 11th ed., APICS: The association for Operations Management. Chicago, IL, p. 38.

Blaikie, N. (2003), *Analyzing Quantitative Data*, Sage, London.

Boardman, J.T. and Clegg, B.T. (2001), “Structured engagement in the extended enterprise”, *International Journal of Operations & Production Management*, Vol. 21, Nos. 5/6, pp. 795-811.

Boland, R. (1985), “Phenomenology: a preferred approach to research in information systems”, in: Mumford, E., Hirschheim, R.A., Fitzgerald, G. and Wood-Harper, A.T. (eds.), *Research Methods in Information Systems*, North Holland, Amsterdam, pp. 193-201.

Boland, R.J. (1991), “Information system use as a Hermeneutic process”, in: Nissen, H.E., Klein, H.K. and Hirschheim, R.A. (eds.), *Information systems research: Contemporary approaches and emergent traditions*, pp. 439-464. Amsterdam: North Holland.

Bond, B., Genovese, Y., Miklovic, D., Wood, N., Zrimsek, B. and Rayner, N. (2000), “ERP is dead - long live ERPII”, available at: www.pentaprise.de/cms_showpdf.php?pdfname=infoc_report (accessed 8 November 2009).

Boniface, M., Nasser, B., Papay, J., Phillips, S.C., Servin, A., Yang, X., Zlatev, Z., Gogouvitis, S.V., Katsaros, G., Konstanteli, K., Kousiouris, G., Menychtas, A. and Kyriazis, D. (2010), “Platform-as-a –service architecture for real-time quality of service management in clouds”, in *5th International Conference on Internet and Web Applications and Services*, ICIW, Spain, pp. 155-160.

Booth, W.C. (1961), *The Rhetoric of Fiction*, Chicago, University of Chicago Press.

Bordonaba-Juste, V. and Cambra-Fierro, J.J. (2009), “Managing supply chain in the context of SMEs: a collaborative and customized partnership with the suppliers as the key for success”, *Supply Chain Management: An International Journal*, Vol. 14, No. 5, pp. 393-402.

Borys, B. and Jemison, D.B. (1989), “Hybrid arrangements as strategic alliances: Theoretical issues in organizational combinations”, *Academy of Management Review*, Vol. 14, No. 2, pp. 234-249.

Bose, I., Pal, R. and Ye, A. (2008), “ERP and SCM systems integration: the case of a valve manufacturer in China”, *Information & Management*, Vol. 45, pp. 233-241.

Boulanger, A. (2005), “Open-source versus proprietary software: is one more reliable and secure than the other?”, *IBM Systems Journal*, Vol. 44, No. 2, pp. 239-248.

Bourgeois, L.J. and Astley, W.G. (1979), “A strategic model of organizational conduct and performance”, *International Studies of Management and Organization*, Vol. 9, pp. 40-66.

Bowersox, D., Closs, D. and Cooper, M.B. (2002), *Supply Chain Logistics Management*, McGraw-Hill, Boston, MA.

Brandon-Jones, A. and Carey, S. (2011), "The impact of user-perceived e-procurement quality on system and contract compliance", *International Journal of Operations & Production Management*, Vol. 31, No. 3, pp. 274-296.

Brehm, N., Gómez, J.M. and Rautenstrauch, C. (2006), "An ERP solution based on web services and peer-to-peer networks for small and medium enterprises", *International Journal of Information Systems and Change Management*, Vol. 1, No. 1, pp. 99-111.

Breu, K., Hemingway, C., Strathern, C. and Bridger, D. (2002), "Workforce agility: the new employee strategy for the knowledge economy", *Journal of Information Technology*, Vol. 17, pp. 21-31.

Brown, A.W. and Johnston, S. (2003), *Using service-oriented architecture and component-based development to build web service applications*. Retrieved April 29, 2010, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.93.6520&rep=rep1&type=pdf.

Browne, J., Harhen, J. and Shivnan, J. (1996), *Production Management Systems – An Integrated Perspective*, 2nd edition, Addison – Wesley Publishers Ltd.

Browne, J. and Zhang, J. (1999), "Extended and virtual enterprises-Similarities and differences", *International Journal of Agile Management Systems*, Vol. 1 No. 1, pp. 30-36. Bryman,

A. (2004), *Social Research Methods*, 2nd ed., Oxford University Press, New York. Bryman,

A. (2008), *Social Research Methods*, 3rd ed. Oxford, UK: Oxford University Press.

Bryman, A. and Bell, E. (2007), *Business Research Methods*, 2nd edition, Oxford University Press Inc., New York.

Buco, M.J., Chang, R.N., Luan, L.Z., Ward, C., Wolf, J.L. and Yu, P.S. (2004), "Utility computing SLA management based upon business objectives", *IBM Systems Journal*, Vol. 43 No. 1, pp. 159-178.

Bull, C.M. (2003a), "Politics in packaged software implementation", in *Proceedings of the 11th European Conference on Information Systems (ECIS)*, Naples, Italy.

Bull, C.M. (2003b), "Strategic issues in Customer Relationship Management (CRM) implementation", *Business Process Management Journal*, Vol. 9, No. 5, pp. 592-602.

Bull, C. (2010), "Customer relationship management (CRM) systems, intermediation and disintermediation: the case of INSG", *International Journal of Information Management*, Vol. 30, pp. 94-97.

Buonanno, G., Faverio, P., Pigni, F., Ravarini, A., Sciuto, D. and Tagliavini, M. (2005), "Factors affecting ERP system adoption: A comparative analysis between SMEs and large companies", *Journal of Enterprise Information Management*, Vol. 18, No. 4, pp. 384-426.

Burrell, G. and Morgan, G. (1979), *Sociological Paradigms and Organisational Analysis*, Heinemann, London.

Busquets, J. (2010), "Orchestrating smart business network dynamics for innovation", *European Journal of Information Systems*, Vol. 19, pp. 481-493.

Buzzell, R.D. and Ortmeyer, G. (1995), "Channel partnerships streamline distribution", *Sloan Management Review*, Spring, pp. 85-96.

Byrne, J.A. and Brandt, R. (1993), "The virtual corporation", *Business Week*, 8 February, pp. 36-41.

Cai, S., Jun, M. and Yang, Z. (2010), "Implementing supply chain information integration in China: the role of institutional forces and trust", *Journal of Operations Management*, Vol. 28, No. 3, pp. 257-268.

Callaway, E. (2000), *ERP – the next generation: ERP is Web Enabled for E-business*, Computer Technology Research Corporation, Charleston.

Camarinha-Matos, L.M. and Pantoja-Lima, C. (2001), "Cooperation coordination in virtual enterprises", *Journal of Intelligent Manufacturing*, Vol. 12 No. 2, pp. 133-150.

Cambra-Fierro, J., Florin, J., Perez, L. and Whitelock, J. (2011), "Inter-firm market orientation as antecedent of knowledge transfer, innovation and value creation in networks", *Management Decision*, Vol. 49 No. 3, pp. 444-467.

Candido, G., Barata, J., Colombo, A.W. and Jammes, F. (2009), "SOA in reconfigurable supply chain: a research roadmap", *Engineering Applications of Artificial Intelligence*, Vol. 22, pp. 939-949.

Cao, M. and Zhang, Q. (2011), "Supply chain collaboration: impact on collaborative advantage and firm performance", *Journal of Operations Management*, Vol. 29, No. 3, pp. 163-180.

Cao, Q. and Dowlatshahi, S. (2005), "The impact of alignment between virtual enterprise and information technology on business performance in an agile manufacturing environment", *Journal of Operations Management*, Vol. 23, pp. 531-550.

Cao, Q. and Hoffman, J.J. (2011), "Alignment of virtual enterprise, information technology, and performance: an empirical study", *International Journal of Production Research*, Vol. 49, No. 4, pp. 1127-1149.

Capaldo, G. and Rippa, P. (2009), "A planned-oriented approach for ERP implementation strategy selection", *Journal of Enterprise Information Management*, Vol. 22, No. 6, pp. 642-659.

Caridi, M. and Cigolini, R. (2002). "Improving materials management effectiveness: a step towards agile enterprise", *International Journal of Physical Distribution and Logistics Management*, Vol. 32, No. 7, pp. 556-576.

Cassell, C. and Symon, G. (1994), "Qualitative research in work contexts", in Cassell, C. and Symon, G. (eds.), *Qualitative Methods in Organizational Research: A Practical Guide*, Sage, London, pp. 1-13.

Cavaye, A.L.M. (1996), "Case study research: a multifaceted research approach for IS", *Information Systems Journal*, Vol. 6, No. 3, pp. 227-242.

Chai, Y., Zhang, XD. And Li, F.Y. (1999), "The research on agile information system", *Computer Integrated Manufacturing Systems*, Vol. 5, No. 2, pp. 6-10.

Charmaz, K. (2006), *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis*. London, Sage.

Charmaz, K. (2008), *Constructionism and the grounded theory method*. In: Handbook of Constructionist Research, Hoslton, J.A. and Gubrium, J.F. (eds.), New York, Guilford Press.

Chatterjee, D. and Ravichandran, T. (2004), "inter-organizational information systems research: a critical review and an integrative framework", in *37th Hawaii International Conference on System Sciences*.

Chen, D., Doumeingts, G. and Vernadat, F. (2008), "Architectures for enterprise integration and interoperability: past, present and future", *Computers in Industry*, Vol. 59, pp. 647-659.

Chen, I.J. (2001), "Planning for ERP systems: Analysis and future trend", *Business Process Management Journal*, Vol. 7 No. 5, pp. 374-386.

Chen, J.R. (2009), "An exploratory study of alignment ERP implementation and organizational development activities in a newly established firm", *Journal of Enterprise Information Management*, Vol. 22, No. 3, pp. 298-316.

Chen, M., Yang, T. and Li, H. (2007), "Evaluating the supply chain performance of IT-based inter-enterprise collaboration", *Information & Management*, Vol. 44, pp. 524-534.

Cheng, J.H. (2011), "Inter-organizational relationships and information sharing in supply chains", *International Journal of Information Management*, Vol. 31, No. 4, pp. 374-384.

Cheng, Y., Farooq, S. and Johansen, J. (2011), "Manufacturing network evolution: a manufacturing plant perspective", *International Journal of Operations & Production Management*, Vol. 31 No. 12, pp. 1311-1331.

Chengalur-Smith, I., Duchessi, P. and Gil-Garcia, J.R. (2012), "Information sharing and business systems leveraging in supply chains: An empirical investigation of one web-based application", *Information & Management*, Vol. 49, pp. 58-67.

Chetcuti, H.R. (2008), "ERP implementation: a multi-stakeholder analysis of critical success factors", *WICT proceedings*, pp. 1-6.

Chi, L., Ravichandran, T. and Andrevski, G. (2010), "Information technology, network structure, and competitive action", *Information Systems Research*, Vol. 21, pp. 543-570.

Chiang C.Y., Kocabasoglu-Hillmer, C. and Suresh, N. (2012), "An empirical investigation of the impact of strategic sourcing and flexibility on firm's supply chain agility", *International Journal of Operations & Production Management*, Vol. 32 No. 1, pp. 49-78.

Childe, S.J. (1998), "The extended enterprise – a concept of co-operation", *Production Planning & Control*, Vol. 9 No. 4, pp. 320-327.

Childerhouse, P. and Towill, D. (2011), "Arcs of supply chain integration", *International Journal of Production Research*, Vol. 49, No. 24, pp. 7441-7468.

Chituc, C.M. and Azevedo, A. and Toscano, C. (2009), "A framework proposal for seamless interoperability in a collaborative networked environment", *Computers in Industry*, Vol. 60, pp. 317-338.

Cho, H., Jung, M. and Kim, M. (1996), "Enabling technologies of agile manufacturing and its related activities in Korea", *Computers and Industrial Engineering*, Vol. 30 No. 3, pp. 323-334.

Choi, T.Y. and Dooley, K.J. (2009), "Supply networks: Theories and models", *Journal of Supply Chain Management*, Vol. 45, No. 3, pp. 25-26.

Choi, T.Y., Dooley, K.J. and Rungutsanatham, M. (2001), "Supply networks and complex adaptive systems: control versus emergence", *Journal of Operations Management*, Vol. 19, pp. 351-366.

Choi, T.Y. and Hong, Y. (2002), "Unveiling the structure of supply networks: Case studies in Honda, Acura, and DiamlerChrysler", *Journal of Operations Management*, Vol. 20, No. 5, pp. 469-493.

Choi, T.Y. and Wu, Z. (2009), "Triads in supply networks: theorizing buyer-supplier-supplier relationships", *Journal of Supply Chain Management*, Vol. 45, No. 1, pp. 8-25.

Chorafas, D.N. (2001), *Integrating ERP, CRM, Supply Chain Management, and Smart Materials.* CRC Press LLC and Auerbach Publications, New York, NY, p: 13.

Chou, S.W. and Change, Y.C. (2008), "The implementation factors that influence the ERP (enterprise resource planning) benefits", *Decision Support Systems*, Vol. 46, pp. 149-157.

Choudhary, V. (2007), "Software as a service: Implications for investment in software development", in *Hawaii International Conference on System Sciences*, p. 3464.

Christopher, M. (2000), "The agile supply chain", *Industrial Marketing Management*, Vol. 29, pp. 37-44.

Christopher, M. and Lee, H. (2004), "Mitigating supply chain risk through improved confidence", working paper, Cranfield School of Management.

Chung, A.A.C., Yam, A.Y.K. and Chan, M.F.S. (2004), "Networked enterprise: a new business model for global sourcing", *International Journal of Production Economics*, Vol. 87, pp. 267-280.

Cotteleer, M.J., Bendoly, E. (2006), "Order lead-time improvement following enterprise-IT implementation: an empirical study", *MIS Quarterly*, Vol. 30, No. 3, pp. 643-660.

Choy, K.L., Lee, W.B. and Lo. V. (2004), "An enterprise collaborative management system – a case study of supplier relationship management", *The Journal of Enterprise Information Management*, Vol. 17 No. 3, pp. 191-207.

Clegg, B. (2003), "The extended enterprise: a matrix framework for effective strategic operations management", In Cotterell, M. (Ed.), *Proceedings of the 20th International Manufacturing Conference IMC 20, Cork, Ireland*.

Clegg, B., Chandler, S., Binder, M. and Edwards, J. (2012), "Governing inter-organizational R&D supplier collaborations: a study at Jaguar Land Rover. *Production Planning & Control*, pp. 1-19, iFirst.

Clegg, B. and Wan, Y. (2013), "ERP systems and enterprise management trends: a contingency model for the enterprisation of operations", *International Journal of Operations & Production Management*, Vol 33. Nos. 11/12, pp. 1458-1489.

Co, H.C. and Barro, F. (2009), "Stakeholder theory and dynamics in supply chain collaboration", *International Journal of Operations & Production Management*, Vol. 29, No. 6, pp. 591-611.

Collins, J., Ketter, W. and Gini, M. (2010), "Flexible decision support in dynamic inter-organisational networks", *European Journal of Information Systems*, Vol. 19, pp. 436-448.

Cousins, P.D. and Crone, M.J. (2003), "Strategic models for the development of obligation based inter-firm relationships: A study of the UK automotive industry", *International Journal of Operations & Production Management*, Vol. 23, No, 12, pp. 1447-1474.

Cox, A. (1996), "Relational competence and strategic procurement management", *European Journal of Purchasing & Supply Management*, Vol. 2, No. 1, pp. 57-70.

Crabtree, B.J. and Miller, W.L. (1999a), "Clinical research: A multimethod typology and qualitative roadmap", in: Crabtree, B.J. and Miller, W.L. (Eds.), *Doing Qualitative Research*, 2nd ed., Sage, Thousand Oaks, pp. 3-30.

Crabtree, B.J. and Miller, W.L. (1999b), "Using codes and code manuals,: a template organizing style of interpretation", in: Crabtree, B.J. and Miller, W.L. (eds.), *Doing Qualitative Research*, 2nd ed., Sage, Thousand Oaks, pp. 163-178.

Crandall, R. (1968), "Vertical integration and the market for repair parts in the United States automobile industry", *The Journal of Industrial Economics*, Vol. 16 No. 3, pp. 212-234.

Creswell, J.W. (1994), *Research Design: Qualitative & Quantitative Approaches*, Sage, Thousands Oaks.

Creswell, J.W. and Plano Clark, V.L. (2007), *Designing and conducting mixed methods research*, Thousand Oaks, CA: Sage.

Cummins, F. A. (2009), *Building the Agile Enterprise with SOA, BPM and MBM*, Morgan Kaufmann Publishers and Elsevier Inc. Burlington, VT.

Daneva, M. and Wieringa, R.J. (2006), "A requirements engineering framework for cross-organizational ERP systems", *Requirements Engineering*, Vol. 11, No. 3, pp. 194-204.

Daniel, E.M. and White, A. (2005), "The future of inter-organizational system linkages: findings of an international delphi study", *European Journal of Information Systems*, Vol. 14, pp. 188-203.

Daniel, E.M., White, A. and Ward, J.M. (2004), "Exploring the role of third parties in inter-organizational web service adoption", *Journal of Enterprise Information Management*, Vol. 17, No. 5, pp. 351-360.

Daniels, S. (1998), "The virtual corporation", *Work Study*, Vol. 47 No. 1, pp. 20-22.

Das, A. Narasimhan, R. and Talluri, S. (2006), "Supplier integration – finding an optimal configuration", *Journal of Operations Management*, Vol. 24, No. 5, pp. 563-582.

Das, T.K. and Teng, B.S. (2000), "A resource-based theory of strategic alliances", *Journal of Management*, Vol. 26, No. 1, pp. 31-61.

Davenport, T.H. (1998), "Putting the enterprise into the enterprise system", *Harvard Business Review*, pp. 121-131.

Davenport, T.H. and Brooks, J.D. (2004), "Enterprise systems and the supply chain", *Journal of Enterprise Information Management*, Vol. 17 No. 1, pp. 8-19.

Davis, E.W. and Spekman, R.E. (2003), *The extended enterprise: Gaining competitive advantage through collaborative supply chains*. Financial Times Prentice Hall, London.

Davis, E.W. and Spekman, R.E. (2004), *Extended enterprise: Gaining Competitive Advantage through Collaborative Supply Chains*, Financial Times Prentice-Hall, New York, NY, p. 20.

Davis, M. and O'Sullivan, D. (1998), "Communications technologies for the extended enterprise", *Production Planning & Control*, Vol. 9 No. 8, pp. 742-753.

Davis, M. and O'Sullivan, D. (1999), "Systems design framework for the extended enterprise", *Production Planning & Control*, Vol. 10 No.1, pp. 3-18.

Dayal, U., Hsu, M. and Ladin, R. (2001), "Business process coordination: State of the art, trends, and open issues", in *Proceedings of 27th International Conference on Very Large Database*, pp. 3-13.

De Leeuw, S. and Fransoo, J. (2009), "Drivers of close supply chain collaboration: one size fits all?", *International Journal of Operations and Production Management*, Vol. 29, pp. 720-739.

De Maria, F., Briano, C., Brandolini, M., Briano, E. and Revetria, R. (2011), "Market-leader ERPs and cloud computing: a proposed architecture for an efficient and effective synergy", *Proc. of the 10th WSEAS Conference on Applied Computer and Applied Computational Science*. *Madison, WI, USA*, pp. 13-19.

Deep, A., Guttridge, P., Dani, S. and Burns, N. (2008), "Investigating factors affecting ERP selection in made-to-order SME sector", *Journal of Manufacturing Technology Management*, Vol. 19, No. 4, pp. 430-446.

Deetz, S. (1996), "Describing differences in approaches to organization science: Rethinking Burrell and Morgan and their legacy", *Organization Science*, Vol. 7, No. 2, pp. 191-207.

Delanty, G. (2002), *Social Science: Beyond Constructivism and Realism*. Buckingham, Open University Press.

Delanty, G. and Strydom, P. (2003), *Philosophies of Social Science: The Classic and Contemporary Readings*, Open University Press, Maidenhead.

Demirkan, H., Cheng, H.K. and Bandyopadhyay, S. (2010), "Coordination strategies in an SaaS supply chain", *Journal of Management Information Systems*, Spring, Vol. 26 No. 4, pp. 119-143.

Denzin, N.K. (1978), *The Research Act*, 2nd ed., New York, McGraw-Hill.

Dey, I. (1999), *Grounding Grounded Theory: Guidelines for Qualitative Inquiry*, San Diego, CA, Academic Press.

Doğan, P. (2009), "Vertical networks, integration, and connectivity", *Journal of Economics and Management Strategy*, Vol. 18, No. 2, pp. 347-392.

Dooley, K.J. (1997), "A complex adaptive systems model of organization change", *Nonlinear Dynamics, Psychology, and Life Sciences*, Vol. 1, pp. 69–97.

Doom, C., Milis, K., Poelmans, S. and Bolemen, E. (2010), "Critical success factors for ERP implementations in Belgian SMEs", *Journal of Enterprise Information Management*, Vol. 23 No. 3, pp. 378-406.

Doz, Y.L. and Hamel, G. (1998), *Alliance advantage: The Art of Creating Value Through Partnering*, Harvard Business School Press, Boston, MA.

Duan, C., Grover, V. and Balakrishnan, N. (2009), "Business process outsourcing: an event study on the nature of processes and firm valuation", *European Journal of Information Systems*, Vol. 18, pp. 442-457.

Dwivedi, Y.K. and Mustafee, N. (2010), "Viewpoint: it's unwritten in the cloud: the technology enablers for realising the promise of cloud computing", *Journal of Enterprise Information Management*, Vol. 23 No. 6, pp. 673-679.

Dyer, J.H. (1996), "Specialized supplier networks as a source of competitive advantage: evidence from the auto industry", *Strategic Management Journal*, Vol. 17, pp. 271-291.

Dyer, J.H. and Singh, H. (1998), "The relational view: cooperative strategy and sources of interorganizational competitive advantage", *Academy of Management Review*, Vol. 23, No. 4, pp. 660-679.

Dyer, Jr., W.G. and Wilkins, A.L. (1991), "Better stories, not better constructs, to generate better theory: a rejoinder to Eisenhardt", *Academy of Management Review*, Vol. 16, No. 3, pp. 613-619.

Earl, M.J. (1989), *Management Strategies for Information Technology*, New York: Prentice-Hall.

Eckartz, S., Daneva, M., Wieringa, R. and Hillegersberg, J.V. (2009), "Cross-organizational ERP management: How to create a successful business case?", *SAC'09 Proceedings of the 2009 ACM Symposium on Applied Computing*. *Honolulu*, *HI*, *USA*.

Eisenhardt, K. (1989), "Building theories from case study research", *Academy of Management Review*, Vol. 14, No. 4, pp. 532-550.

Eisenhardt, K. (1991), "Better stories and better constructs: the case for rigor and comparative logic", *Academy of Management Review*, Vol. 16, No. 3, pp. 620-627.

Eisenhardt, K.M. and Martin, J.A. (2000), "Dynamic capabilities: what are they?", *Strategic Management Journal*, Vol. 21, Nos. 10/11, pp. 1105-1121.

Ellram, L.M. (1996), "The use of the case study method in logistics research", *Journal of Business Logistics*, Vol. 17, No. 2, pp. 93-138.

Ericson, J. (2001), "What the heck is ERPII?", available at: http://www.line56.com/articles/default.asp?ArticleID=2851 (accessed 27 May 2012).

Esteves, J. (2009), "A benefits realisation road-map framework for ERP usage in small and medium-sized enterprises", *Journal of Enterprise Information Management*, Vol. 22 Nos 1/2, pp. 25-35.

European Commission (2003), "Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium sized enterprises", *Official Journal of the European Union*, L124, 1422, pp. 36-41.

Faisal, C.M.N. (2011), "Issues in cloud computing: usability evaluation of cloud based application", February.

Fawcett, S.E., Fawcett, A.M., Watson, B.J. and Magnan, G.M. (2012), "Peeking inside the black box: toward an understanding of supply chain collaboration dynamics", *Journal of Supply Chain Management*, Vol. 48 No. 1, pp. 44-72.

Fawcett, S.E., Wallin, C., Allred, C., Fawcett, A.M. and Magnan, G.M. (2011), "Information technology as an enabler of supply chain collaboration: a dynamic-capabilities perspective", *Journal of Supply Chain Management*, Vol. 47 No. 1, pp. 38-59.

Filstead, W.J. (1971), "Introduction", in: Filstead, W.J. (ed.), *Qualitative Methodology: Firsthand Involvement with the Social World*, Markham Publishing, Chicago, pp. 1-11.

Fink, A. (2005), *How to conduct surveys: A step-by-step guide*, 3rd ed., Sage.

Fitzgerald, B. and Howcroft, D. (1998), "Competing dichotomies in IS research and possible strategies for resolution", in *Proceedings of the 19th International Conference on Information Systems*, Hirschheim, R., Newman, M. and DeGross, J. (eds.), pp. 155-164.

Flynn, B.B., Huo, B. and Zhao, X. (2010), "The impact of supply chain integration on performance: A contingency and configuration approach", *Journal of Operations Management*, Vol. 28, No. 1, pp. 58–71.

Forslund, H. and Jonsson, P. (2009), "Obstacles to supply chain integration of the performance management process in buyer-supplier dyads: the buyers' perspective", *International Journal of Operations & Production Management*, Vol. 29, pp. 77-95.

Frank, L. (2004), "Architecture for integration of distributed ERP systems and e-commerce systems", *Industrial Management & Data Systems*, Vol. 104 No. 5, pp. 418-429.

Frohlich, M.T. (2002), "E-integration in the supply chain: barriers and performance", *Decision Sciences*, Vol. 33, No. 4, pp. 537-557.

Frohlich, M.T. and Westbrook, R. (2002), “Demand chain management in manufacturing and services: Web-based integration, drivers and performance”, *Journal of Operations Management*, Vol. 20, No. 6, pp. 729-745.

Fujii, S., Kaihara, T. and Morita, H. (2000), “A distributed virtual factory in agile manufacturing environment”, *International Journal of Production Research*, Vol. 38, No. 17, pp. 4113-4128.

Fynes, B., Voss, C. and de Burca, S. (2005), “The impact of supply chain relationship quality on quality performance”, *International Journal of Production Economics*, Vol. 96, No. 3, pp. 339-354.

Galbraith, J.R. (1983), “Strategy and organization planning”, *Human Resource Management*, Vol. 22, pp. 63-77.

Galliers, R.D. (1994), “Information systems, operational research and business reengineering”, *International Transactions in Operational Research*, Vol. 1 No. 2, pp. 159-167.

Gargeya, V.B. and Brady, C. (2005), “Success and failure factors of adopting SAP in ERP system implementation”, *Business Process Management Journal*, Vol. 11, No. 5, pp. 501-516.

Ghobbar, A.A. and Friend, C.H, (2004), “The material requirements planning system for aircraft maintenance and inventory control: a note”, *Journal of Air Transport Management*, Vol. 10, pp. 217-221.

Giere, R.N. (1985), *Constructive Realism*. In: Churchland, P.M. and Clifford, A.H. (eds.), pp. 75-98. Images of Science, Chicago, the University of Chicago Press.

Gioia, D.A. and Pitre, E. (1990), “Multiparadigm perspectives on theory building”, *Academy of Management Review*, Vol. 15, No. 4, pp. 584-602.

Gittell, J.H. and Weiss, L. (2004), “Co-ordination networks within and across organisations: a multi-level framework”, *Journal of Management Studies*, Vol. 411, pp. 127-153.

Glaser, B.G. (1978), *Theoretical Sensitivity: Advances in the Methodology of Grounded Theory*. Mill Valley, CA, Sociology Press.

Glaser, B.G. (1994), “The constant comparative method of qualitative analysis”, In: Glaser, B.G. (ed.), 182-196. *More Grounded Theory Methodology: A Reader*, Mill Valley, Sociology Press.

Glaser, B.G. and Strauss, A.L. (1967), *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Aldine, New York, NY.

Glaser, B.G. and Strauss, A. (1968), *Time for dying*, Chicago: Aldine.

Glaser, B.G. and Strauss, A.L. (1971), “Discovery of substantive theory: a basic strategy underlying qualitative research”, in: Filstead, W.J. (ed.), *Qualitative Methodology: Firsthand Involvement with the Social World*. Markham Publishing, Chicago, pp. 288-304.

Goldman, S., Nagel, R. and Preiss, K. (1995), *Agile Competitors and Virtual Organizations*, New York, NY: van Nostrand Reinhold.

Goranson, H.T. (1999), *The Agile Virtual Enterprise: Cases, Metrics, Tools*, Quorum Books and Greenwood Publishing Group, Inc, Westport, CT, p. 65.

Gottfredson, M., Puryear, R. and Phillips, S. (2005), “Strategic sourcing: from periphery to the core”, *Harvard Business Review*, Vol. 83, No. 2, pp. 132-139.

Gou, H., Huang, B., Liu, W. and Li, X. (2003), “A framework for virtual enterprise operation management”, *Computers in Industry*, Vol. 50, No. 3, pp. 333-352.

Goulding, C. (2001), “Grounded theory: A magical formula or a potential nightmare”, *Marketing Review*, Vol. 2, No. 1, pp. 21-34.

Goulding, C. (2002), *Grounded theory: A practical guide for management, business and market researchers*, London: Sage.

Grant, R.M. (1991), “The resource-based theory of competitive advantage: Implications for strategy formulation”, *California Management Review*, Spring, pp. 114-135.

Grant, R.M. (1996), “Prospering in dynamically-competitive environments: Organization capability as knowledge integration”, *Organization Science*, Vol. 7, No. 4, pp. 375-387.

Greene, J.C., Caracelli, V.J. and Graham, W.F. (1989), “Toward a conceptual framework for mixed-method evaluation designs”, *Educational Evaluation and Policy Analysis*, Vol. 11, No. 3, pp. 255-274.

Grefen, P., Eshuis, R., Mehandijev, N., Kouvas, G. and Weichart, G. (2009), “Internet-based support for process-oriented instant virtual enterprises”, *IEEE Internet Computing*, Vol .13, No. 6, pp. 30-38.

Guglar, P. and Dunning, J.H. (1993), “Technology based cross-border alliances”, in *Multinational Strategic Alliances*, Culpan, R. (ed.), Howarth Press Inc., Binghamton, NY.

Gulati, R. (1999), "Network location and learning: the influence of network resources and firm capabilities on alliance formation", *Strategic Management Journal*, Vol. 20, No. 5, pp. 397-420.

Gulledge, T. and Deller, G. (2009), "Service-oriented concepts: bridging between managers and technologists", *Industrial Management & Data Systems,* Vol. 109 No. 1, pp. 5-15.

Gunasekaran, A. and Ngai, E.W.T. (2004), "Information systems in supply chain integration and management", *European Journal of Operational Research*, Vol. 159, pp. 269-295.

Gupta, A. (2000), "Enterprise resource planning: the emerging organizational value systems", *Industrial* Management & Data Systems, Vol. 100, No. 3, pp. 114-118.

Halaweh, M. (2012), "Integration of grounded theory and case study: An exemplary application from e-commerce security perception research", *Journal of Information Technology and Application,* Vol. 13, No. 1, pp. 31-51.

Halldorsson, A. and Aastrup, J. (2003), "Quality criteria for qualitative inquiries in logistics", *European Journal of Operational Research*, Vol. 144, No. 2, pp. 321-332.

Halldorsson, A. and Skjøtt-Larsen, T. (2004), "Developing logistics competencies through third party logistics relationships", *International Journal of Operations & Production Management*, Vol. 24, No. 2, pp. 192-206.

Hamel, G. and Prahalad, C.K. (1994), *Competing for the Future*, Harvard Business School Press, Boston.

Hammer, M. (1990), "Reengineering work: don't automate, obliterate", *Harvard Business Review*, Vol. 68, No. 4, July-August, pp. 104-112.

Hammersley, M. (1996), "The relationship between qualitative and quantitative research: Paradigm loyalty versus methodological eclecticism", in: Richardson, J.T.E. (ed.), *Handbook of qualitative research methods for psychology and the social sciences*, (pp. 89-107), Leicester: BPS Books.

Handfield, R.B. and Melnyk, S.A. (1998), "The scientific theory-building process: a primer using the case of TQM", *Journal of Operations Management*, Vol. 16, No. 4, pp. 321-339.

Hanna, V. and Walsh, K. (2000), "Alliances: the small firm perspective" in *Proceedings of 4th International Conference on Managing Innovative Manufacturing* (pp. 333-340), Aston University, Birmingham: Aston Business School.

Hansen, J.M. (2009), "The evolution of buyer-supplier relationships: an historical industry approach", *Journal of Business & Industrial Marketing*, Vol. 24, Nos. 3/4, pp. 227-236.

Hanseth, O. and Lyytinen, K. (2010), "Design theory for dynamic complexity in information infrastructures: the case of building internet", *Journal of Information Technology*, Vol. 25, pp. 1-19.

Harland, C.M. (1996), "Supply chain management: relationships, chain and networks", *British Journal of Management*, Vol. 7, Special issue, pp. 63-80.

Harland, C.M. and Knight, L.A. (2001), "Supply network strategy: role and competence requirements", *International Journal of Operations & Production Management*, Vol. 21, No. 4, pp. 476-489.

Harrigan, K.R. (1984), "Formulating vertical integration strategies", *Academy of Management Review*, Vol. 9, pp. 638-652.

Harrigan, K.R. (1985), "Vertical integration and corporate strategy", *Academy of Management Journal*, Vol. 28 No. 2, pp. 397-425.

Hart, C. (1999), *Doing a literature review: Releasing the social science research imagination*, London, Sage.

Hart, O. (1989), "An economist's perspective on the theory of the firm", *Colombia Law Review*, Vol. 89, page. 1.757-1.774.

Hart, P. and Saunders, C. (1997), "Power and trust: Critical factors in the adoption and use of electronic data interchange", *Organization Science*, Vol. 8, No. 1, pp. 23-42.

Harwood, S. (2003), *ERP: the implementation cycle*, Burlington: Butterworth-Heinemann.

Haug, A., Pedersen, A. and Arlbjørn, J.S. (2010), "ERP system strategies in parent-subsidiary supply chains", *International Journal of Physical Distribution & Logistics Management*, Vol. 40 No. 4, pp. 298-314.

Hauser, K., Sigurdsson, H.S. and Chudoba, K.M. (2010), "EDSOA: an event-driven service-oriented architecture model for enterprise applications", *International Journal of Management & Information Systems*, Vol. 14 No. 3, pp. 37-47.

He, X. (2004), "The ERP challenge in China: a resource-based perspective", *Information Systems Journal*, Vol. 14, pp. 153-167.

Heene, A. and Sanchez, R. (eds.) (1997), *Competence-Based Strategic Management*, Chichester, UK: Wiley.
Henderson, J. and Venkatraman, N. (1993), "Strategic alignment: Leveraging information technology for transforming organisations", *IBM Systems Journal*, Vol. 32, No. 1, pp. 4-16.
Hendricks, K.B., Singhal, V.R. and Stratman, J.K. (2007), "The impact of enterprise systems on corporate performance: a study of ERP, SCM, and CRM system implementations", *Journal of Operations Management*, Vol. 25, pp. 65-82.
Henningsson, S. and Carlsson, S. (2011), "The DySIIM model for managing IS integration in mergers and acquisitions", *Information Systems Journal*, Vol. 21 No. 5, pp. 441-476.
Hicks, D.A. and Stecke, K.E. (1995), "The ERP maze: enterprise resource planning and other production and inventory control software", *IIE Solutions*, Vol. 27, pp. 12-16.
Hirschheim, R.A. (1992), "Information systems ephistemology: An historical perspective". In: Galliers, R. (ed.). *Information Systems Research – Issues, Methods and Practical Guidelines*, Oxford: Blackwell Scientific Publications.
Hite, J.M. and Hesterly, W.S. (2001), "The evolution of firm networks: From emergence to early growth of the firm", *Strategic Management Journal*, Vol. 22, No. 3, pp. 275-286.
Ho, L.T. and Lin, G.C.I. (2004), "Critical success factor framework for the implementation of integrated-enterprise systems in the manufacturing environment", *International Journal of Production Research*, Vol. 42 No. 17, pp. 3731-3742.
Hoffmann, W.J. (2007), "Strategies for managing a portfolio of alliances", *Strategic Management Journal*, Vol. 28 No. 8, pp. 827-856.
Hofmann, P. (2008), "ERP is dead, long live ERP", *Internet Computing, IEEE*, Vol. 12 No. 4, pp. 84-88.
Holland, C. and Light, B. (1999), "A critical success factors model for ERP implementation", *IEEE Software* (May/June), pp. 30-35.
Holweg, M. and Pil, F.K. (2008), "Theoretical perspectives on the coordination of supply chains", *Journal of Operations Management*, Vol. 26, pp. 389-406.
Hong, K.K. and Kim, Y.G. (2002), "The critical success factors for ERP implementation: An organizational fit perspective", *Information & Management*, Vol. 40, pp. 25–40.
Howells, J. and Wood, M. (1995), "Diffusion and management of electronic data interchange: Barriers and opportunities in the UK pharmaceutical and healthcare industries", *Technology Analysis & Strategic Management*, Vol. 7, No. 4, pp. 371-387.
Huang, C.D. and Hu, Q. (2007), "Achieving IT-business strategic alignment via enterprise-wide implementation of balanced scorecards", *Information Systems Management*, Vol. 24, pp. 173-84.
Humphreys, P.K., Lai, M.K. and Sculli, D. (2001), "An inter-organizational information system for supply chain management", *International Journal of Production Economics*, Vol. 70, pp. 245-255.
Hussein, A. (2009), "The use of triangulation in social sciences research: Can qualitative and quantitative methods be combined?", *Journal of Comparative Social Research*, Vol. 1, pp. 1-12.
Hussey, J. and Hussey, R. (1997), *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*, Palgrave: Basingstoke.
Hye, P.K. and Joel, F. (1999), "Virtual enterprise – information system and network solution", *Computers & Industrial Engineering*, Vol. 37, pp. 441-444.
Hyvonen, T., Jarvinen, J. and Pellinen, J. (2008), "A virtual integration – the management control system in a multinational enterprise", *Management Accounting Research*, Vol. 19, pp. 45-61.
Ibbott, C.J. and O'Keefe, R.M. (2004), "Trust, planning and benefits in a global interorganizational system", *Information Systems Journal*, Vol. 14, No. 2, pp. 131-152.
Ibrahim, M. and Ribbers, P.M. (2009), "The impacts of competence-trust and openness-trust on interorganizational systems", *European Journal of Information Systems*, Vol. 18, pp. 223-234.
Inmon, W.H., *Building the Data Warehouse*, 2nd Edition. John Wiley & Sons.
Ip, W.H., Kwong, C.K. and Fung, R. (2000), "Design of maintenance system in MRPII", *Journal of Quality in Maintenance Engineering*, Vol. 6, No. 3, pp. 177-191.
Iskanius, P. (2009), "Risk management in ERP project in the context of SMEs", *Engineering Letters*, Vol. 17, No. 4, pp. 266-273.
Jacobs, F.R. and 'Ted' Western Jr., F.C. (2007), "Enterprise resource planning (ERP) – a brief history", *Journal of Operations Management*, Vol. 25, pp. 357-363.

Jagdev, H.S. and Browne, J. (1998), "The extended enterprise – a context for manufacturing", *Production Planning & Control*, Vol. 9 No. 3, pp. 216-229.

Jagdev, H.S. and Thoben, K.D. (2001), "Anatomy of enterprise collaborations", *Production Planning & Control*, Vol. 12, No. 5, pp. 437-451.

Jagdev, H.S., Vasiliu, L., Browne, J. and Zaremba, M. (2008), "A semantic web service environment for B2B and B2C auction applications within extended and virtual enterprises", *Computers in Industry*, Vol. 59, No. 8, pp. 786-797.

Jain, V. and Benyoucef, L. (2008), "Managing long supply chain networks: some emerging issues and challenges", *Journal of Manufacturing Technology Management*, Vol. 19, No. 4, pp. 469-496.

Jaiswal, M.P. and Kaushik, A. (2005), "Realising enhanced value due to business network redesign through extended ERP systems: case study of HLLNet", *Business Process Management Journal*, Vol. 11 No. 2, pp. 171-184.

Jean R.J., Sinkovics, R.R. and Cavusgil, S.T. (2010), "Enhancing international customer-supplier relationships through IT resources: a study of Taiwanese electronics suppliers", *Journal of International Business Studies*, Vol. 41, pp. 1218-1239.

Jiang, J., Klein, G., Means, T. (2000), "Project risk impact on software development team performance", *Project Management Journal*, Vol. 31, No. 4, pp. 19–26.

Jick, T.D. (1979), "Mixing qualitative and quantitative methods: Triangulation in action", *Administrative Science Quarterly*, Vol. 24, No. 4, pp. 602-611.

Johnson, P. and Duberley, J. (2000), *Understanding Management Research: An Introduction to Epistemology*, Sage, London.

Johnson, P. and Harris, D. (2002), Qualitative and quantitative issues in research design, in: Partington, D. (ed.), *Essential Skills in Management Research*, pp. 99-116, London, Sage Publications.

Johansson, B. and Bjørn-Andersen, N. (2007), "identifying requirements for future ERP systems", *Proceedings of the 30th Information Systems Research Seminar* in Scandinavia IRIS, p. 1.

Johansson, B. and Sudzina, F. (2008), "ERP systems and open source: an initial review and some implementations for SMEs", *Journal of Enterprise Information Management*, Vol. 21 No. 6, pp. 649-658.

Johnson, M. and Mena, C. (2008), "Supply chain management for servitised products: a multi-industry case study", *International Journal of Production Economics*, Vol. 114, No. 1, pp. 27-39.

Jones, D. and Womack, J. (2002), *Seeing the whole: Mapping the extended value stream*, Lean Enterprise Institute, Brookline.

Joskow, P. (2002), "Electricity sector restructuring and competition: a transaction cost perspective", in Brousseau, E. and Glachant, J.-M. (Eds), *The Economics of Contracts: Theories and Applications*, Cambridge University Press, Cambridge.

Joskow, P.L. (2003), "Vertical integration", *Handbook of New Institutional Economics*, Kluwer, Boston, MA, p. 25, 2 December.

Kaihara, T. and Fujii, S. (2002), "IT based virtual enterprise coalition strategy for agile manufacturing environment", in *Proceedings of the 35th CIRP International Seminar on Manufacturing Systems*, pp. 32-37.

Kaplan, B. and Maxwell, J.A. (1994), "Qualitative research methods for evaluating computer information systems", in Anderson, J.G., Aydin, C.E. and Jay, S.J. (eds.), *Evaluating Health Care Information Systems: Methods and Applications*, CA: Sage, pp. 45-68.

Karlsson, C. (2003), "The development of industrial networks: challenges to operations management in an extraprise", *International Journal of Operations & Production Management*, Vol. 23 No. 1, pp. 44-61.

Karlsson, C. and Sköld, M. (2007), "The manufacturing extraprise: an emerging production network paradigm", *Journal of Manufacturing Technology Management*, Vol. 18, No. 8, pp. 912-932.

Kasper-Fuehrer, E.C. and Ashkanasy, N.M. (2001), "Communicating trustworthiness and building trust in interorganizational virtual organizations", *Journal of Management*, Vol. 27, pp. 235-254.

Katzan, Jr. H. (2010), "On the privacy of cloud computing", *International Journal of Management and Information Systems*, Vol. 14 No. 2, pp. 1-12.

Katzy, B.R. and Dissel, M. (2001), "A toolset for building the virtual enterprise", *Journal of Intelligent Manufacturing*, Vol. 12, pp. 121-131.

Keen, P.G.W. (1991), *Shaping the Future: Business Design through Information Technology*. Boston, MA: Harvard Business School Press.

Kelly, M.J., Schaan, J. L. and Joncas, H. (2002), "Managing alliance relationships: Key challenges in the early stages of collaboration", *R&D Management*, Vol. 32, No. 1, pp. 11-22.

Khan, A. and Pillania, R. (2008), "Strategic sourcing for supply chain agility and firms' performance: A study of Indian manufacturing sector", *Management Decision*, Vol. 46, No. 10, pp. 1508-1530.

Khazanchi, D. and Munkvold, B.E. (2002), "On the rhetoric and relevance of IS research paradigms: A conceptual framework and some propositions", in *Proceedings of the 36th Hawaii International Conference on System Sciences*.

Khoo, B., Harris, P. and Hartman, S. (2010), "Information security governance of enterprise information systems: an approach to legislative compliant", *International Journal of Management & Information Systems*, Vol. 14 No. 3, pp. 49-55.

King, N. (1994), "The qualitative research interview", in Symon, G. and Cassell, C. (eds.), *Qualitative Methods in Organizational Research: A Practical Guide*, Sage, London, pp. 14-36.

King, N. (1998), "Template analysis", in: Symon, G. and Cassell, C. (eds.), pp. 118-134. *Qualitative Methods and Analysis in Organizational Research: A Practical Guide*, London, Sage.

King, N. (2004), "Using templates in the thematic analysis of texts", in Cassell, C. and Symon, G. (Eds.), *Essential Guide to Qualitative Methods in Organizational Research*. Sage, London.

Kirk, J. and Miller, M.L. (1986), *Reliability and Validity in Qualitative Research*, Sage, Beverly Hills.

Kitchenham, B. and Charters, S. (2007), "Guidelines for performing systematic literature reviews in software engineering, *Technical Report EBSE-2007-01*, School of Computer Science and Mathematics, Keele University.

Klein, R. (2007), "Customization and real time information access in integrated eBusiness supply chain relationships", *Journal of Operations Management*, Vol. 25, pp. 1366-81.

Knippel, R. (2005), *Service Oriented Enterprise Architecture*, Masters thesis, University of Copenhagen. Copenhagen.

Ko, I., Olfman, L. and Choi, S. (2009), "The impacts of electronic collaboration and information exploitation capability on firm performance: Focusing on suppliers using buyer-dominated interorganizational information systems", *International Journal of e-Collaboration*, Vol. 5, No. 2, pp. 1-17.

Kocabasoglu, C. and Suresh, N.C. (2006), "Strategic sourcing: An empirical investigation of the concept and its practices in U.S. manufacturing firms", *Journal of Supply Chain Management*, Vol. 42, No. 2, pp. 4-16.

Koh, S.C.L., Gunasekaran, A. and Rajkumar, D. (2008), "ERPII: the involvement, benefits and impediments of collaborative information sharing", *International Journal of Production Economics*, Vol. 113, pp. 245-268.

Koh, S.C.L., Simpson, M. (2005), "Change and uncertainty in SME manufacturing environments using ERP", *Journal of Manufacturing Technology Management*, Vol. 16 No. 6, pp. 629-653.

Kotler, P. (1997), *Marketing Management*, 9th ed., Prentice-Hall, Englewood Cliffs.

Kovács, G.L. and Paganelli, P. (2003), "A planning and management infrastructure for large, complex, distributed projects – beyond ERP and SCM", *Computers in Industry*, Vol. 51, pp. 165-183.

Krippendorff, K. (2004), *Content Analysis: An Introduction to its Methodology*, 2nd ed., Thousand Oaks, Sage.

Krishnamurthy, R. and Yauch, C. (2007), "Leagile manufacturing: a proposed corporate infrastructure", *International Journal of Operations & Production Management*, Vol. 27, No. 6, pp. 588-604. Kristianto, Y., Ajmal, M.M. and Helo, P. (2011), "Advanced planning and scheduling with collaboration processes in agile supply and demand networks", *Business Process Management Journal*, Vol. 17, No. 1, pp. 107-126.

Krumbholz, M., Galliers, J., Coulianos, N. and Maiden, N.A.M. (2000), "Implementing enterprise resource-planning packages in different corporate and national cultures", *Journal of Information Technology*, Vol. 15, pp. 267-79.

Kuhn, T.S. (1970), *The Structure of Scientific Revolutions*, 2nd ed., University of Chicago Press, Chicago.

Kuk, G. (2004), "Effectiveness of vendor-managed inventory in the electronics industry: Determinants and outcomes", *Information & Management*, Vol. 41, No. 5, pp. 645-654.

Kumar, K. and van Dissel, H. (1996), “Sustainable collaboration: managing conflict and cooperation in interorganizational systems”, *MIS Quarterly*, Vol. 20 No. 3, pp. 279-300.

Kumar, K. and van Hillegersberg, J. (2000), “ERP experiences and evolution”, *Communications of the ACM*, Vol. 43 No. 4, pp. 23-26.

Kumar, N., Stern, L.W. and Anderson, J.C. (1993), “Conducting interorganizational research using key informants”, *Academy of Management Journal*, Vol. 36, No. 6, pp. 1633-1651.

Laframboise, K. and Ryes, F. (2005), “Gaining competitive advantage from integrating enterprise resource planning and total quality management’, *Journal of Supply Chain Management: A Global Review of Purchasing & Supply*, Vol. 41, No. 3, pp. 49-64.

Lai, F., Li, D., Wang, Q. and Zhao, X. (2008), “The information technology capability of third-party logistics providers: a resource-based view and empirical evidence from China”, *Journal of Supply Chain Management*, Vol. 44 No. 3, pp. 22-38.

Lambert, D.M. (2004), “The eight essential supply chain management processes”, *Supply Chain Management Review*, Vol. 8, No. 6, pp. 18-26.

Lambert, D.M. (2008), *Supply Chain Management: Process, Partnerships, Performance*, 3rd Edition. Sarasota, FL: Supply Chain Management Institute.

Landry, M. and Banville, C. (1992), “A disciplined methodological pluralism for MIS research”, *Accounting, Management & Information Technologies*, Vol. 2, No. 2, pp. 77-97.

Lang, S.Y.T., Dickinson, J. and Buchal, R.O. (2002), “Cognitive factors in distributed design”, *Computers in Industry*, Vol. 48, No. 1, pp. 89-98.

Langlois, R.N. (2002), “Modularity in technology and organization”, *Journal of Economic Behavior & Organization*, Vol. 49, pp. 19-37.

Larsson, R. (1993), “Case survey methodology: Quantitative analysis of patterns across case studies”, *Academy of Management*, Vol. 36 No. 6, pp. 1515-1546.

Law, C.C.H. and Ngai, E.W.T. (2007), “An investigation of the relationships between organizational factors, business process improvement, and ERP success”, *Benchmarking: An International Journal*, Vol. 14 No. 3, pp. 387-406.

Law, G. (2002), “Open source security: opportunity or oxymoron?”, *Computer*, Vol. 35, No. 3, pp. 18-21.

Lawrence, P. and Lorsch, J. (1967), *Organization and environment: Managing differentiation and integration*. Homewood, IL: Irwin.

Laws, K. and McLeod, R. (2004), “Case study and grounded theory: Sharing some alternative qualitative research methodologies with systems professionals”, in *Proceedings of the 22nd International Conference*, 25-29 July, Systems Dynamic Society.

Leary, M.R. (2001), *Introduction to Behavioral Research Methods*, 3rd ed., London, Allyn & Bacon.

Lee, A.S. and Baskerville, R.L. (2003), “Generalizing generalisability in information systems research”, *Information Systems Research*, Vol. 14, No. 3, pp. 221-243.

Lee, J., Siau, K. and Hong, S. (2003), “Enterprise integration with ERP and EAI”, *Communications of the ACM*, Vol. 46 No.2, pp. 54-60.

Lee, J.H., Shim, H.J. and Kim, K.K. (2010), “Critical success factors in SOA implementation: an exploratory study”, *Information Systems Management*, Vol. 10, No. 2, pp. 123-145.

Lee, N. and Lings, I. (2008), *Doing Business Research – A Guide to Theory and Practice*, Sage, London.

Leiblein, M.J. (2003), “The choice of organizational governance form and performance: Predictions from transaction cost, resource-based and real options theories”, *Journal of Management*, Vol. 29, pp. 937-961.

Levy, D. (1994), “Chaos theory and strategy: Theory, applications, and managerial implications”, *Strategic Management Journal*, Vol. 15, pp. 167–178.

Lewis, M., Brandon-Jones, A., Slack, N. and Howard, M. (2010), “Competing through operations and supply: the role of classic and extended resource-based advantage”, *International Journal of Operations & Production Management*, Vol. 30, Nos. 9-10, pp. 1032-1058.

Li, C. (1999), “ERP packages: what’s next?”, *Information Systems Management*, Vol. 16 No. 3, pp. 31-36 (electronic version).

Li, F. and Williams, H. (1999), “Interfirm collaboration through interfirm networks”, *Information Systems Journal*, Vol. 9, pp. 103-115.

Li, L., Markowski, C., Xu, L. and Markowski, E. (2008), “TQM – a predecessor of ERP implementation”, *International Journal of Production Economics*, Vol. 115, pp. 569-580.

Lieblich, A., Mashiach-Tuval, R. and Zilber, T. (1998), *Narrative research: Reading, analysis and interpretation*, Thousand Oaks, CA: Sage.

Lin, F. and Rohm, C.E.T. (2009), "Managers' and end-users' concerns on innovation implementation: a case of an ERP implementation in China", *Business Process Management Journal*, Vol. 15 No. 4, pp. 527-547.

Lincoln, Y.S. and Guba, E.G. (1985), *Naturalistic Inquiry*, Sage, Beverly Hills.

Lipnack, J. and Stamps, J. (1997), "Virtual teams", *Reaching Across Space, Time, and Organizations with Technology*, Wiley, New York, NY.

Litwin, M.S. (2003), "How to assess and interpret survey psychometrics", in: Fink (ed.), *The Survey Kit*, 2nd ed., Sage, Thousand Oaks, Kit 8.

Locke, K. (1996b), "Rewriting the discovery of grounded theory after 25 years?", *Journal of Management Inquiry*, Vol. 5, No. 3, pp. 239-245.

Locke, K. (2001), *Grounded Theory in Management Research*, London, Sage.

Lockett, H., Johnson, M., Evans, S. and Bastl, M. (2011), "Product service systems and supply network relationships: An exploratory case study", *Journal of Manufacturing Technology Management*, Vol. 22, No. 3, pp. 293-313.

Lucas, H.C. Jr., Oh, W., Simon, G. and Weber, B.W. (2002), "Information technology and the New York stoke exchange's strategic resources from 1982-1999", CIS working paper Series, 2002-08, Zicklin School of Business, Baruch College, New York, NY, available at: http://cisnet.baruch.cuny.edu/papers/cis200208.pdf.

Luke, R.D., Begun, J.W. and Pointer, D.D. (1989), "Quasi firms: strategic interorganizational forms in the health care industry", *Academy of Management Review*, Vol. 14, No. 1, pp. 9-19.

Lyman, K.B., Caswell, N. and Biem, A. (2009), "Business value network concepts for the extended enterprise", in Vervest, P.H.M., Liere, D.W. and Zheng, L. (Eds), *Proc. of the Network Experience*, Springer, Berlin.

Lynch, R. (2003), *Corporate strategy*, 3rd ed., Prentice-Hall Financial Times, Harlow.

Lyytinen, K. and Damsgaard, J. (2011), "Inter-organizational information systems adoption – a configuration analysis approach", *European Journal of Information Systems*, Vol. 20, No. 5, pp. 496-509.

MacBeth, D.K. (2002), "Emergent strategy in managing cooperative supply chain change", *International Journal of Operations & Production Management*, Vol. 22 No. 7, pp. 728- 740.

Madlberger, M. (2009), "A model of antecedents of RFID adoption intention in the supply chain", in *Proceedings of the 42nd Hawaii International Conference on System Sciences*, Waikoloa, pp. 1-10.

Madu, C.N. and Kuei, C. (2004), *ERP and Supply Chain Management*, Chi Publishers, Fairfield, CT.

Mahoney, J.T. (1989), *Organizational Rationalization and Innovation: Vertical Integration and Multidivisional Organization*, PhD thesis, University of Pennsylvania.

Mahoney, J.T. (1992), "The choice of organisational form: vertical financial ownership versus other methods of vertical integration", *Strategic Management Journal*, Vol. 13 No. 8, pp. 559-584.

Malhotra, R. and Temponi, C. (2010), "Critical decisions for ERP integration: Small business issues", *International Journal of Information Management*, Vol. 30, No. 1, pp. 28-37.

Mandke, V.V. and Nayar, M.K. (2004), "Beyond quality: the information integrity imperative", *Total Quality Management & Business Excellence*, Vol. 15, Nos. 5-6, pp. 645-654.

Manenti, P. (2012), "In pursuit of operational excellence: accelerating business change through next generation ERP", *IDC Manufacturing Insights*, #IDCWP47T.

Manthou, V., Vlachopoulou, M. and Folinas, D. (2004), "Virtual e-Chain (VeC) model for supply chain collaboration", *International Journal of Production Economics*, Vol. 87, No. 3, pp. 241-250.

Markus, M.L. and Tanis, C. (2000), "The enterprise system experience – from adoption to success", in Zmud, R.W. (Ed.), *Framing the Domains of IT Management: Projecting the Future Through the Past*, Pinnaflex Educational Resources, Inc., Cincinnatti, OH, PP. 173-207.

Markus, M., Tanis, C. and Fenema, P. (2000), "Multisite ERP implementation", *Communications of the ACM* Vol. 43, No. 4, pp. 42– 46.

Martinez, M.T., Fouletier, P., Park, K.H. and Faurel, J. (2001), "Virtual enterprise: Organization, evolution and control", *International Journal of Production Economics*, Vol. 74, pp. 225-238.

Martins, A., Ferreira, J.J.P. and Mendonca, J.M. (2004), "Quality management and certification in the virtual enterprise", *International Journal of Computer Integrated Manufacturing*, Vol. 17 No. 3, pp. 212-223.

Mata, F.J., Fuerst, W.L. and Barney, J.B. (1995), "Information technology and sustained competitive advantage: A resource-based analysis", *MIS Quarterly*, Vol. 19, No. 4, pp. 487–504.

Maurizio, A., Girolami, L. and Jones, P. (2007), "EAI and SOA: factors and methods influencing the integration of multiple ERP systems (in an SAP environment) to comply with the Sarbanes-Oxley Act", *Journal of Enterprise Information Management*, Vol. 20 No. 1, pp. 14-31.

McAdam, R. and McCormack, D. (2001), "Integrating business processes for global alignment and supply chain management", *Business Process Management Journal*, Vol. 7, No. 2, pp. 113-130.

McAfee, A. (2002), "The impact of enterprise information technology adoption on operational performance: an empirical investigation", *Production and Operations Management*, Vol. 11 No. 1, pp. 33-53. McAfee, A. and Upton, D. (1996), *Vandelay Industries*, Harvard Business School Case #9-697-037, Harvard Business School Publishing, Boston, MA.

McCutcheon, D.M. and Meredith, J.R. (1993), "Conducting case study research in operations management", *Journal of Operations Management*, Vol. 11, No. 3, pp. 239-256.

Meissonier, R. and Houzé, E. (2010), "Toward an 'IT Conflict-Resistance Theory': action research during IT pre-implementation", *European Journal of Information Systems*, Vol. 19, pp. 540-561.

Mentzer, J.T., Stank, T.P. and Esper, T.L. (2008), "Supply chain management and its relationship to logistics, marketing, production, and operations management", *Journal of Business Logistics*, Vol. 29, No. 1, pp. 31-46.

Merton, R.K., Fiske, M. and Kendall, P.L. (1956), *The focused interview: A manual of problems and procedures*, Free Press, New York.

Michel, R. (2000), "The road to extended ERP", available at: www.manufacturingsystems.com/extendedenterprise (accessed 8 May 2009).

Miles, M.B. and Huberman, M. (1994), *Qualitative Data Analysis: A Sourcebook of New Methods*. 2nd Edition. Beverly Hills, CA: Sage Publications.

Miller, D. and Friesen, P. (1980), "Archetypes of organizational transition", *Administrative Science Quarterly*, Vol. 25, No. 2, pp. 268-299.

Miller, E. (1990), "Integrating PDM and ERP", *Computer-Aided Engineering*, Vol. 18, No. 3, pp. 69-78.

Min, S. and Mentzer, J.T. (2000), "The role of marketing in supply chain management", *International Journal of Physical Distribution & Logistics Management*, Vol. 30, No. 9, pp. 765-787.

Mohamed, U.A., Galal-Edeen, G.H. and El-Zoghbi, A.A. (2010), "Building and integrated B2B e-commerce hub architecture based on SOA and semantic ontology", *Journal of Enterprise Information Management*, Vol. 23 No. 6, pp. 775-812.

Molina-Azorin, J.F. (2009), "Understanding how mixed methods research is undertaken within a specific research community: the case of business studies", *International Journal of Multiple Research Approaches*, Vol. 3, No. 1, pp. 47-57.

Moller, C. (2005), "ERPII: a conceptual framework for next-generation enterprise systems?", *Journal of Enterprise Information Management*, Vol. 18, No. 4, pp. 483-497.

Momoh, A., Roy, R. and Shehab, E. (2010), "Challenges in enterprise resource planning implementation: state-of-the-art", *Business Process Management Journal*, Vol. 16, No. 4, pp. 537-565.

Monk, E.F. and Wagner, B.J. (2009), *Concepts in Enterprise Resource Planning*. 3rd ed., Course Technology, Cengage Learning, Cambridge, MA.

Monteverde, K., & Teece, D.J. (1982), "Supplier switching costs and vertical integration in the automobile industry", *The Bell Journal of Economics*, Vol. 13 No. 1, pp. 206-213.

Morgan, D.L. (1998), "Planning focus groups", in Morgan, D.L. and Krueger (eds.), *The Focus Group Kit*, Sage, Thousand Oaks, Kit 2.

Morgan, G. (1979), "Response to Mintzberg", *Administrative Science Quarterly*, Vol. 24, No. 1, pp. 137-139.

Morse, J.M. (2010), "Sampling in grounded theory", in: Charmaz, K. and Bryant, A. (eds.), pp. 229-244. *The Sage Handbook of Grounded Theory*, Los Angeles, CA, Sage Publications.

Mudambi, R. and Mudambi, S.M. (1995), "From transaction cost economics to relationship marketing: A model of buyer–supplier relations", *International Business Review*, Vol. 4, No. 4, pp. 419–433.

Mueller, B., Viering, G., Legner, C. and Riempp, G. (2010), "Understanding the economic potential of service-oriented architecture", *Journal of Management Information Systems*, Vol. 26 No. 4, spring, pp. 145-180.

Müller, R.M., Linders, S. and Pires, L.F. (2010), "Business intelligence and service-oriented architecture: a Delphi study", *Information Systems Management*, Vol. 27, No. 2, pp. 168-187.

Muscatello, J.R. and Chen, I.J. (2008), "Enterprise resource planning (ERP) implementations: theory and practice", *International Journal of Enterprise Information Systems*, Vol. 4, No. 1, pp. 63-78.

Muscatello, J.R., Small, M.H. and Chen, I.J. (2003), "Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms", *International Journal of Operations & Production Management*, Vol. 23 No. 8, pp. 850-871.

Myers, M.D. (1997), "Qualitative research in information systems", *MIS Quarterly,* Vol. 21, No. 2, pp. 241-242.

Nah, F. and Delgado, S. (2006), "Critical success factors for enterprise resource planning implementation and upgrade", *Journal of Computer Information Systems*, Vol. 46, pp. 99-113.

Nah, F., Faja, S. and Cata, T. (2001), "Characteristics of ERP software maintenance: a multiple cast study", *Journal of Software Maintenance*, Vol. 13 No. 6, pp. 1-16.

Newman, M. and Zhao, Y. (2008), "The process of enterprise resource planning implementation and business process re-engineering: tales from two Chinese small and medium-sized enterprises", *Information Systems Journal*, Vol. 18, pp. 405-426.

Noke, H. and Hughes, M. (2010), "Climbing the value chain: strategies to create a new product development capability in mature SMEs", *International Journal of Operations & Production Management*, Vol. 30 No. 2, pp. 132-154.

Normann, R. and Ramirez, R. (1993), "From value chain to value constellation: Designing interactive strategy", *Harvard Business Review*, July-August, pp. 65-77.

Nour, M.A. and Mouakket, S. (2011), "A classification framework of critical success factors for ERP systems implementation: a multi-stakeholder perspective", *International Journal of Enterprise Information Systems*, Vol. 7, No. 1, pp. 56-71.

ÓhUallacháin, B. and Wasserman, D. (1999), "Vertical integration in a lean supply chain: Brazilian automobile component parts", *Economic Geography*, Vol. 75, pp. 21–42.

Oliver, C. (1997), "Sustainable competitive advantage: Combining institutional and resource-based views", *Strategic Management Journal*, Vol. 18, No. 9, pp. 697–713.

Oliver, D.G., Serovich, J. M., and Mason, T. L. (2005), "Constraints and opportunities with interview transcription: Towards reflection in qualitative research", *Social Forces*, Vol. 84, No. 2, pp. 1273–1289.

Olson, D.L. and Zhao, F. (2007), "CIO's perspectives of critical success factors in ERP upgrade projects", *Enterprise Information Systems*, Vol. 1, No. 1, pp. 129-138.

Olsen, K.A. and Sætre, P. (2007), "IT for niche companies: is an ERP system the solution?", *Information Systems Journal*, Vol. 17, pp. 37-58.

Olsen, W.K. (2004), "Triangulation in social research: Qualitative and quantitative methods can really be mixed", in: Holborn, M. (ed.), *Developments in Sociology: An Annual Review,* Ormskirk, Lancs, UK, Causeway Press.

O'Neil, H. and Sackett, P. (1994), "The extended manufacturing enterprise paradigm", *Management Decision*, Vol. 32 No. 8, pp. 42-49.

Ono, K. and Kubo, T. (2009), "Relationships with distributors", *Journal of Business & Industrial Marketing*, Vol. 24, pp. 439-448.

Oppenheim, A.N. (2000), *Questionnaire Design, Interviewing and Attitude Measurement*. Pinter Publishers Ltd, New York, NY.

O'Reilly, P. and Finnegan, P. (2010), "Intermediaries in inter-organisational networks: building a theory of electronic marketplace performance", *European Journal of Information Systems*, Vol. 19, pp. 462-480.

Oura, J. and Kijima, K. (2002), "organization design initiated by information system development: a methodology and its practice in Japan", *System Research and Business Science,* Vol. 19, No. 1, pp. 77-86.

Owen, L., Goldwasser, C., Choate, K. and Blitz, A. (2008), "Collaborative innovation throughout the extended enterprise", *Strategy and Leadership,* Vol. 36 No. 1, pp. 39-45.

Pal, N. and Pantaleo, D.C. (2005), *The Agile Enterprise: Reinventing your Organization for Success in an On-demand World*, Springer Science + Business Media, Inc, New York, NY.

Palacios, M.C., Alvarez, E., Alvarez, M. and Santamaria, J.M. (2006), "Lesson learned for building agile and flexible scheduling tool for turbulent environments in extended enterprise", *Robotics and Computer-Integrated Manufacturing*, Vol. 22, pp. 485-492.

Palaniswamy, R. and Frank, T. (2000), "Enhancing manufacturing performance with ERP systems", *Information Systems Management*, Vol. 17 No. 3, pp. 1-13.

Pan, K., NUNES, J.M.B. and Peng, G.C. (2011), "Risks affecting ERP viability: insights from a very large Chinese manufacturing group", *Journal of Manufacturing Technology Management*, Vol. 22, No. 1, pp. 107-130.

Panetto, H. and Molina, A. (2008), "Enterprise integration and interoperability in manufacturing systems: Trends and issues, *Computers in Industry*, Vol. 59, No. 7, pp. 641–646.

Panteli, N. and Sockalingam, S. (2005), "Trust and conflict within virtual inter-organizational alliances: a framework for facilitating knowledge sharing", *Decision Support Systems*, Vol. 39, No. 4, pp. 599-617.

Papazoglou, M.P., Traverso, P., Dustdar, S., Leymann, F. and Kramer, B.J. (2006), "Service-oriented computing research roadmap", in: *Proceedings of the Dagstuhl Seminar, Service Oriented Computing (SOC)*, Paper 524.

Park, K. and Kusiak, A. (2005), "Enterprise resource planning (ERP) operations support system for maintaining process integration", *International Journal of Production Research*, Vol. 43 No. 19, pp. 3959-3982.

Pasandideh, S.H.R., Niaki, S.T.A. and Nia, A.R. (2010), "An investigation of vendor-managed inventory application in supply chain: the EQQ model with shortage", *International Journal of Advanced Manufacturing Technology*, Vol. 49, pp. 329-339.

Pateli, A. and Lioukas, S. (2011), "The choice of governance mode in ICT alliances: A property rights approach", *Information & Management*, Vol. 48, pp. 69-77.

Paton, S., Clegg, B., Hsuan, J. and Pilkington, A. (2011), *Operations Management*, McGraw-Hill, NY.

Patton, M.Q. (2002), *Qualitative Research & Evaluation Methods*, 3rd ed., Sage, Thousand Oaks.

Pearcy, D. and Guinipero, L. (2008), "Using e-procurement applications to achieve integration: what role does firm size play?", *Supply Chain Management: An International Journal*, Vol. 13, No. 1, pp. 26-34.

Penrose, E. (2008), "Strategy/organization and the metamorphosis of the large firm", *Organization Studies*, Vol. 29, pp. 1117-1124.

Peppard, J. and Rylander, A. (2006), "From value chain to value network: Insights for mobile operators", *European Management Journal*, Vol. 24, pp. 128-141.

Perona, M. and Saccani, N. (2004), "Integration techniques in customer-supplier relationships: An empirical research in the Italian industry of household appliances", *International Journal of Production Economics*, Vol. 89, No. 2, pp. 189-205.

Peteraf, M. and Reed, R. (2007), "Managerial discretion and internal alignment under regulatory constraints and change", *Strategic Management Journal*, Vol. 28, pp. 1089-1112.

Pettigrew, A.M. (1990), "Longitudinal field research on change: Theory and practice", *Organization Science*, Vol. 1, No. 3, pp. 267-292.

Peyrefitte, J., Golden, P.A. and Brice Jr, J. (2002), "Vertical integration and economic performance: a managerial capability framework", *Management Decision*, Vol. 40, No. 3, pp. 217-226.

Poba-Nzaou, P. and Raymond, L. (2010), "Managing ERP system risk in SMEs: a multiple case study", *Journal of Information Technology*, pp. 1-23.

Poler, R., Hemandez, J.E., Mula, J. and Lario, F.C. (2008), "Collaborative forecasting in networked manufacturing enterprises", *Journal of Manufacturing Technology Management*, Vol. 19, No. 4, pp. 514-528.

Ponis, S.T. and Spanos, A.C. (2009), "ERPII systems to support dynamic, reconfigurable and agile virtual enterprises", *International Journal of Applied Systemic Studies*, Vol. 2 No. 3, pp. 265-283.

Poon, P. and Wagner, C. (2001), "Critical success factors revisited: success and failure cases of information systems for senior executives", *Decision Support Systems*, Vol. 30, pp. 393-418.

Porter, M.E. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, Free Press, New York.

Post, J.E., Preston, L.E. and Sachs, S. (2002), "Managing the extended enterprise: the new stakeholder view", *California Management Review*, Vol. 45, No. 1, pp. 6-28.

Pouloudi, A. and Whitley, E.A. (1997), "Stakeholder identification in interorganizational systems: gaining insights for drug use management systems", *European Journal of Information Systems*, Vol. 15, No. 2, pp. 85-96.

Power, D. (2005), “Supply chain management integration and implementation: a literature review”, *Supply Chain Management: An International Journal*, Vol. 10, No. 4, pp. 252-263.

Power, D.J. (2008), “Decision support systems concept”, in: Adam, F. and Humphreys, P. (eds.) *Encyclopedia of Decision Making and Decision Support Technologies*, p. 232. Hershey, PA: Information Science Reference.

Power, D. and Singh, P. (2007), “The e-integration dilemma: the linkages between Internet technology application, trading partner relationships and structural change”, *Journal of Operations Management*, Vol. 25, pp. 1292-1310.

Prahalad, C.K. and Hamel, G. (1990), “The core competence of the corporation”, *Harvard Business Review*, May, pp. 79-91.

Prahalad, C.K. and Krishnan, M.S. (1999), “The new meaning of quality in the information age”, *Harvard Business Review*, Vol. 77, No. 5, pp. 109-118.

Presley, A. (2006), “ERP investment analysis using the strategic alignment model”, *Management Research News*, Vol. 29, No. 5, pp. 273-284.

Purchase, V., Parry, G., Valerdi, R., Hightingale, D. and Mills, J. (2011), “Enterprise Transformation: why are we interested, what is it, and what are the challenges?”, *Journal of Enterprise Transformation*, Vol. 1, No. 1, pp. 14-33.

Rai, A. and Tang, X. (2010), “Leveraging IT capabilities and competitive process capabilities for the management of interorganizational relationship portfolios”, *Information Systems Research*, Vol. 21, No. 3, pp. 516-542.

Raihana, G.F.H. (2012), “Cloud ERP – a solution model”, *International Journal of Computer Science and Information Technology & Security*, Vol.2, No. 1, pp. 76-79.

Rajaguru, R. and Matanda, M.J. (2009), “Influence of inter-organisational integration on business performance: The mediating role of organisational-level supply chain functions”, *Journal of Enterprise Information Management*, Vol. 22, No. 4, pp. 456-467.

Ramcharran, H. (2001), “Inter-firm linkages and profitability in the automobile industry: the implications for supply chain management”, *The Journal of Supply Chain Management*, Winter, pp. 11-17.

Ramrattan, M. and Patel, N.V. (2010), “Web-based information systems development and dynamic organisational change: the need for development tools to cope with emergent information requirements’, *Journal of Enterprise Information Management*, Vol. 23 No. 3, pp. 365-377.

Rao, S. (2000), “Enterprise resource planning: business needs and technologies”, *Industrial Management & Data Systems*, Vol. 100, No. 2, pp. 81-88.

Rappa, M.A. (2004), “The utility business model and the future of computing services”, *IBM Systems Journal*, Vol. 43 No. 1, pp. 32-42.

Rashid, M.A., Hossain, L. and Patrick, J.D. (2002), “The evolution of ERP systems: a historical perspective”, in Hossain, L., Patrick, J.D. and Rashid, M.A. (eds.), *Enterprise Resource Planning: Global opportunities and challenges* (pp. 1-16). Hershey, PA: Idea Group Publishing.

Ray, G., Wu, D. and Konana, P. (2009), “Competitive environment and the relationship between IT and vertical integration”, *Information Systems Research*, Vol. 20 No. 4, pp. 585-603.

Raymond, L. (2005), “Operations management and advanced manufacturing technologies in SMEs: a contingency approach”, *Journal of Manufacturing Technology Management*, Vol. 16, No. 8, pp. 936-955.

Rayport, J.F. and Sviokla, J.J. (1995), “Exploiting the virtual value chain”, *The McKinsey Quarterly*, Vol. 1, pp. 21-36.

Reuter, C., Foerstl, K., Hartmann, E. and Blome, C. (2010), “Sustainable global supplier management: the role of dynamic capabilities in achieving competitive advantage”, *Journal of Supply Chain Management*, Vol. 46, No. 2, pp. 45-63.

Reve, T. (1990), “The firm as a nexus of internal and external contracts”, in Aoki, M., Gustafson, B. and Williamson, O.E. (eds.), *The firm as a Nexus of Treaties*, Thousand Oaks, CA: Sage Publications.

Richards, T. (2002), “An intellectual history of NUD*ist and Nvivo”, *International Journal of Social Research Methodology*, Vol. 5, No. 3, pp. 199-214.

Richardson, J. (1996), “Vertical integration and rapid response in fashion apparel”, *Organization Science*, Vol. 7 No. 4, pp. 400-412.

Risjord, M., Dunbar, S.B. and Moloney, M.F. (2002), “A new foundation for methodological triangulation”, *Journal of Nursing Scholarship*, Vol. 34, No. 3, pp. 269-275.

Rodon, J., Sese, F. and Christiaanse, E. (2011), "Exploring users' appropriation and post-implementation managerial intervention in the context of industry IOIS", *Information Systems Journal*, Vol. 21, pp. 223-248.

Rosenzweig, E.D. (2009), "A contingent view of e-collaboration and performance in manufacturing", *Journal of Operations Management*, Vol. 27, pp. 462-478.

Rotem-Gal-Oz, A., Bruno, E. and Dahan, U. (2007), *SOA patterns*, Manning Publications Co.

Rothaermel, F.T., Hitt, M.A. and Jobe, L.A. (2006), "Balancing vertical integration and strategic outsourcing: effects on product portfolio, product success, and firm performance", *Strategic Management Journal*, Vol. 27, pp. 1033-1056.

Rouibah, K. and Ould-Ali, S. (2006), "Dynamic data sharing and security in a collaborative product definition management system", *Robotics and Computer-Integrated Manufacturing*, Vol. 23, No. 2, pp. 217-233.

Sabbaghi, A. (2011), "CIM strategy and strategic management: An MIS perspective", *The Journal of Applied Business Research*, Vol. 7, No. 1, pp. 57-66.

Saeed, K.A., Malhotra, M.K. and Grover, V. (2011), "Interorganizational system characteristics and supply chain integration: an empirical research", *Decision Sciences*, Vol. 42 No. 1, pp. 7-42.

Samaranayake, P. (2009), "Business process integration, automation, and optimization in ERP: integrated approach using enhanced process models", *Business Process Management Journal*, Vol. 15 No. 4, pp. 504-526.

Samaranayake, P. and Chan, F.T.S. (2006), "Business process integration and automation in ERP system environment – integration of applications and workflows", paper presented at the 2nd International Conference on Information Management and Business, Sydney.

Sammon, D. and Adam, F. (2005), "Towards a model of organizational prerequisites for enterprise-wide systems integration: examining ERP and data warehousing", *Journal of Enterprise Information Management*, Vol. 18 No. 4, pp. 458-470.

Sanders, N.R. (2007), "An empirical study of the impact of e-business technologies on organizational collaboration and performance", *Journal of Operations Management*, Vol. 25, No. 6, pp. 1332-1347.

Sarkis, J., Talluri, S. and Gunasekaran, A. (2007), "A strategic model for agile virtual enterprise partner selection", *International Journal of Operations & Production Management*, Vol. 27, No. 11, pp. 1213-1234.

Sawhney, M. and Parikh, D. (2001), "Where value lives in a networked world", *Harvard Business Review*, Vol. 79, No. 1, pp. 79-86.

Schniederjans, M.J. and Kim, G.C. (2003), "Implementing enterprise resource planning systems with total quality control and business process reengineering: survey results", *International Journal of Operations & Production Management*, Vol. 23, Nos. 3/4, pp. 418-429.

Schroth, C. and Schmid, B. (2009), "Reference architecture for cross-company electronic collaboration", *International Journal of e-Collaboration*, Vol. 5, No. 2, pp. 75-91.

Scott, J.E. and Vessey, I. (2000), "Implementing enterprise resource planning systems: the role of learning from failure", *Information Systems Frontiers*, Vol. 2 No. 2, pp. 213-232.

Sedmak, M., Fan, I.S. and Wognum, P.M. (2004), "Hidden gems: what literature reveals about the cases of enterprise system implementation", in *Proceedings of the British Academy of Management Conference*, St Andrews, UK, pp. 1-21.

Seifert, M. (2009), "Collaboration formation in virtual organisations by applying prospective performance measurement", dissertation, University of Bremen, Bremen.

Sekaran, U. and Bougie, R. (2010), *Research Methods for Business: A Skill Building Approach*, 5th Edition, Hoboken, NJ: John Wiley & Sons.

Serrano, N.S. and Sarriegi, J.N. (2006), "Open source software ERPs: a new alternative for an old need", *IEEE Software*, Vol. 23, No. 3, pp. 94-97.

Shang, S. and Seddon, P.B. (2000), "A comprehensive framework for classifying the benefits of ERP systems", *Americas Conference on Information Systems (AMCIS) 2000 Proceedings*, paper 39, pp. 1005-1014, available at: http://aisel.aisnet.org/amcis2000/39.

Shannak, R.O. and Aldhmour, F.M. (2009), "Grounded theory as methodology for theory generation in information system research", *European Journal of Economics, Finance and Administrative Sciences*, Issue. 15, pp. 32-50.

Sharif, A.M., Irani, Z. and Love, P.E.D. (2005), "Integrating ERP with EAI: a model for post-hoc evaluation", *European Journal of Information Systems*, Vol. 14 No. 2, pp. 162-174.

Sharif, A.M. (2010), "Invited viewpoint: it's written in the cloud: the hype and promise of cloud computing", *Journal of Enterprise Information Management*, Vol. 23 No. 2, pp. 131-134.

Sharp, J.M., Irani, Z. and Desai, S. (1999), "Working towards agile manufacturing in the UK industry", *International Journal of Production Economics*, Vol. 62, pp. 155-169.

Shehab, E., Sharp, M., Supramaniam, L. and Spedding, T. (2004), "Enterprise resource planning: an integrative review", *Business Process Management Journal*, Vol. 10, No. 4, pp. 359-386.

Shi, Y. and Gregory, M. (1998), "International manufacturing networks – to develop global competitive capabilities", *Journal of Operations Management*, Vol. 16, pp. 195-214.

Shiau, W.L., Hsu, P.Y. and Wang, J.Z. (2009), "Development of measures to assess the ERP adoption of small and medium enterprises", *Journal of Enterprise Information Management*, Vol. 22 Nos. 1/2, pp. 99-118.

Shotter, J. (1993), *Conversational realities: Constructing life through language*, Sage Publications.

Shukla, S., Agarwal, S. and Shukla, A. (2012), "Trends in cloud-ERP for SMB's: a review", *International Journal of New Innovations in Engineering and Technology*, Vol. 1, No. 1, pp. 7-11.

Silverman, D. (2000), *Doing Qualitative Research: A Practical Handbook*, Sage, London.

Slater, S.F. and Narver, J.C. (1995), "Market orientation and the leading organization", *Journal of Marketing*, Vol. 59, No. 3, pp. 63-74.

Smart, A. (2008), "eBusiness and supply chain integration", *Journal of Enterprise Information Management*, Vol. 21 No. 3, pp. 227-246.

Smith, J.K. and Deemer, D.K. (2000), "The problem of criteria in an age relativism", in: Denzin, N.K. and Lincoln, Y.S. (eds.), *Handbook of Qualitative Research*, 2nd ed., Sage, Thousand Oaks, pp. 877-896.

Snider, B., da Silveira, G.J.C. and Balakrishnan, J. (2009), "ERP implementation at SMEs: analysis of five Canadian cases", *International Journal of Operations & Production Management*, Vol. 29 No. 1, pp. 4-29.

Snow, C.C. and Thomas, J.B. (1994), "Field research methods in strategic management: Contributions to theory building and testing", *Journal of Management Studies*, Vol. 31, No. 4, pp. 457-480.

Soh, C., Kien, S. and Tay-Yap, J. (2000), "Cultural fits and misfits: is ERP a universal solution?", *Communication of the ACM*, Vol. 43, No. 4, pp. 47-51.

Somers, T.M. and Nelson, K. (2001), "The impact of critical success factors across the stages of enterprise resource planning implementations", *Proceeding of the 34th Hawaii International Conference on System Sciences*, Hawaii.

Songini, M.L. (2002), "J.D. Edwards pushes CRM, ERP integration", *Computerworld*, Vol. 36 No. 25, p. 4.

Soon, Q.H. and Udin, Z.M. (2011), "Supply chain management from the perspective of value chain flexibility: an exploratory study", *Journal of Manufacturing Technology Management*, Vol. 22 No. 4, pp. 506-526.

Spiggle, S. (1994), "Analysis and interpretation of qualitative data in consumer research", *Journal of Consumer Research*, Vol. 21 No. 3, pp. 491-503.

Squire, B., Cousins, P., Lawson, B. and Brown, S. (2009), "The effect of supplier manufacturing capabilities on buyer responsiveness", *International Journal of Operations & Production Management*, Vol. 29, No. 8, pp. 766-788.

Stabell, C.B. and Fjeldstad, O.D. (1998), "Configuring value for competitive advantage: on chains, shops, and networks", *Strategic Management Journal*, Vol. 19, No. 5, pp. 413-437.

Stake, R.E. (1995), *The Art of Case Study Research*. Thousand Oaks, Sage.

Stalk, G., Evans, P. and Shulman, L.E. (1992), "Competing on capabilities: the new rules of corporate strategy", *Harvard Business Review*, March-April, pp. 57-69.

Steele, B.J. (2007), "Eavesdropping and honoured ghosts: from classical to reflexive realism", *Journal of International Relations and Development*, Vol. 10, pp. 272-300.

Stevens, C.P. (2003), "Enterprise resource planning: a trio of resources", *Information Systems Management*, Vol. 20 No. 3, pp. 61-71.

Stevenson, M. and Spring, M. (2009), "Supply chain flexibility: an inter-firm empirical study", *International Journal of Operations & Production Management*, Vol. 29, No. 9, pp. 946-971.

Strauss, A.L. (1987), *Qualitative Analysis for Social Scientists*. Cambridge, CA, Cambridge University Press.

Strauss, A.L. (1994), “Discovering new theory from previous theory: an exercise in theoretical sampling”, in: Glaser, B.G. (ed.), *More Grounded Theory Methodology: A Reader*, Sociology Press, Mill Valley, pp. 369-388.

Strauss, A.L. and Corbin, J. (1990), *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Newbury Park, CA, Sage.

Strauss, A.L. and Corbin, J. (1998). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, 2nd ed., Thousand Oaks, CA, Sage.

Subramani, M. "How do suppliers benefit from information technology use in supply chain relationships," *MIS Quarterly*, Vol. 28, No. 1, March, pp. 45-74.

Subramoniam, S., Tounsi, M. and Krishnankutty, K.V. (2009), “The role of BPR in the implementation of ERP systems”, *Business Process Management Journal*, Vol. 15, No. 5, pp. 653-668.

Suddaby, R. (2006), “From the editors: What grounded theory is not”, *Academy of Management Journal*, Vol. 49, No. 4, pp. 633-642.

Sullivan, C.H. Jr (1985), “Systems planning in the information age”, *Sloan Management Review*, Vol. 27, No. 4, pp. 3-12.

Sultan, N.A. (2011), “Reaching for the “cloud”: how SMEs can manage”, *International Journal of Information Management*, Vol. 31, pp. 272-278.

Sumner, M. (2000), “Risk factors in enterprise-wide/ERP projects”, *Journal of Information Technology*, Vol. 15, pp. 317-327.

Sutton, S.G. (2006), “Extended-enterprise systems’ impact on enterprise risk management”, *Journal of Enterprise Information Management*, Vol. 19 No. 1, pp. 97-114.

Svahn, S. and Westerlund, M. (2009), “Purchasing strategies in supply relationships’, *Journal of Business & Industrial Marketing*, Vol. 24, Nos. 3/4, pp. 173-181.

Svensson, G. (2003), “Holistic and cross-disciplinary deficiencies in the theory generation of supply chain management”, *Supply Chain Management: An International Journal*, Vol. 8, No. 4, pp. 303-316.

Tam, M., Yen, D. and Beaumont, M. (2002), “Exploring the rationales for ERP and SCM integration”, *Industrial Management and Data Systems*, Vol. 102, No. 1, pp. 26-34.

Tapscott, D., Ticoll, D. and Lowy, A. (2000), *Digital Capital*. Harvard Business School Press, Boston, MA.

Tarafdar, M. and Qrunfleh, S. (2009), “IT-business alignment: a two-level analysis”, *Information Systems Management*, Vol. 26 No. 4, pp. 338-349.

Tarantilis, C.D., Kiranoudis, C.T. and Theodorakopoulos, N.D. (2008), “A web-based ERP system for business services and supply chain management: application to real-world process scheduling”, *European Journal of Operational Research*, Vol. 187, pp. 1310-1326.

Tate, W.L. and Ellram, L.M. (2009), “Offshore outsourcing: a managerial framework”, *Journal of Business & Industrial Marketing*, Vol. 24 Nos. 3/4, pp. 256-268.

“Ted” Weston, F.C. Jr. (2002), “A vision for the future of extended enterprise systems”, presentation, J.D. Edwards FOCUS users Conference, Denver, Colorado, 12 June.

“Ted” Weston, F.C. Jr. (2003), “ERPII: the extended enterprise system”, *Business Horizons*, November/December, pp. 49-55.

Teece, D.J. (2007), “Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance”, *Strategic Management Journal*, Vol. 28, pp. 1319-1350.

Tencati, A. and Zsolnai, L. (2009), “The collaborative enterprise”, *Journal of Business Ethics*, Vol. 85 No. 3, pp. 367-376.

Tesch, R. (1990), *Qualitative Research: Analysis Types and Software Tools*. New York, Falmer.

Tesfatsion, L. (2006), “Agent-based computational economics: A constructive approach to economic theory?”, in: Tesfatsion, L. and Judd, K.L. (eds), *Handbook of Computational Economics*, Vol. 2: Agent Based Computational Economics, North-Holland, New York, NY, pp. 831-80.

Themistocleous, M., Irani, Z. and O’Keefe, R. (2001), “ERP and application integration: exploratory survey”, *Business Process Management Journal*, Vol. 7 No. 3, pp. 195-204.

Thun, J.H. (2010), “Angles of integration: an empirical analysis of the alignment of internet-based information technology and global supply chain integration”, *Journal of Supply Chain Management*, Vol. 46 No. 2, pp. 30-44.

Todd, Z., Nerlich, B., McKeown, S. and Clarke, D.D. (2004), *Mixing methodologies in psychology: the integration of qualitative and quantitative methods in theory and practice*. Hove: Psychology Press.

Torbacki, W. (2008), "SaaS – direction of technology development in ERP/MRP systems", *Archives of Materials Science and Engineering*, Vol. 31 No. 1, pp. 57-60.

Triantafillakis, A., Kanellis, P. and Martakos, D. (2004), "Data warehousing interoperability for the extended enterprise", *Journal of Database Management*, Vol. 15 No. 3, pp. 73-82.

Trienekens, J.H. and Beulens, A.J.M. (2001), "Views on inter-enterprise relationships", *Production Planning & Control*, Vol. 12, No. 5, pp. 466-477.

Tsinopoulos, C. and Bell, K. (2010), "Supply chain integration systems by small engineering to order companies: the challenge of implementation", *Journal of Manufacturing Technology Management*, Vol. 21, No. 1, pp. 50-62.

Tsou, H.T. and Chen, J.S. (2012), "The influence of interfirm codevelopment competency on e-service innovation", *Information and Management*, Vol. 49, Nos 3-4, pp. 177-189.

Tugnawat, P. (2008), *Service oriented approach for ERP integration*. Retrieved June 10, 2010, from http://blogs.oracle.com/pt/2008/03/service_oriented_approach_for.html.

Turban, E., Leidner, D., Mclean, E. and Wetherbe, J. (2006), *Information Technology for Management: Transforming Organizations in the Digital Age*, 5th ed., John Willy & Sons.

Tuusjärvi, E. and Möller, K. (2009), "Multiplicity of norms in inter-company cooperation", *Journal of Business & Industrial Marketing*, Vol. 24, No. 7, pp. 519-528.

Urquhart, C. and Fernández, W. (2013), "Using grounded theory method in information systems: The researcher as blank slate and other myths", *Journal of Information Technology*, Vol. 28, pp. 224-236.

Usunier, J.C. (1996), *Marketing Across Cultures*, Prentice-Hall, Englewood Cliffs, NJ.

Vallespir, B. and Kleinhans, S. (2001), "Positioning a company in enterprise collaborations: vertical integration and make-or-buy decisions", *Production Planning and Control*, Vol. 12, pp. 478-487.

Van de Ven, A.H. (1989), "Nothing is quite so practical as a good theory", *Academy of Management Review*, Vol. 14, No. 4, pp. 486-489.

Van de Ven, A.H. and Drazin, R. (1985), *The Concept of Fit in Contingency Theory*, in Staw, B.M. and Cummings, L.L. (eds), Research in Organizational Behavior, 7, pp. 333-365, Greenwich, CT, JAI Press.

Van Maanen, J. (1979), "The fact of fiction in organisational ethnography", *Administrative Science Quarterly*, Vol. 24, No. 4, pp. 539-550.

Vannoy, S. and Salam, A. (2010), "Managerial interpretations of the role of information systems in competitive actions and firm performance: A grounded theory investigation", *Information Systems Research*, Vol. 21, No. 3, pp. 496-515.

Vathanophas, V. (2007), "Business process approach towards an inter-organizational enterprise system", *Business Process Management Journal*, Vol. 13 No. 3, pp. 433-450.

Vazquez-Bustelo, D. and Avella, L. (2006), "Agile manufacturing: industrial case studies in spain", *Technovation*, Vol. 26, pp. 1147-1161.

Wacker, J.G. (1998), "A definition of theory: research guidelines for different theory-building research methods in operations management", *Journal of Operations Management*, Vol. 16, No. 4, pp. 361-385.

Wallace, T.F. and Kremzar, M.H. (2001), *ERP: Making it Happen: The Implementer's Guide to Success with Enterprise Resource Planning*, Wiley, New York, NY.

Walters, D. (2004). "New business models – new approaches", *International Journal of Physical Distribution & Logistics Management*, 34 Nos. 3/4, pp. 219-229.

Wan, Y. and Clegg, B. (2010), "Enterprise management and ERP development: Case study of Zoomlion using the dynamic enterprise reference grid", in CENTERIS 2010 – Conference on ENTERprise Information Systems. Eds. Quintela Varajão, J.E., Part I, CCIS, pp. 191-198. October 20-22, Portugal Springer Verlag. ISBN: 978-3-642-16401-9.

Wang, Z.J., Xu, X.F. and Zhan, D.C. (2006), "Component reuse based agile reconfiguration for enterprise resource planning (ERP) systems in manufacturing enterprises", *International Journal of Production Research*, Vol. 44 No. 23, pp. 5107-5129.

Ward, P.T., Bickford, D.J., Leong, G.K. (1996), "Configuration of manufacturing strategy, business strategy, environment, and structure", *Journal of Management*, Vol. 22, No. 4, pp. 597-626.

Waring, T. and Wainwright, D. (2008), "Issues and challenges in the use of template analysis: Two comparative case studies from the field", *The Electronic Journal of Business Research Methods*, Vol. 6, No. 1, pp. 85 – 94.

Watzlawick, P. (1984), *The invented reality*. Cambridge, Mass: Harvard university Press.

Weber, M.M. (2002), "Measuring supply chain agility in the virtual organization", *International Journal of Physical Distribution and Logistics Management*, Vol. 32, No. 7, pp. 557-590.

Wei, Z., Tan, J. and Feng, Y. (2009), "Integration technology of ERP and PDM based on business remote function call", *International Journal of Advanced Manufacturing Technology*, Vol. 40, pp. 1044-1052.

Westrup, C. and Liu, W. (2008), "Both global and local: ICTs and joint ventures in China", *Information Systems Journal*, Vol. 18, pp. 427-443.

Whetten, D.A. (1989), "What constitutes a theoretical contribution?", *Academy of Management Review*, Vol. 14, No. 4, pp. 490-495.

Wideder, B., Booth, P., Matolcsy, Z.P. and Ossimitz, M-L. (2006), "The impact of ERP systems on firm and business process performance", *Journal of Enterprise Information Management*, Vol. 19, Nos. 1/2, pp. 13-29.

Wight, O. (1984), *Manufacturing Resource Planning: MRPII*, Williston: Oliver Wight Ltd. Publications.

Wilkes, L. and Veryard, R. (2004), "Service-Oriented Architecture: considerations for agile systems", *Microsoft Architect Journal*, April, available at: www.msdn2.microsoft.com (accessed 16 May 2010).

Williamson, O.E. (1979), "Transaction-cost economics: the governance of contractual relations", *Journal of Law and Economics*, Vol. 12, pp. 233-250.

Williamson, O.E. (2008), "Outsourcing: Transaction cost economics and supply chain management", *Journal of Supply Chain Management*, Vol. 44, No. 2, pp. 5–27.

Wood, B. (2010), "ERP vs. ERPII vs. ERPIII future enterprise applications", available at: www.r3now.com/erp-vs-erp-ii-vs-erp-iii-future-enterprise-applications (accessed 3 October 2010).

Wooldridge, M. (1997), "Agent-based software engineering", *IEE Proceedings – Software*, Vol. 144, No. 1, pp. 26-37.

Wortmann, J.C., Hegges, H.M.H. and Rolfes, S. (2000), "Embedding enterprise software in extended enterprise models", *Computers in Industry*, Vol. 42, pp. 231-43.

Wu, C. and Barnes, D. (2012), "A dynamic feedback model for partner selection in agile supply chains", *International Journal of Operations & Production Management*, Vol. 32, No. 1, pp. 79-103.

Wu, N. and Sun, J. (2002), "Grouping the activities in virtual enterprise paradigm", *Production Planning & Control*, Vol. 13, No. 4, pp. 407-415.

Wu, Z., Choi, T.Y. and Rungtusanatham, M.J. (2010), "Supplier-supplier relationships in buyer-supplier-supplier triads: Implications for supplier performance", *Journal of Operations Management*, Vol. 28, No. 2, pp. 115-123.

Wylie, L. (1990), "A vision of the next-generation MRPII", Scenario S-, pp. 300-339, Gartner Group, April 12.

Xu, W., Wei, Y. and Fan, Y. (2002), "Virtual enterprise and its intelligence management", *Computers & Industrial Engineering*, Vol. 42, pp. 199-205.

Xu, X. (2012), "From cloud computing to cloud manufacturing", *Robotics and Computer-Integrated Manufacturing*, Vol. 28, No. 1, pp. 75-86.

Yam, A.Y.K., Chan, M.F.S. and Chung, W.W.C. (2007), "Networked enterprises: a case study of implementing an information network system for global product development", *Benchmarking: An International Journal*, Vol. 14 No. 3, pp. 369-386.

Yasuda, H. (2005), "Formation of strategic alliances in high-technology industries: Comparative study of the resource-based theory and the transaction-cost theory", *Technovation*, Vol. 25, No. 7, pp. 763-770.

Yin, R.K. (2003), *Case study research: Design and methods*, 3rd ed., Applied Social Research Methods Series, 5, Beverly Hills, CA, Sage.

Yu, J. and Krishnan, K. (2004), "A conceptual framework for agent-based agile manufacturing cells", *Information Systems Journal*, Vol. 14, pp. 93-109.

Yusuf, Y.Y., Gunasekaran, A., Adeleye, E.O. and Sivayoganathan, K. (2004), "Agile supply chain capabilities: determinants of competitive objectives", *European Journal of Operational Research*, Vol. 159, pp. 379-392.

Zeng, A.Z. and Pathak, B.K. (2003), “Achieving information integration in supply chain management through B2B e-hubs: concepts and analyses”, *Industrial Management & Data Systems*, Vol. 103, No. 9, pp. 657-65.

Zhao, X., Huo, B., Flynn, B.B. and Yeung, J. (2008), “The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain”, *Journal of Operations Management,* Vol. 26, No. 3, pp. 368-388.

Zhu, K. and Kraemer, K.L. (2002), “E-commerce metrics for net-enhanced organizations: Assessing the value of e-commerce to firm performance in the manufacturing sector”, *Information Systems Research*, Vol. 13, No. 3, pp. 275–295.

Zrimsek, B. (2003), “ERPII vision”, paper presented at US symposium/ITxpo. Gartner Research (25C, SPG5, 3/03), San Diego, CA, 23-27 March.

Zuboff, S. (1988), *In the Age of the Smart Machine: the Future of Work and Power*. Oxford: Heinemann.

APPENDIX

Appendix A: Pre-Study Literature Review Results

Table I. Journals-Key Terms Matrix

(Distribution of studies by source in the journals to meet key terms)

Selected Journal	**Search Key Terms**									
	ERP			Inter-firm/org. Relationships (a.k.a. enterprise mgt.)			Supply Chain Integration	Dynamic Capabilities	Interoperability & Networking	Enterprise/org. Transformation
	ERP	ERPII	ERP and new IT/IS	Vertical Integration	Extended enterprise	Virtual Enterprise				
Advanced Engineering Informatics									1	
Automation in Construction									1	
American Journal of Business							1			
African Journal of Business Management			1				1			
Academy of Management Journal				1	1					
Academy of Management Review				3	1	2				
Archives of Materials Science and Engineering	1		1			1				
Annual Reviews in Control						1			1	
Asian Social Science				1	1	1	1		1	
Benchmarking: An International Journal	1	2	2		1	2			2	
Business Ethics Quarterly						1				
Business Horizons		2			1					
Business Intelligence Journal			1				1			
Business & Information Systems Engineering			1							

Business Process Management Journal	18	4	4	3	4	6	6		4	9
BT Technology Journal			1			1		1		
Computer			1							
Computers & Education	1	1								
Concurrent Engineering				1			1			
Cornell Hospitality Quarterly				2						
Computers & Industrial Engineering			1	1	1	2				
Computers in Industry	2	1	4	3	5	9	1	1	8	1
Cutter IT Journal					1	1			1	
California Management Review		1			1					
Communications of the ACM	1	3	3	1	1	2				
Communications of the Association for Information Systems (AIS)	3	2	1	1			1		2	
Communications of the IIMA		1		1	1	1				
Computer Standards & Interfaces									2	
Communication Teacher				1						
Comparative Technology Transfer and Society										1
Decision Sciences		1		1	1	1	2			
Decision Support Systems	2		1			1		1		
Engineering Applications of Artificial Intelligence			1			1	1	1	1	1
Electronic Commerce Research				1	1	1		1		
Electronic Commerce Research and Applications		1	2			1				
Economic Geography				2	1	1	1			

Economy Informatics		1	1							
Enterprise Information Systems	1									
European Journal of Information Systems	8	7	10	6	12	13	3	3	9	4
European Journal of Operational Research	4		3			1	4	2		
Engineering Management Journal			1							
European Management Journal									1	
Expert Systems with Applications	1	1	1	1	1	1	1		1	
Foreign Affairs				1	1	1	1		1	
Future Generation Computer Systems	1	1	1							
Global Journal of Enterprise Information System	1		1		1	1	1		1	
Harvard Business Review	1						1		2	
IBM Systems Journal			3		1	1				
Industrial and Corporate Change				1				3		
Information and Organization	1	1				1			1	
Information and Software Technology			3		1	1	1	1	2	
Internet Computing IEEE		1	1							
International Economic Journal				1						
International Journal of Agile Management Systems	1				1	1	1	1		
International Journal of Advanced Manufacturing Technology	1	2	1		3	3	3		3	
International Journal of Applied Systemic Studies		1				1				

International Journal of Business Science and Applied Management		1	1		1		1		1	
International Journal of Computer Integrated Manufacturing			1			3		1	1	
International Journal of Computer Science and Network Security	1						1			
International Journal of Computer Science & Communication	1		1			1				
International Journal of e-Collaboration	1	2	1	2	5	7	1		6	3
International Journal of Electronic Commerce							1		1	
International Journal of Enterprise Information Systems	1									
International Journal of Engineering Science and Technology	1		1							
International Journal of Human Resource Management				1						
International Journal of Information Management	7	3	5	6	5	9	2	1	2	3
International Journal of Innovation, Management and Technology							1			
International Journal of Industrial Organization				1	1					
International Journal of Leadership in Education									1	
International Journal of Logistics Research and Applications				1	1	2	1			

International Journal of Management and Information Systems	2	1	3							
International Journal of Medical Informatics									1	
International Journal of Management Reviews				2	2	2			1	
International Journal of Operations & Production Management	6	5	6	11	14	17	20	9	13	5
International Journal of Productivity and Performance Management					1		1			
International Journal of Physical Distribution & Logistics Management	2	2	1	2	3	3	9	2	3	
International Journal of Production Economics	2	3		4	4	7	10	2	7	
International Journal of Project Management									1	
International Journal of Production Research	5	2	3	2	2	5	3	4	3	3
International Journal of Quality & Reliability Management			1	1	1	2				
Industrial Management				1						
Information & Management	9	5	4	2	3	3	4		2	1
Information Management & Computer Security	1	1		1	1	1			1	
Industrial Management & Data Systems	4	3	5					1		
Industrial Marketing Management					1		3		1	
Information Polity			1			2				
Internet Research:				1	1	1				

Electronic Networking Applications and Policy										
Information Resources Management Journal		1								
Information Systems									1	
Information Systems Journal	21	19	25	7	10	27	5	4	13	12
Information Systems Management	5	2	4			1	1		1	
Information Systems Research	2	3	4	3	3	3		2	4	
International Transactions in Operational Research	1	2	1							1
IEEE Transactions on Systems, Man, and Cybernetics								1		1
Information Technology & People	1									
Journal of Accountancy				1						
Journal of Applied Behavioral Science				1						
Journal of Achievements in Materials and Manufacturing Engineering						1				
Journal of Advanced Manufacturing Systems			1			3		1	1	
Journal of Business Ethics				1					1	
Journal of Business & Industrial Marketing		2	1	3	18	6	5	1	14	
Journal of Business Logistics							1	1		
Journal of Computing			1			1				
Journal of Computer Information Systems	1	1	1							
Journal of Database		1	1	1	2	1			2	

Management										
Journal of Enterprise Information Management	18	13	18	4	7	15	3	2	6	2
Journal of Electronic Commerce Research			1							
Journal of Economics & Management Strategy				1	1	1			1	
Journal of Enterprise Transformation				1		1		1	1	7
Journal of Emerging Technologies in Accounting	1									
Journal of International Business Studies		1			1				1	
Journal of Integrated Care				1						
Journal of Intelligent & Fuzzy Systems		1				1			1	
Journal of Intelligent Manufacturing			2			3			1	
Journal of Information Technology	2	1	3			1		2	3	
Journal of Information Technology Theory and Application		1	1						1	
Journal of Knowledge Management						2		2		
Journal of Law and Economics				1	1	1			1	
Journal of Management						1				
Journal of Money, Credit, and Banking				1						
Journal of Media Economics				1	1					
Journal of Management Information Systems	1	1	3			1	1		1	
Journal of	6	3	13	10	12	22	16	6	12	3

Manufacturing Technology Management										
Journal of Organizational Computing and Electronic Commerce					1	1		1		1
Journal of Organizational Change Management		2	3		2	2		1		4
Journal of Operations Management	4	6	4	12	19	12	18	4	18	1
Journal of Supply Chain Management	1	2	1	2	14	4	11	2	9	
Journal of Strategic Information Systems						1			1	
Journal of Service Science & Management						1				
Journal of the Association for Information Systems	1	1	1					1	1	
Journal of the European Economic Association	1			1						
Leader to Leader				1						
Management Accounting Research			1			1				
Management Decision				2	2	1				
Managerial Finance			1		1	1				1
MIS Quarterly	1	2	1	1	1	1			1	
MIS Quarterly Executive	1	1								
Management Research News	1	1								
Management Research Review		1	1						1	1
Online Information Review		1	1							
Organization Science	1			3	1	1		1	2	
Pacific Asia Journal of the Association for Information Systems		1	1					1		

Procedia Computer Science			1					1		
Perspectives of Innovations, Economics & Business					1				1	
Public Organization Review					1	1			1	
Production Planning & Control		3	1	4	11	5	2		6	
Robotics and Computer-Integrated Manufacturing		1	1		1			1		1
Revista Informatica Economică		1		1	1	1			1	
Rand Journal of Economics				1						
Review of Economics and Statistics	1			1						1
Research Policy				1	1	1			1	
Supply Chain Management							1			
Supply Chain Management: An International Journal	2	2	1	1	7	5	16	2	7	1
Software, IEE Proceedings		1			1					
Strategy & Leadership					1				1	1
Strategic Management Journal				6	4	3		1		
Sloan Management Review				1	1					
Systems Research and Behavioral Science	1	1								
Technovation		1	1			3				2
The Bell Journal of Economics				1						
The Database for Advances in Information						1				1

Systems										
Turkish Journal of Electrical Engineering & Computer Sciences		1	1					1		1
The Journal of Industrial Economics				1						
Total Quality Management & Business Excellence	2	1		2						1
Transportation Research Part		1			1		1	1		
VINE: The Journal of Information and Knowledge Management Systems		1		1	1			1		1
Work Study						1				
Subtotal counts	168	146	186	151	218	265	172	77	207	75
Total counts	1665[s]									

Note: [s] While 796 journal papers were reviewed, some articles were based in more than one *key terms* and were, therefore, placed in multiple disciplines

Table II. Journals-Academic Database Matrix
(Distribution of journal papers obtained from academic literature database)

Group	Selected Journals	Academic Literature Database												Results
		Elsevier	Emerald	JSTOR	Springer	IEEE Xplore	IGI	ABI/Inform Global	Informs	Taylor & Francis	Wiley	Palgrave	Others[t]	
Operations, Manufacturing & Supply Chain Management	European Journal of Operational Research	9												9
	International Journal of Logistics Research and Applications									2				2
	International Journal of Operations & Production Management		60											60
	International Journal of Productivity and Performance Management		1											1
	International Journal of Physical Distribution & Logistics Management		12											12
	International Journal of Production Economics	22												22
	International Journal of Production Research									13				13
	International Transactions in Operational Research	2												2
	Journal of Achievements in Materials and Manufacturing Engineering												1	1
	Journal of Business Logistics										1			1
	Journal of Intelligent Manufacturing				2			1						3
	Journal of Operations Management	40												40
	Journal of Supply Chain Management							2			21			23

[t] 'Others' includes the ACM, AISeL, Sage, Pergamon Press , Scientific Commons, Oxford University Press, ME Sharpe, MCB University Press, MIT Press, etc.

	Production Planning & Control									14				14
	Supply Chain Management												1	1
	Supply Chain Management: An International Journal		22											22
	Total Quality Management & Business Excellence									4				4
	Transportation Research Part	1												1
	Work Study		1											1
1st Group Results	19 journals	74	96	0	2	0	0	3	0	33	22	0	2	232
Information Technology, Engineering & Innovation Management	Advanced Engineering Informatics	1												1
	Automation in Construction	1												1
	Archives of Materials Science and Engineering												1	1
	Annual Reviews in Control	1												1
	Business & Information Systems Engineering				1									1
	BT Technology Journal				1									1
	Computer					1								1
	Computers & Education	1												1
	Concurrent Engineering												1	1
	Computers & Industrial Engineering	1											1	2
	Computers in Industry	15												15
	Cutter IT Journal												1	1
	Communications of the ACM												5	5
	Communications of the Association for Information Systems (AIS)												4	4
	Communications of the IIMA												2	2
	Computer Standards & Interfaces	2												2
	Comparative Technology Transfer and Society												1	1
	Decision Support Systems	4												4
	Engineering Applications of Artificial Intelligence	1												1
	Electronic Commerce												1	1

	Research													
	Electronic Commerce Research and Applications	3												3
	Enterprise Information Systems									1				1
	European Journal of Information Systems											34		34
	Engineering Management Journal												1	1
	Expert Systems with Applications	2												2
	Future Generation Computer Systems	2												2
	Global Journal of Enterprise Information System												2	2
	IBM Systems Journal					3								3
	Information and Software Technology	3												3
	Internet Computing IEEE					1								1
	International Journal of Agile Management Systems		3											3
	International Journal of Advanced Manufacturing Technology				6									6
	International Journal of Computer Integrated Manufacturing									3				3
	International Journal of Computer Science and Network Security												1	1
	International Journal of Computer Science & Communication												1	1
	International Journal of e-Collaboration						9							9
	International Journal of Electronic Commerce												1	1
	International Journal of						1							1

	Enterprise Information Systems													
	International Journal of Engineering Science and Technology												1	1
	International Journal of Information Management	21											1	22
	International Journal of Innovation, Management and Technology												1	1
	International Journal of Management and Information Systems							4						4
	International Journal of Medical Informatics	1												1
	Information & Management	14												14
	Information Management & Computer Security							1						1
	Industrial Management & Data Systems		9											9
	Information Polity												2	2
	Internet Research: Electronic Networking Applications and Policy												1	1
	Information Resources Management Journal							1						1
	Information Systems	1												1
	Information Systems Journal										72			72
	Information Systems Management									8				8
	Information Systems Research								8					8
	IEEE Transactions on Systems, Man, and Cybernetics					1								1
	Information Technology & People		1											1
	Journal of Advanced Manufacturing Systems												3	3
	~~Journal of Computing~~												1	1

	Journal of Computer Information Systems												2	2
	Journal of Database Management							2						2
	Journal of Enterprise Information Management		40											40
	Journal of Electronic Commerce Research												1	1
	Journal of Intelligent & Fuzzy Systems												1	1
	Journal of Information Technology									1		4		5
	Journal of Information Technology Theory and Application												1	1
	Journal of Management Information Systems												4	4
	Journal of Manufacturing Technology Management		48											48
	Journal of Organizational Computing and Electronic Commerce									1				1
	Journal of Strategic Information Systems	1												1
	Journal of the Association for Information Systems												1	1
	Online Information Review		1											1
	Pacific Asia Journal of the Association for Information Systems												1	1
	Procedia Computer Science	1												1
	Robotics and Computer-Integrated Manufacturing	2												2
	Research Policy	1												1
	Software, IEE Proceedings					1								1
	Systems Research and Behavioral Science										1			1

	Technovation	3												3
	The Database for Advances in Information Systems												1	1
	Turkish Journal of Electrical Engineering & Computer Sciences												1	1
	VINE: The Journal of Information and Knowledge Management Systems		4											4
2nd Group Results	80 journals	82	106	0	8	7	10	8	8	14	73	38	46	400
General Strategic Management & Business Practices	American Journal of Business		1											1
	African Journal of Business Management												1	1
	Academy of Management Journal			1										1
	Academy of Management Review			4										4
	Benchmarking: An International Journal		3											3
	Business Horizons												1	1
	Business Intelligence Journal												1	1
	Business Process Management Journal		34											34
	Cornell Hospitality Quarterly												2	2
	California Management Review												2	2
	European Management Journal												1	1
	Harvard Business Review												4	4
	International Journal of Applied Systemic Studies												1	1
	International Journal of Business Science and Applied Management												1	1
	International Journal of Management Reviews										2			2
	Journal of International Business Studies											1		1

	Journal of Management												1	1
	MIS Quarterly							1					1	2
	MIS Quarterly Executive												1	1
	Management Research News		1											1
	Management Research Review		2											2
	Strategic Management Journal			2							4			6
	Sloan Management Review							1						1
3rd Group Results	23 journals	0	41	7	0	0	0	2	0	0	6	1	17	74
Organization & Management Science	Asian Social Science												1	1
	Business Ethics Quarterly			1										1
	Communication Teacher									1				1
	Decision Sciences										2			2
	Industrial & Corporate Change												3	3
	Information and Organization												2	2
	International Journal of Human Resource Management									1				1
	International Journal of Industrial Organization	1												1
	International Journal of Leadership in Education									1				1
	International Journal of Project Management	1												1
	International Journal of Quality & Reliability Management		2											2
	Industrial Management												1	1
	Journal of Applied Behavioral Science												1	1
	Journal of Business Ethics				1									1
	Journal of Enterprise Transformation									8				8
	Journal of Integrated Care		1											1
	Journal of Knowledge Management												2	2
	Journal of Organizational		4											4

	Change Management													
	Journal of Service Science & Management												1	1
	Leader to Leader										1			1
	Management Decision		2					1						3
	Organization Science								4					4
	Public Organization Review				2									2
	Strategy & Leadership		1											1
4th Group Results	24 journals	2	10	1	3	0	0	1	4	11	3	0	11	46
Economic & Marketing Management	Economic Geography			1							1			2
	Economy Informatics												1	1
	Foreign Affairs												1	1
	International Economic Journal									1				1
	Industrial Marketing Management	3												3
	Journal of Accountancy												1	1
	Journal of Business & Industrial Marketing		21											21
	Journal of Economics & Management Strategy										1			1
	Journal of Emerging Technologies in Accounting												1	1
	Journal of Law and Economics												1	1
	Journal of Money, Credit, and Banking										1			1
	Journal of Media Economics									1				1
	Journal of the European Economic Association												1	1
	Management Accounting Research	1												1
	Managerial Finance		1											1
	Perspectives of Innovations, Economics & Business												1	1
	Revista Informatica Economică												1	1
	Rand Journal of Economics							1						1
	Review of Economics and												1	1

	Statistics													
	The Bell Journal of Economics			1										1
	The Journal of Industrial Economics										1			1
5th Group Results	21 journals	4	22	2	0	0	0	1	0	2	4	0	9	44
Total Results	167 journals	162	275	10	13	7	10	15	12	60	108	39	85	796

*53 high quality journals were provisionally selected as highlighted based on Table I and Table II

Table III. Journals Papers Classification

Selected journal	Paper amount	Key issues	Year	Academic literature database
Advanced Engineering Informatics	1	Deal with the class of interoperability in enterprise modeling	2004	Elsevier
Automation in Construction	1	Seek value proposition on interoperability of BIM and collaborative working environments	2010	Elsevier
American Journal of Business	1	Propose four levels of SCM integration with motivating factors	2009	Emerald
African Journal of Business Management	1	Focus on EAI, SOA and their relevance to e-SC formation	2010	Academic Journals
Academy of Management Journal	1	Propose a new look and framework at VI to predict when using make-or-buy decisions	1985	JSTOR
Academy of Management Review	4	Define the quasi firms to achieve inter-organizational forms	1989	JSTOR
		Propose a framework to develop the dimensions of vertical integration strategies	1984	JSTOR
		Present a model focusing on the process of adaption and acculturation in M&As	1988	JSTOR
		Develop a conceptual framework and identify the concept of fit in strategy research	1989	JSTOR
Archives of Materials Science and Engineering	1	Present SaaS technology used in ERP/MRP systems for SME production	2008	Archivesmse
Annual Reviews in Control	1	Discuss technical, semantic and org. issues of enterprise interoperability and networking	2010	Elsevier
Asian Social Science	1	Illustrate SDN enterprise's collaboration and compare different alliances between SDN and SC	2011	Ccsenet
Benchmarking: An International Journal	3	Empirically investigate the relationships between org. factors, BPI improvement and ERP success	2007	Emerald
		Improve the understanding of e-business, competitive advantage and their roles in SMEs	2007	Emerald
		Use global dispersed production network to show the networked enterprise and IS	2007	Emerald
Business Ethics Quarterly	1	Argue the confidence and trust in virtual corporation development	1998	JSTOR
Business Horizons	1	Discuss the future extended enterprise system – ERPII	2003	EconPapers
Business Intelligence Journal	1	Study how e-business has influenced the SCM	2008	DOAJ
Business & Information Systems Engineering	1	Present a comprehensive LR on the state of ISN research focusing on SNSs – Enterprise 2.0	2011	SpringerLink
Business Process Management Journal	34	Examine extended ERP systems at business network level	2005	Emerald
		Discuss SC and B2B to build virtual enterprises	2002	Emerald
		Process-oriented approach for facing complex social problem to ERP implementation	2001	Emerald
		Propose an integrated approach to process integration, automation and optimization in ERP	2009	Emerald
		Evaluate and improve two popular business process modeling languages	2009	Emerald
		Report on a global investigation of key turning points in business process maturity	2009	Emerald
		Improve the business process by determining and analyzing the weak points	2008	Emerald

		Conduct a survey on business process management standards	2009	Emerald
		Offer an approach to build an enterprise process view using cognitive mapping	2005	Emerald
		Discuss the idea of business process modeling with information integrity	2009	Emerald
		Determine criteria used in ERP selection process	2005	Emerald
		Develop and evaluate a methodology for business process improvement	2005	Emerald
		Analyze the impact of e-commerce and SC integration on firms	2005	Emerald
		Investigate and compare the technology-driven and process-driven approaches for ERP	2005	Emerald
		Examine the relationships between BPII, ISs integration and customer focus	2005	Emerald
		Present a virtual process simulation technique for modeling process alternatives	2009	Emerald
		Focus on process improvement and value-mapping in small network	2005	Emerald
		Understand the CSFs of ERP implementation in China	2009	Emerald
		Discuss business processes management through outsourcing	2009	Emerald
		Deliver an insight into the interaction effects of process-oriented mgt. and BI	2009	Emerald
		Present a methodology to define the best strategic practices for BPR	2009	Emerald
		Investigate and analyze the common success and failure factors of adopting ERP system project	2005	Emerald
		Present a research for developing a standard to process mgt. system in a whole SC	2009	Emerald
		Stress the impact of BPM and other CSFs on successful ERP implementations	2009	Emerald
		Focus on the role of BPR in the ERP systems implementation	2009	Emerald
		Present a comprehensive review of the research concerning ERP systems	2004	Emerald
		Analyze critical planning issues for ERP systems and identify the future trend of ESs	2001	Emerald
		Argue the integration potential of ERP can be unleashed by process-based performance systems	2002	Emerald
		Present an integrative review of the critical factors that cause ERP implementation failures	2010	Emerald
		Study the issues of ERP systems to the coordination of the activities of the enterprise	2007	Emerald
		Provide an understanding of how an org. changes in ERP implementation	2010	Emerald
		Describe how system thinking application to business processes resulting in PrOH modeling	2006	Emerald
		Identify the critical impediments that large orgs. face in the ERP systems implementation	2005	Emerald
		Help to successfully plan, implement, and operate ERP projects using a risk mgt. framework	2010	Emerald
BT Technology Journal	1	Examine the drivers of organizational agility and demands on Web services-based infrastructure	2004	SpringerLink
Computer	1	Discuss SoftUDC – a software-based data center for Utility Computing	2004	IEEE Xplore
Computers & Education	1	Study the processes of knowledge sharing and the influence of the IT use	2009	Elsevier

Concurrent Engineering	1	Assert the preferred modus operandi for multinational team is adopting process-oriented mfg.	1996	Cer.sagepub
Cornell Hospitality Quarterly	2	Examine the mergers and acquisitions (editorial)	2009	Sage
		Discuss the degree of relatedness in M&As to reap the potential benefits (editorial)	2009	Sage
Computers & Industrial Engineering	2	Expose the structure and management of virtual enterprise	2002	Elsevier
		Present an IS infrastructure and networking solution to support the inter-org. enterprises	1999	Pergamon Press
Computers in Industry	15	ICT architecture for virtual enterprise	2002	Elsevier
		Software solutions for networked organizations	2003	Elsevier
		Propose a framework for seamless interoperability in a collaborative networked environment	2009	Elsevier
		Define and clarify the architectures for enterprise integration and interoperability	2008	Elsevier
		Conclude the main challenges regarding frameworks supporting business systems integration	2010	Elsevier
		Show dynamic business network process management in instant virtual enterprises	2009	Elsevier
		Describe challenges, trends and issues in enterprise integration and interoperability	2008	Elsevier
		Achieve seamless interoperability in a collaborative networked environment	2008	Elsevier
		Propose a formalization of interoperability grounded in the general system theory	2010	Elsevier
		Investigate how reference information models can meet interoperability and agility of ISs	2010	Elsevier
		Analyze the recent research literature on ERP systems	2005	Elsevier
		Show a semantic web service environment for B2B and B2C auction apps. within EEs and VEs	2008	Elsevier
		Propose a new enterprise modeling methodology to SC reengineering and integration	2010	Elsevier
		Present a research and framework on OM for VEs	2003	Elsevier
		Develop a business processes oriented systems integration platform for networked enterprises	2010	Elsevier
Cutter IT Journal	1	Identify the management of collaborative governance-related challenges and approaches	2008	Cutter Consortium
California Management Review	2	Discuss the enterprise logistics in the information era	1997	Aerotropolis
		Manage the extended enterprise – the new stakeholder view	2002	Aerotropolis
Communications of the ACM	5	ERP experiences and evolution	2000	Scientific Commons
		Propose different multisite ERP implementation approaches	2000	Scientific Commons
		Describe an infrastructure for sharing mfg. information in virtual enterprises	1996	Scientific Commons
		List the best practices for successfully implementing ERPII (project) upgrade	2006	Scientific Commons
		Enterprise integration with ERP and EAI	2003	Scientific Commons
Communications of the Association for	4	Provide an annotated bibliography of the ERP publications and review the state of	2001	ACM

Information Systems (AIS)		the ERP art		
		Consolidate the fragmented knowledge on EA benefits/value and present the EA benefits model	2011	AISeL
		Explore IT's role in enabling collaboration in orgs.	2011	AISeL
		Explore the paradigm shifts focusing on e-business and business/systems integration	2000	AISeL
Communications of the IIMA	2	Examine the enterprise relationships mgt. and develop an integrated architecture	2008	Iima.org
		Describe a conceptual model for e-business enabled ERPII architecture	2010	Iima.org
Computer Standards & Interfaces	2	Promote global interoperability and interconnectivity of broadband networks	1998	Elsevier
		Survey interoperability frameworks and enterprise architectures in e-Government initiatives	2009	Elsevier
Communication Teacher	1	Understand the implications of media conglomeration in vertical and horizontal integration	2009	Taylor & Francis
Comparative Technology Transfer and Society	1	Identify the factors that contribute to IS development team learning	2006	Project MUSE
Decision Sciences	2	e-integration in the supply chain	2002	Wiley-Blackwell
		Develop the IOS concept and examine its configuration with different SCI profiles	2011	Wiley-Blackwell
Decision Support Systems	4	Explore knowledge sharing in ERP implementation	2006	Elsevier
		Examine ERP performance at the post-implementation stage	2008	Elsevier
		Present a framework for understanding the trust and conflict in virtual inter-org, alliances	2005	Elsevier
		Propose a model to evaluate strategies for effective web services adoption for dynamic eB	2006	Elsevier
Engineering Applications of Artificial Intelligence	1	Provide a roadmap into SOA adoption to support agile reconfigurable supply chains	2009	Elsevier
Electronic Commerce Research	1	Present an infrastructure for achieving dynamic inter-enterprise workflow mgt.	2003	Kluwer Academic
Electronic Commerce Research and Applications	3	Explore the consumer switch to online banking and virtual market	2011	Elsevier
		Examine the trust factors that affect the adoption of Internet-based inter-org. systems	2011	Elsevier
		Clarify multiple issues relating to service-oriented technologies and mgt.	2008	Elsevier
Economic Geography	2	Discuss the vertical integration in a lean supply chain	1999	JSTOR
		Illuminate geo. differences impact in interorg. relation & external resources on firms behavior	2011	Wiley-Blackwell
Economy Informatics	1	Offer a concise perspective about ERP systems used in e-business	2002	Ase.ro
Enterprise Information Systems	1	Report the CIO's perspectives of CSFs in ERP upgrade projects	2007	Taylor & Francis
European Journal of Information Systems	34	Investigate the inter-organizational information systems adoption	2011	Palgrave Macmillan
		Offer an introduction to poststructuralist interpretivist research in social IS	2010	Palgrave Macmillan
		Investigate participants' perceptions on relationships with SC partners on a global basis	2010	Palgrave Macmillan
		Evaluate cross-organizational impacts of IT	2010	Palgrave Macmillan
		Consider factors associated with outsourcing IS systems	2009	Palgrave Macmillan
		New approach enables flexible decision support in dynamic inter-organizational	2010	Palgrave Macmillan

		networks		
		IT governance through IT steering committees and IT-related communication policies	2010	Palgrave Macmillan
		Explore the relationships among NII, governance and socio-economic development	2009	Palgrave Macmillan
		Theorize electronic marketplace performance in inter-organizational networks	2010	Palgrave Macmillan
		Propose the “orchestrating smart business networks” dynamics for innovation	2010	Palgrave Macmillan
		IT innovation can provide competitive advantages while involving risks	2010	Palgrave Macmillan
		Conceptual clarity in the relationship between data, information and knowledge	2010	Palgrave Macmillan
		Consider user’s resistance toward IT as a key process embedded into IT choices and design	2010	Palgrave Macmillan
		The impacts of competence-trust and openness-trust on inter-organizational systems	2009	Palgrave Macmillan
		Evaluate integrating ERP system with legacy process when using an EAI approach	2005	Palgrave Macmillan
		Propose a model for technology-supported cross-org. and cross-border collaboration	2010	Palgrave Macmillan
		Introduce the business strategic conflict and examine its impact in inter-org. collaboration	2010	Palgrave Macmillan
		Analyze how the SPI with weak mgt. support use intra-org. alliances in IS change	2010	Palgrave Macmillan
		Explore the boundaries of new forms of inter-org. networks and related IS issues (editorial)	2010	Palgrave Macmillan
		Identify factors that influence offshore GSD workers’ WLC and their valence toward GDW	2010	Palgrave Macmillan
		Propose an online community self-disclosure model	2010	Palgrave Macmillan
		Develop a model of strategies TTK to affect technology adaptation in distributed ISD projects	2010	Palgrave Macmillan
		Use the dynamic capabilities view to uncover the SC visibility and create strategic value	2010	Palgrave Macmillan
		Discuss the security communication and information warfare in information network (editorial)	2010	Palgrave Macmillan
		Explore the future role and use of ISs (e.g. ERP) to produce a vision for future IS linkages	2005	Palgrave Macmillan
		Advocate a shift from engineering on IT business alignment to agricultural view (editorial)	2010	Palgrave Macmillan
		Examine the value proposition of BPO regarding the nature of the processes being outsourced	2009	Palgrave Macmillan
		Explain employees’ extended use of complex information systems	2007	Palgrave Macmillan
		Assess the misalignments between package functionality and org. requirements	2007	Palgrave Macmillan
		Prioritize the SWOT for e-government and evaluate the alternative strategies for e-government	2007	Palgrave Macmillan
		Develop a framework for e-government projects focusing on IS evaluation	2007	Palgrave Macmillan

		Explore how information and communication behavior in e-RAs impact on org. efficiency	2007	Palgrave Macmillan
		Reveal the impediments and benefits of information sharing in collaborative e-government	2007	Palgrave Macmillan
		Assess the benefits from e-business transformation through effective enterprise mgt.	2003	Palgrave Macmillan
European Journal of Operational Research	9	Explore the relationships between agile SC integration and competitive objectives	2004	Elsevier
		Explore the impact of the alignment between VE and IT on business performance in an AM	2006	Elsevier
		Describe experiences of an ERP implementation	2003	Elsevier
		Review the management of Internet enabled ERP implementation and e-business change	2003	Elsevier
		Present a novel taxonomy of the CSFs in ERP implementation process	2003	Elsevier
		Develop a framework to study ISs apps. In SCI and mgt.	2004	Elsevier
		Propose a framework of ERP benefits and SCM competencies to examine ERP's impact on SCM	2010	Elsevier
		Present a web-based ERP systems for business services and SCM	2008	Elsevier
		Discuss ERP focusing on corporate capabilities and implementation	2003	Elsevier
Engineering Management Journal	1	Demonstrate a roadmap for e-business implementation	2005	Elogistics.lhu.edu.tw
European Management Journal	1	Emphasize the cooperative advantages on corporate value-added and distinctive competence	1993	Pergamon Press
Expert Systems with Applications	2	Impact of ERP on SCM	2010	Elsevier
		Investigate the service chain-based business alliance formation in SOA	2011	Elsevier
Foreign Affairs	1	Provide a better understanding of globally integrated enterprise	2006	HeinOnline
Future Generation Computer Systems	2	Explore how the existing data-oriented functionality can be extended for enterprise use	2011	Elsevier
		Analyze the preparedness and shortcomings of the SOA paradigm to e-Science	2011	Elsevier
Global Journal of Enterprise Information System	2	Use web-base ERP to integrate process with partners and customers	2011	Lund University
		Present the key business issues concerning interoperability connection with ERP systems	2009	eJournal
Harvard Business Review	4	Discuss how to put the enterprise into the enterprise systems	1998	StFX
		Discuss the informal networks in the company	1993	Ximb
		Propose a simple framework to figure out the right effective SC for the product	1997	Computingscience
		Recognize patterns in the evolution of networks to capture the value	2001	N/A
IBM Systems Journal	3	Explore the impact of SOA on enterprise systems, org. structures, and individuals	2005	IEEE Xplore
		Examine the utility business model and its future role in the computing services	2004	IEEE Xplore
		Present a business-objectives-based utility computing SLA mgt. system with implementation	2004	IEEE Xplore
Industrial and Corporate Change	3	Discuss the nature and scope of dynamic capabilities	2010	Oxford University Press
		Examine the organizational routines development-dynamic capabilities in MNEs	2010	Oxford University Press
		Model and simulate the learning mechanisms affecting the development of DC	2010	Oxford University Press

Information and Organization	2	Examine the simultaneous implementation within a single org. of two ISs – ERP and KM	2003	Pergamon Press
		Focus on intertwining material and virtual work	2003	Pergamon Press
Information and Software Technology	3	Identify and test the state of art in SOA with dynamic binding	2011	Elsevier
		Propose an application-level approach to enable interoperability between mobile agent systems	2008	Elsevier
		Discuss patterns and technologies for enabling SC traceability via collaborative e-business	2008	Elsevier
Internet Computing IEEE	1	Discuss the next generation and developing trends of ERP systems	2008	IEEE Xplore
International Economic Journal	1	Empirical analysis of intra-firm trade for vertically integrated multinational enterprises	2002	Taylor & Francis
International Journal of Agile Management Systems	3	Compare leanness with agility, relate lean/agile requirements to the SC improvement	2000	Emerald
		Discuss the MRP, MRPII, ERP to provide a technological evolution approach	2000	Emerald
		Identify the similarities and differences between the EE and VE of mfg. systems	1999	Emerald
International Journal of Advanced Manufacturing Technology	6	Analyze the ERP and PDM integration for independent enterprise network mfg. systems	2009	SpringerLink
		Propose a model to enhance supply mgt. & IT in quality, delivery, mfg. and cost via outsourcing	2010	SpringerLink
		Develop a knowledge-based design advisory system for collaborative design for micromfg.	2010	SpringerLink
		Identify a knowledge-intensive model in product design domain named PKM	2010	SpringerLink
		Address a scheduling problem of inbound & outbound trailers in a cross-docking system with JIT	2010	SpringerLink
		Consider the retailer-supplier partnership by investigating VMI system in SC	2010	SpringerLink
International Journal of Applied Systemic Studies	1	ERPII systems support virtual enterprises	2009	Inderscience
International Journal of Business Science and Applied Management	1	Evaluate IOS development influencing partnership integration within SCM	2007	DOAJ
International Journal of Computer Integrated Manufacturing	3	Discuss and present the integration of quality mgt. within the virtual and networked enterprises	2004	Taylor & Francis
		Describe the operational aspects of VR-RA for CIM system implementation	2008	Taylor & Francis
		Present an OSAC model to emphasis flexible authorization in dynamic eB environments	2009	Taylor & Francis
International Journal of Computer Science and Network Security	1	Explore the role of ERP in SCI	2010	Ijcsns
International Journal of Computer Science & Communication	1	Offer a concise perspective about ERP systems used in e-business	2010	N/A
International Journal of e-Collaboration	9	Describe the challenges of supporting creativity and innovation through e-collaboration	2008	IGI Global
		Investigate the design of tools to support scientific creativity in distributed	2008	IGI Global

		collaboration		
		Look into the e-collaboration and e-commerce in virtual worlds	2008	IGI Global
		Assess the impact of collaborative technologies on innovation at the firm level	2008	IGI Global
		Examine how and when adopt information technology in decision making efforts	2008	IGI Global
		Investigate the reference architecture for cross-company electronic collaboration	2009	IGI Global
		Assess the impacts of electronic collaboration and information exploitation capability on firm	2009	IGI Global
		Focus on the impact of collaborative actions and e-collaboration tools on product innovation	2008	IGI Global
		Address the drivers of engaging in inter-org. information sharing in SCM	2009	IGI Global
International Journal of Electronic Commerce	1	Examine the relationships of B2B interoperability on integration in supply chains	2009	ME Sharpe
International Journal of Enterprise Information Systems	1	Investigate the current CSFs of ERP systems implementation and propose a new framework	2011	IGI Global
International Journal of Engineering Science and Technology	1	Offer a concise perspective about ERP systems used in e-business	2010	Csjournals
International Journal of Human Resource Management	1	Address the requirements of an international firm in terms of HRM and asset for VI adoption	2007	Taylor & Francis
International Journal of Information Management	22	Intra-organizational knowledge sharing	2009	Elsevier
		Knowledge chain conceptual model	2009	Elsevier
		CRM systems impact on service improvement	2010	Elsevier
		Understand new SCM practices improved by information management	2009	Elsevier
		Develop an integrative model to explain the post-implementation success of ERP	2009	Elsevier
		Review the corporate portals to provide a new concept in information mgt.	2001	Pergamon Press
		Examine e-government implementation strategies in developed and transition economies	2012	Elsevier
		Explore the internal and external business processes integration and collaborative design teams	2011	Elsevier
		Investigate changes in operational performance resulting from ERP system implementation	2012	Elsevier
		Discuss the cloud computing capabilities for SMEs focusing on its flexibility and cost structure	2011	Elsevier
		Examine factors influencing information sharing and implementation in inter-org. relationships	2011	Elsevier
		Explore how leading orgs. are using emerging technologies to enable org. innovation	2011	Elsevier
		Examine the role IT in achieving operational agility	2012	Elsevier
		Analyze the impact of knowledge mgt. on CRM success	2011	Elsevier
		Recommend best practices for the critical decisions for ERP implementation in small businesses	2010	Elsevier
		Present a new model of ERP CSFs in IS innovation to explore more implementation strategies	2006	Elsevier

		Explain how improve ERP fit to org. process through knowledge transfer	2007	Elsevier
		Uncover the impact of cultural differences in ERP project implementation	2007	Elsevier
		Identify a set of dimensions of org. structure and ERP system that can be used to gauge the fit	2008	Elsevier
		Present a model to describe and analyze IOS from a power and interest perspective	2005	Elsevier
		Argue ICTs support the inter-org. infrastructures in the value chain	2004	Elsevier
		Provide key terms of inter-org. collaboration and inter-org. governance practices for IT	2012	Elsevier
International Journal of Innovation, Management and Technology	1	Present a broader view of the SCI challenges	2010	N/A
International Journal of Industrial Organization	1	Conclude duopoly competition can be reversed by outsourcing and vertical integration	2008	Elsevier
International Journal of Leadership in Education	1	Examine whether the cooperation and collaboration is reality or rhetoric	2004	Taylor & Francis
International Journal of Logistics Research and Applications	2	Present the design and management of inter-firm relationships	2007	Taylor & Francis
		Discuss and compare the supply chain concept and structure with virtual enterprises	2001	Taylor & Francis
International Journal of Management and Information Systems	4	Propose event-driven service-oriented architecture for enterprise applications	2010	ABI/Inform Global
		Detail ERP crisis management through leadership communication	2010	ABI/Inform Global
		Examine the issues of information security governance of enterprise information systems	2010	ABI/Inform Global
		Provide a conspectus of the issues in cloud computing privacy	2010	ABI/Inform Global
International Journal of Medical Informatics	1	Focus on challenges to the interoperability process and build an interoperable network	2008	Elsevier
International Journal of Management Reviews	2	Present a literature review about proximity and inter-org. collaboration	2006	Wiley-Blackwell
		Refine the social capital and network resource concept relating to inter-firm networks	2010	Wiley-Blackwell
International Journal of Operations & Production Management	60	Assess performance measurement compatibility with extended enterprise	2010	Emerald
		Provide an dynamic approach for designing and managing the supply strategy	2010	Emerald
		Empirically demonstrate the "operations-as-marketing" strategy	2010	Emerald
		Discuss structured engagement paradigm for concurrent engineering within the EE	2001	Emerald
		Provide a guideline on using GTM for theory building in OM research	2010	Emerald
		Examine the processes by which organizations integrate new technology into products	2010	Emerald
		Describe an emergent SCM system supporting a sustainable value-based organization	2010	Emerald
		Analyze the evolution of competitive advantage using "classic" and "extended" RBT	2010	Emerald
		Address the understanding of how do companies achieve mix manufacturing	2010	Emerald

		flexibility		
		Focus on ERP systems implementation in small and midsize manufacturing firms	2003	Emerald
		Investigate the role of QM on mass customization capability	2010	Emerald
		Provide a practical model to help form agile virtual enterprise	2007	Emerald
		Examine and consider the cost environment for the agile intra- and inter-enterprise	2001	Emerald
		Investigate the role of the Internet within the mfg. SC focusing on planning and control ops.	2001	Emerald
		Propose a virtual factory modeling approach to support the mfg. enterprise integration	2001	Emerald
		Strategically review the supply networks	2004	Emerald
		Consider third party logistics from a resource and competence perspective	2004	Emerald
		Illustrate emergent strategy in managing cooperative supply chain change	2002	Emerald
		Examine the strategic models for development of obligation based inter-firm relationships	2003	Emerald
		Analyze the development of industrial networks with changing operations	2003	Emerald
		Present an argument for supply network strategy management	2001	Emerald
		Explore the CSFs of ERP system implementation in SMEs	2009	Emerald
		Test the mediating roles in the relationship between mfg. flexibility and performance	2010	Emerald
		Develop a better understanding about drivers of enterprise systems complexity using GTM	2010	Emerald
		Investigate internal and external factors that drive lean and agile operations capabilities	2009	Emerald
		Examine the interaction fit between mfg. strategy and TM and its impact on performance	2012	Emerald
		Propose a process-modeling based on OM and SOM to comply with servitised mfg.	2012	Emerald
		Describe indicators that measure value-leverage and illustrate the LSSI companies	2012	Emerald
		Demonstrate the influence of ERP implementation at the production-sales interface	2012	Emerald
		Explore the determinants of knowledge transfer in inter-firm new product development	2012	Emerald
		Examine strategies to reposition via creating a new product development capability in SMEs	2010	Emerald
		Investigate the impact of ERP/operational alignment for order-processing performance	2004	Emerald
		Develop a model of external technology integration in product and process development	2004	Emerald
		Present a dynamic feedback model for partner selection in agile supply chains	2012	Emerald
		Propose key antecedents of a trade-off versus a cumulative model by mfg.	2011	Emerald

		business units		
		Review survey-based research connecting ICT, SCM, and supply chain performance	2011	Emerald
		Examine the mfg. network evolution at the mfg. plant level	2011	Emerald
		Investigate the impact of strategic sourcing and flexibility on firm’s SC agility	2012	Emerald
		Investigate the different types of innovation and their mgt. practices in service companies	2007	Emerald
		Propose a theoretical model of leagile mfg. to single corporate enterprise with multiple units	2007	Emerald
		Propose the concept of product-service-organization to create value via collaborative networks	2009	Emerald
		Present a framework to enable an operations strategy for product-centric servitization	2009	Emerald
		Examine the linkage between strategic alignment in SC and type of interactions with suppliers	2009	Emerald
		Explore the parallels between supply mgt. roles and entrepreneurial skill sets and mechanisms	2009	Emerald
		Explore the antecedents of close SC collaboration to develop a model for close SC collaboration	2009	Emerald
		Develop theory on effective buyer-seller interaction for different types of business services	2009	Emerald
		Explain to what degree SR and ops. tool obstacles hinder SCI of the PM process	2009	Emerald
		Provide a framework for analyzing stakeholder mgt. strategies in SC collaboration	2009	Emerald
		Study the SC flexibility in the context of inter-firm supply network	2009	Emerald
		Examine the relationship between SCI and modular product design	2010	Emerald
		Relationships between suppliers capabilities, SC collaboration and buyer responsiveness	2009	Emerald
		Explore the actual adoption of Internet technologies in SC processes	2003	Emerald
		Focus on the impact of e-business system adoption and developments on SCM	2005	Emerald
		Test the relationship between SC collaboration and performance improvement	2006	Emerald
		Investigate the impact of customer-induced and task uncertainty on the coordination practices	2011	Emerald
		Empirically explore the characteristics and contingencies of service delivery system design	2011	Emerald
		Understand the relationship between the adoption of NFWOs and country culture impact	2011	Emerald
		Examine how user-perceived EPQ influence both system and contract compliance	2011	Emerald
		Challenge the “infinite variety” by measuring how much is actually demanded by the customer	2011	Emerald
		Develop a performance measurement model for service ops. using the AHP approach	2006	Emerald

International Journal of Productivity and Performance Management	1	Model the logistics outsourcing relationship to study the logistical SC	2007	Emerald
International Journal of Physical Distribution & Logistics Management	12	Improve "end-to-end" visibility to mitigate supply chain risk	2004	Emerald
		Discuss supply chain-related risks to the extended enterprise	2004	Emerald
		Present different SCM approaches – independent, semi-integrated and integrated	2002	Emerald
		Propose a new model to improve materials mgt. towards agile enterprise	2002	Emerald
		Propose a model for measuring SC agility in the virtual organization	2002	Emerald
		Discuss the relationship between technology and logistics third-party providers	2003	Emerald
		Explore the risk mgt. and risk mgt. strategies in global SCs	2008	Emerald
		Clarify the different ERP system strategies for companies in parent-subsidiary SCs	2010	Emerald
		Examine the interplay between individual and collective capabilities in collaborative networks	2004	Emerald
		Explore the structural and process integration mechanisms to form SC value integration	2011	Emerald
		Investigate the integration of SCM and ERP systems for competing in the 21st SC	2006	Emerald
		Review the rhetoric and reality of SCI	2002	Emerald
International Journal of Production Economics	22	Examine the causal relationships between TQM and ERP implementation	2008	Elsevier
		Examine the main types and evolution of VE to propose a control system	2001	Elsevier
		Examine key dimensions of successful implementation of ERP system within large mfg. orgs.	2004	Elsevier
		Theorize and develop the agile manufacturing strategies	2011	Elsevier
		Conduct an automated negotiation of supply contracts for flexible production networks	2004	Elsevier
		Describe the combination of agile and lean characteristics in mfg. organizations	2003	Elsevier
		Demonstrate how higher SC security at lower cost can be achieved	2005	Elsevier
		Explore the management of customer-supplier relationships through integration techniques	2004	Elsevier
		Product-driven SC selection using integrated multi-criteria decision-making methodology	2004	Elsevier
		SCM for the 21st century organizational competitiveness (editorial)	2004	Elsevier
		Present the notion of buyer-supplier "relationship architecture"	2005	Elsevier
		Study the decision making on an in-house logistic division's operation strategies	2005	Elsevier
		Study the evolution towards an integrated steel SC by using process mapping techniques	2004	Elsevier
		Demonstrate the impact of product life cycle on supply chain strategy	2003	Elsevier
		Develop a conceptual framework to explore the impact of SCR quality on quality performance	2005	Elsevier
		Present a virtual e-chain model for supply chain collaboration	2004	Elsevier
		Understand what business conditions determine integrative practices in SCM	2005	Elsevier
		Analyze and extend the concept of SCM and provide the value chain management	2004	Elsevier
		Propose and develop a new business model for global sourcing in networked	2004	Elsevier

		enterprise		
		Find the involvement, benefits and impediments of collaborative information sharing – ERPII	2008	Elsevier
		Propose a conceptual model to identify where best practice Co. are becoming AM orgs.	1999	Elsevier
		Report on the theoretical foundations and practical reasons for applying enterprise mgt.	2007	Elsevier
International Journal of Project Management	1	Investigate the impact of trust between project owners and contractors in large projects	2009	Elsevier
International Journal of Production Research	13	Explore the relationship between OM and GM focusing on the IT and VE strategies	2011	Taylor & Francis
		Present the architecture of component-based ERP for agile system reconfiguration in mfg.	2006	Taylor & Francis
		CSF framework for the implementation of integrated-enterprise systems in mfg.	2004	Taylor & Francis
		Propose an ERP operations support system to achieve and maintain the process integration	2005	Taylor & Francis
		Propose an online approach to dynamic rescheduling for production planning applications	2008	Taylor & Francis
		Propose a process re-engineering-oriented org. change exploratory simulation system	2008	Taylor & Francis
		Evaluate the real applicability of value stream mapping in mfg. system redesign	2008	Taylor & Francis
		Conduct a critical analysis of existing solutions to EAI from mfg. perspective	2008	Taylor & Francis
		Introduce the concept of distributed virtual factory in agile mfg. environment	2000	Taylor & Francis
		Consider the marketplace environment effect on SC strategy selection – lean, agile or leagile	2000	Taylor & Francis
		Describe collaborative practices in SC and identify crucial issues for virtual teams adoption	2000	Taylor & Francis
		Discuss the requirements for forming an e-SC based on systems integration, ERP and BPR	2009	Taylor & Francis
		Report on the theoretical foundations and practical reasons for applying enterprise mgt.	2006	Taylor & Francis
International Journal of Quality & Reliability Management	2	Discuss the quality mgt. in virtual orgs. from an inter-org. perspective	2010	Emerald
		Show how to use QFD for e-business planning and analysis in micro-sized enterprises	2007	Emerald
Industrial Management	1	Discuss how culture affect mergers and acquisitions	2000	N/A
Information & Management	14	ERP and SCM systems integration	2008	Elsevier
		Research model development in diffusion view of ERP systems implementation	2002	Elsevier
		Discuss the design and implementation of inter-enterprise workflow-supported SCM system	2005	Elsevier
		Present an ERP selection methodology	2007	Elsevier
		Investigate the contribution of individual and group characteristics on group	2007	Elsevier

		support systems		
		Evaluate the SC performance of IT-based inter-enterprise collaboration	2007	Elsevier
		Incorporate KM into successful ERP implementation phases	2007	Elsevier
		Risk management in ERP project implementation	2007	Elsevier
		The CSFs for ERP implementation from an organizational fit perspective	2002	Elsevier
		Test the role of three key social enablers in ERP implementation	2003	Elsevier
		Apply the strategic alignment notion to ERP implementation and analyze business performance	2010	Elsevier
		Explain the choice between equity and non-equity alliances in the ICT industry	2011	Elsevier
		Examine the information sharing and business systems leveraging in web-based SCs	2012	Elsevier
		Examine K&TIMs effects on inter-firm codevelopment competency and e-service innovation	2012	Elsevier
Information Management & Computer Security	1	Cover the development, applications and enterprise integration of ERP and data warehousing	2003	ABI/Inform Global
Industrial Management & Data Systems	9	Evaluate how SOA investments can add business value	2009	Emerald
		Present a survey of ERP-related research and illustrate a taxonomy of ERP research	2003	Emerald
		Explore the Internet utilization and its impact on org. performance focusing on value chain	2007	Emerald
		Focus on the social context of ERP adoption by emphasizing a knowledge transfer	2007	Emerald
		Provide a common understanding of service-oriented concepts to enable discuss of SOA	2009	Emerald
		Illustrate how to design distributed ERP systems and e-commerce with high performance	2004	Emerald
		Provide insight into the antecedents of ERP use and use of alternative software simultaneously	2006	Emerald
		Examine the ERP implementation problems and suggest strategies for extending ERP value	2002	Emerald
		Present a dynamic model of e-business strategy for ERP enabled orgs.	2005	Emerald
Industrial Marketing Management	3	Examine the SC decision models to demonstrate the importance of decision integration in SCM	2004	Elsevier
		Draw the challenges to strategic marketing in global supply chains	2004	Elsevier
		Examine the intersection of strategic management and supply chain management	2004	Elsevier
Information Polity	2	Explore e-government and the emergence of virtual orgs. in the public sector	2003	IOS Press
		Problematize the capacities to act that citizens are provided with by means of e-intermediaries	2003	IOS Press
Internet Research: Electronic Networking Applications and Policy	1	Develop an analytical framework for evaluating e-commerce business models and strategies	2001	MCB University Press
Information Resources Management Journal	1	Present an integrated analysis of KM and system design	2000	ABI/Inform Global
Information Systems	1	Address how to organize and use knowledge method to resolve ISs	2008	Elsevier

		interoperability problem		
Information Systems Journal	72	Incorporate the intangibles into traditional cost-benefit analysis in an ERP project	2002	Wiley-Blackwell
		Examine IOIS mgt. intervention to boost IOIS assimilation	2011	Wiley-Blackwell
		Compare the importance of evaluation criteria in proprietary and OSS EAS (ERP) selection	2011	Wiley-Blackwell
		Explore the impact of selected socio-cultural factors on the intention to share knowledge	2011	Wiley-Blackwell
		Enrich the technology adoption theories in a B2B focusing on SCI and computer-based IS	2010	Wiley-Blackwell
		Study and observe the negative behavior inside one virtual world	2009	Wiley-Blackwell
		Understand the individual virtual competency to manage knowledge transfer in virtual settings	2009	Wiley-Blackwell
		Investigate collaborative technology improvement in knowledge telework	2008	Wiley-Blackwell
		Explore the effect of e-commerce on IT structure and brand architecture integration	2008	Wiley-Blackwell
		Analyze the process of ERP implementation and BPR focusing on SMEs	2008	Wiley-Blackwell
		Study managerial interventions in IT implementation to improve the ERP implementation	2008	Wiley-Blackwell
		Describe the use of PrOH modeling to increase understanding of IS	2008	Wiley-Blackwell
		Explain the relationship-based e-commerce	2008	Wiley-Blackwell
		Examine technology, structure and identity during an ES implementation	2008	Wiley-Blackwell
		Argue the e-business implementation requires organizational change	2007	Wiley-Blackwell
		Investigate the viability and relevance of MMM during IS development practice	2007	Wiley-Blackwell
		Identify the significant factors that influenced the decision to adopt web-based training	2007	Wiley-Blackwell
		Examine the practices of SMEs and analyze performance of delivering customer services online	2006	Wiley-Blackwell
		Discuss the impact of ERP implementation strategy on cross-functionality	2006	Wiley-Blackwell
		Demonstrate the actor-network theory can be extended to investigate the strategy formulation	2005	Wiley-Blackwell
		Clarify how Internet-based electronic markets affect the inter-org. relationships	2005	Wiley-Blackwell
		Apply chaos theory to study ISs in orgs.	2005	Wiley-Blackwell
		Reveal and understand how virtual teams – virtuality impact in a global org.	2005	Wiley-Blackwell
		Deal with the architecture and cooperation mechanism of web-based agile mfg. cells	2004	Wiley-Blackwell
		Present the application of Delta Model of BPR in transforming e-business and SC	2004	Wiley-Blackwell
		Present an evaluation of SCM software	2004	Wiley-Blackwell
		Explore the strategic orientation concept and apply it to internet-based business performance	2004	Wiley-Blackwell
		Explore the roles and dynamics and trust, planning and benefits in a global IOS	2004	Wiley-Blackwell
		Study the internet/virtual retail store development focusing on consumer-system	2003	Wiley-Blackwell

		interaction		
		Discuss the ICT technologies application to introduce the disruptive IS innovations	2003	Wiley-Blackwell
		Examine the development and implementation of intranet- and internet-based IS in a single org.	2003	Wiley-Blackwell
		Document the relation between information sharing and teams performance focusing on SCs	2003	Wiley-Blackwell
		Investigate various ways in which different internet-based IS are used by org. participants	2003	Wiley-Blackwell
		Examine trust, control and the role of IOSs in electronic partnerships	2003	Wiley-Blackwell
		Identify factors affecting IS process innovation adoption decisions	2003	Wiley-Blackwell
		Propose a framework for evaluating data warehousing investments	2002	Wiley-Blackwell
		Analyze the role of intermediaries in electronic marketplaces	2002	Wiley-Blackwell
		Identify factors enabling or inhibiting the adoption and use of IS/IT in SMEs	2002	Wiley-Blackwell
		Examine antecedents and consequences of social integration in system development projects	2002	Wiley-Blackwell
		Bridge the gap between the IS org. and the rest of the business to improve the value of IS	2001	Wiley-Blackwell
		Argue the importance of IS and associate innovation for org. change	2001	Wiley-Blackwell
		Present a norm-based agency for designing collaborative ISs	2001	Wiley-Blackwell
		Examine the balance between trust and control in a VO focusing on the OSS	2001	Wiley-Blackwell
		Propose a conceptual framework to organize different views of business processes (modeling)	2000	Wiley-Blackwell
		Illustrate the ‘soft’ org. factors including trust, power and IOIS to facilitate the e-commerce	2000	Wiley-Blackwell
		Examine value creation from IS investments from org. information competencies perspective	2000	Wiley-Blackwell
		Argue integrating VTs strategically & operationally must consider context and adoption process	1999	Wiley-Blackwell
		Illustrate how inter-firm networks facilitate the new inter-firm collaboration	1999	Wiley-Blackwell
		Devise a new framework for managing IT-enabled business change	1999	Wiley-Blackwell
		Demonstrate the information mgt. in process-based orgs.	1999	Wiley-Blackwell
		Address the role of BPR in SMEs and develop a framework to assess its implementation	1998	Wiley-Blackwell
		Explore the dynamic nature of IT-enabled strategic change	1998	Wiley-Blackwell
		Demonstrate the rationality of doing qualitative research in IS science	1998	Wiley-Blackwell
		Define and explore the concepts of travelling executive and executives’ mobile IS	1997	Wiley-Blackwell
		Research into agile requirements engineering practices and challenges	2010	Wiley-Blackwell
		Investigate relationship theories application in designing web site to foster customer loyalty	2009	Wiley-Blackwell
		Discuss the IT – ERP systems utilization for niche companies	2007	Wiley-Blackwell
		Examine the fit between business and IT environment and its impact on system	2008	Wiley-Blackwell

		performance		
		Develop and test a client-vendor knowledge transfer model in IS offshore outsourcing	2011	Wiley-Blackwell
		Examine the IT project risks identified by SEs and PMs and compare these two groups	2010	Wiley-Blackwell
		Conceptualize and measure the virtuality of teams	2010	Wiley-Blackwell
		Contribute to the integration theory within the field of IS project mgt.	2010	Wiley-Blackwell
		Suggest guidelines for GT studies in ISs	2010	Wiley-Blackwell
		Identify the social interactions patterns and their relationships to ISD performance measures	2010	Wiley-Blackwell
		Explore how OSS project effectiveness is affected by expertise integration	2011	Wiley-Blackwell
		Explore user involvement in developing mobile and temporarily interconnected systems	2010	Wiley-Blackwell
		Examine virtual team collaboration focusing on communication breakdown and translucence	2009	Wiley-Blackwell
		Address the issues of e-commerce enabled mfg. ops. and integrated SCM (editorial)	2004	Wiley-Blackwell
		Introduce a RBP model on ERP challenges to help make ERP decisions	2004	Wiley-Blackwell
		Explore Chinese business environment and ICT use from a process-based perspective using JVs	2008	Wiley-Blackwell
		Focus on information requirements as a driver of IT innovation adoption and diffusion	2008	Wiley-Blackwell
		Examine the role of managerial agency in achieving business benefits from ERP systems	2010	Wiley-Blackwell
Information Systems Management	8	Identify four types of “tactical IT-business alignment” processes	2009	Taylor & Francis
		Identify opportunities and limitations of SOA when applied to BI applications	2010	Taylor & Francis
		Critical successful factors in SOA implementation	2010	Taylor & Francis
		Explore how narrative collaboration systems can support virtual distributed teams	2009	Taylor & Francis
		Describe the first large-scale, public sector ERP implementation	2009	Taylor & Francis
		Explore an Integration of EDI with e-SCM system using EAI technology	2005	Taylor & Francis
		Indicate ERP systems do enhance the performance of mfg. organizations	2000	Taylor & Francis
		Examine associations between the mfg. firms business and the benefits from ERP system	2005	Taylor & Francis
Information Systems Research	8	Explore the flexible, agile and distributed information systems development	2009	Informs
		Leverage IT and competitive dynamics for Inter-organizational relationship management	2010	Informs
		Examine competitive actions and dynamics in social networking firms in digital age	2010	informs
		Explicate the impact of competitive environment on the relationship between IT and VI	2009	Informs
		Demonstrate cooperation, coordination, and governance in multi-sourcing	2010	Informs

		Examine the relationships between IT capability, network structure, and competitive action	2010	Informs
		Explicate the role of ISs in competitive actions and firm performance	2010	Informs
		Analyze the switching costs and network effects in determining the level of competition	2010	Informs
International Transactions in Operational Research	2	Review issues of information and business systems and organizational change	1994	Elsevier
		Review computer-based IS for decision making	1994	Elsevier
IEEE Transactions on Systems, Man, and Cybernetics	1	Propose an unique methodology named business PrOH modeling	2007	IEEE Xplore
Information Technology & People	1	Argue the deconstructing information packages focusing on org. behavior of ERP systems	2004	Emerald
Journal of Accountancy	1	Discuss the differences between mergers and acquisitions	2002	AICPA
Journal of Applied Behavioral Science	1	Examine employees' subjective experiences of creativity after M&As	2008	Sage
Journal of Achievements in Materials and Manufacturing Engineering	1	Introduce modeling methodology for building of virtual organizations	2007	OCSCO World Press
Journal of Advanced Manufacturing Systems	3	Study the VE formulation with multi-agent technology in AM environment	2002	World Scientific
		Presents a new integrated approach to improve the accuracy of virtual mfg. environments	2002	World Scientific
		Focus on manufacturing virtualization in a collaborative environment	2002	World Scientific
Journal of Business Ethics	1	Explore collaborative approach to build long-term, mutually beneficial relationships	2009	SpringerLink
Journal of Business & Industrial Marketing	21	Manage interdependency for B2B relationships	1998	Emerald
		Present how the relationship value help suppliers create value in customer relationships	2009	Emerald
		Propose a framework of DSS for purchasing management in supply chain network	2009	Emerald
		Build and test a model of buyer-seller relationships from a dialectical perspective	2009	Emerald
		Emphasize complexity and context in marketing systems, embracing both B2B and B2C	2009	Emerald
		Explore the impact of customer share in key-supplier relationships	2009	Emerald
		Increase understanding about the causes of conflict in inter-competitor cooperation	2009	Emerald
		Examine how customer relationship performance affect the heterogeneity of firm performance	2009	Emerald
		Introduce SP and SD to contribute to the success of relationship marketing efforts	2009	Emerald
		Identify tangible and intangible value elements requested by the business customer	2009	Emerald
		Review the sociological perspective on managerial uncertainty as a feature of org. form	2009	Emerald
		Develop a model to explain manufacturers' intention to extend relationships with distributors	2009	Emerald
		Develop a promise mgt.-based approach to regain customer mgt. for marketing	2009	Emerald

		Examine the multiplicity of norms in inter-company cooperation in SME	2009	Emerald
		Present a managerial framework to facilitate supplier selection and offshore outsourcing	2009	Emerald
		Explore how different purchasing strategies are connected to complex supply relationships	2009	Emerald
		Evaluate the evolution of buyer-supplier relationships from adversarial toward relational	2009	Emerald
		Investigate the impact of SC integration on brand equity	2009	Emerald
		Examine mediating effect of supplier oriented purchasing on conflict in inter-firm relationships	2009	Emerald
		Identify the influence of client sophistication on relationships within B2B	2009	Emerald
		Address the issue of managing buyer-seller relationships involving information communication	2009	Emerald
Journal of Business Logistics	1	Model the lean, agile and leagile supply chain strategies	2006	Wiley-Blackwell
Journal of Computing	1	Examine the scope of cloud computing services for SMEs	2010	arXiv
Journal of Computer Information Systems	2	Understand and classify information system alignment approaches	2009	IACIS
		Design a new development model for ERP systems project	2002	IACIS
Journal of Database Management	2	Identify data warehouse interoperation in Web-based collaborative EEs environment	2004	ABI/Inform Global
		Identify relationships based on relation element theory and discuss the relationship construct	2004	ABI/Inform Global
Journal of Enterprise Information Management	40	Propose a methodological approach for ERP implementation strategy	2009	Emerald
		Examine the usage of external business services by SMEs in China	2009	Emerald
		Understand the process of aligning ERP implementation with the organizational development	2009	Emerald
		Examine the CSFs of ERP implementations in SMEs	2010	Emerald
		Provide an overview of current trends in inter-organizational cooperation	2009	Emerald
		Review the factors and methods of integrating multiple ERP systems in an EAI environment	2007	Emerald
		Explain ERP failure in developing countries	2010	Emerald
		Investigate IOIS and IOA integration on business performance	2009	Emerald
		Investigate the Internet-based ICT adoption in SMEs	2010	Emerald
		Discuss the emerging IT platform of cloud computing	2010	Emerald
		Develop new measures and metrics for e-supply chains performance	2009	Emerald
		Discuss the collaborative practices of virtual teams	2009	Emerald
		Provide relationships between ERP benefits and impacts on SCM performance	2009	Emerald
		Examine the web-based IS development and dynamic change for emergent orgs.	2010	Emerald
		Comprehensively review the current state of the ERP research field	2010	Emerald
		Provide evidence of the “IT organizational assimilation capacity”	2010	Emerald
		Explore the role of third-parties in inter-organizational web service adoption	2004	Emerald
		Define and analyze risks within information technologies in service delivery	2010	Emerald

		Investigate public online e-business consumer complaint responses mgt.	2010	Emerald
		Redefine the knowledge management strategy and technology in a global basis	2010	Emerald
		Present a model to explore agile methods to help SMEs address the market competition	2010	Emerald
		Frame next generation enterprise systems – ERPII	2005	Emerald
		Propose an insight about ERP adoption highlighting differences between SMEs and large Co.	2005	Emerald
		Present the concept of org. prerequisites for enterprise-wide integration – ERP/DW	2005	Emerald
		Review the factors and methods used to integrate multiple ERP systems with SOA in EAI	2007	Emerald
		Contribute to the development of measures to assess the ERP adoption of SMEs	2009	Emerald
		Develop a benefits realization road-map for ERP usage in SMEs	2009	Emerald
		Explore the rationales for the integration of KM and ERP in SMEs	2009	Emerald
		Analyze the factors and peculiarities influencing ERP outcomes in SMEs	2009	Emerald
		Develop a model to predict which SMEs are more likely to become adopters of ESs	2009	Emerald
		Focus on extended-enterprise systems' impact on enterprise risk management	2006	Emerald
		Discuss an enterprise collaborative mgt. system focusing on SRM	2004	Emerald
		Investigate into key challenges within enterprise IS and EAI	2004	Emerald
		Discuss the IT project mgt within public sector organizations	2010	Emerald
		Build integrated B2B e-commerce hub solutions based on SOA	2010	Emerald
		Explore critical elements of ERP implementation project performance	2010	Emerald
		Evaluate the enabling factors that are expected to facilitate the cloud computing adoption	2010	Emerald
		Examine how e-business and SCI can be integrated	2008	Emerald
		Investigate the feasibility of integrating diverse ERP systems by using EAI technologies	2004	Emerald
		Describe a methodology to design and adopt inter-enterprise collaboration within VC networks	2004	Emerald
Journal of Electronic Commerce Research	1	Discuss the implications and impacts of web services to e-commerce research and practices	2003	Docis.info
Journal of Economics & Management Strategy	1	Study competition in a network industry focusing on VI, network and connectivity	2009	Wiley-Blackwell
Journal of Enterprise Transformation	8	Consider and debate on what constitutes enterprise transformation	2011	Taylor & Francis
		Focus on aligning the enterprise transformation with transformation need and internal context	2011	Taylor & Francis
		Develop a simulation modeling for analyzing enterprise-wide dynamic and transformation	2011	Taylor & Francis
		Describe the development of a modeling hierarchy for complex enterprise networks	2011	Taylor & Francis
		Address the competencies needed to succeed in transforming an enterprise	2011	Taylor & Francis

		Examine the planned radical change in orgs. from VIO to a more horizontal org.	2011	Taylor & Francis
		Develop model to illustrate sustaining lean transformation via growth and positive org. change	2011	Taylor & Francis
		Illustrate the use of TISM of continuity and change forces in e-government	2011	Taylor & Francis
Journal of Emerging Technologies in Accounting	1	Empirically analyze the ERP system benefits	2004	AAA Digital Library
Journal of International Business Studies	1	Report how suppliers use IT to govern the international exchange relationships with customers	2010	Palgrave Macmillan
Journal of Integrated Care	1	Review the horizontal and vertical integration in the UK	2010	Emerald
Journal of Intelligent & Fuzzy Systems	1	Present a VE model with BI management in networking international expert teams	2003	IOS Press
Journal of Intelligent Manufacturing	3	Toolset for building the virtual enterprise	2001	SpringerLink
		Cooperation in virtual enterprises	2001	SpringerLink
		Describe and analyze the distributed planning and control systems for the VE	2000	ABI/Inform Global
Journal of Information Technology	5	Identify the risk factors in implementing traditional management ISs – ERP projects	2000	Taylor & Francis
		Design theory for dynamic complexity in information infrastructures – EDI networks	2010	Palgrave Macmillan
		Explore the nature and possibilities of dynamic collaboration	2009	Palgrave Macmillan
		Explore knowledge exchange in electronic networks of practice	2007	Palgrave Macmillan
		Understand ERP system risk mgt. in SMEs	2010	Palgrave Macmillan
Journal of Information Technology Theory and Application	1	Study coordination of multi-org. IS development projects	2009	AISeL
Journal of Knowledge Management	2	Knowledge management in agile innovative organizations	1999	MCB University Press
		Examine the knowledge management, response ability, and the agile enterprise	1999	MCB University Press
Journal of Law and Economics	1	Identify the governance of contractual relations in transaction-cost economics	1979	Chicago Press
Journal of Management	1	Propose a theory of trust in inter-org. VOs focusing on trustworthiness and trust build	2001	Pergamon Press
Journal of Money, Credit, and Banking	1	Address the horizontal and vertical integration in securities trading and settlement	2006	Wiley-Blackwell
Journal of Media Economics	1	Address the pattern of mergers and acquisitions, and convergence – the strategic alliances	1998	Taylor & Francis
Journal of Management Information Systems	4	Coordination strategies in SaaS supply chain	2010	ME Sharpe
		Integrate two view of trust and virtual teams	2009	ME Sharpe
		Understand the economic potential of SOA	2010	ME Sharpe
		Empirically investigate the value of integrating enterprise information systems	2009	ME Sharpe
Journal of Manufacturing Technology Management	48	Investigate factors affecting ERP selection in MTO SME sector	2008	Emerald
		Propose an integrated web-based logistics mgt. system for agile supply demand network design	2006	Emerald
		Study the effect of technology adoption to operational competitiveness in mfg. firms	2012	Emerald

		Propose a Fit Manufacturing Framework to help mfg. companies to achieve sustainability	2012	Emerald
		Research the Product Service Systems and supply network relationships	2011	Emerald
		Investigate SCM practices related to flexibility, value chain and capabilities	2011	Emerald
		Focus on new PSS development tools helping companies moving towards product-oriented PSS	2012	Emerald
		Investigate the VI practice of manufacturers in their servitization adoption	2011	Emerald
		Explore the sustainable supply chain for collaborative manufacturing	2011	Emerald
		Improve the mfg. by mapping and simulation of critical operations	2006	Emerald
		Develop a maturity scale to assess SCI and improvement in SC performance	2008	Emerald
		Explore potential risks affecting long-term viability of ERP in the post-implementation phase	2011	Emerald
		Describe the work to realize a hierarchical model for e-SC coordination and optimization	2007	Emerald
		Review and discuss a distribution outsourcing alliance process	2009	Emerald
		Examine how responsive and agile the ERP systems are to change and uncertainty in SME mfg.	2005	Emerald
		Propose an overall model of collaborative forecasting for networked mfg. enterprises	2008	Emerald
		Investigate CAD and CAE as enablers of AM	2011	Emerald
		Develop a framework for a new form of production system arguing for SME collaboration	2006	Emerald
		Develop and implement customized e-business solutions in a DIY fashion	2007	Emerald
		Model and schedule collaborative design and mfg. activities at a cyber mfg. centre	2008	Emerald
		Study how managers in mfg. firms approach the challenge of knowledge mgt. in their orgs.	2008	Emerald
		Investigate technologies, systems and paradigms to manage SC networks/networked enterprise	2008	Emerald
		Exemplify technical approaches supporting partner identification for VOs in mfg.	2008	Emerald
		Investigate how R&D collaboration takes place for complex new products	2008	Emerald
		Explore what a network perspective can add to mfg. mgt. and strategy – the mfg. extraprise	2007	Emerald
		Understand the management of product variety in multinational corporation operations & SCs	2006	Emerald
		Develop a whiteboard-based interface for collaboration in e-mfg. environment	2007	Emerald
		Determine the critical factors of TQM and measure their effect on org. performance of SMEs	2006	Emerald
		Present a conceptual framework to evaluate e-business strategic capabilities	2006	Emerald
		Provide a modular structured mgt. tool for managing SC transformation process	2006	Emerald
		Use value stream mapping approach to improve productivity and capacity in SC processing side	2008	Emerald

		Launch a dynamic strategic framework for managing dynamic capabilities in mfg. firms	2007	Emerald
		Propose a conceptual framework for prototyping outsourcing in new product development	2010	Emerald
		Examine the possibility of applying FEA and CAD/CAM to acquire the AM	2010	Emerald
		Develop a model for optimizing SC costs by reconciling differential effects of transportation	2010	Emerald
		Provide a methodology on OFP reengineering by capitalizing SCM integration and coordination	2010	Emerald
		Propose a methodology for operations performance improvement in complex mfg. environment	2010	Emerald
		Present challenges in transforming mfg. servitization orgs. into product-service providers	2010	Emerald
		Propose demand-supply chain representation to support org. between OEMs and customers	2010	Emerald
		Discuss the main problems in spare parts SC integration mgt.	2010	Emerald
		Provide a review to understand the research of mfg. technology and mgt. in a national context	2010	Emerald
		Identify complementary and substitute business practices to support AMT	2010	Emerald
		Explore the application of mfg. postponement in a service setting	2010	Emerald
		Develop a model for overcoming the key barriers to implement SCI systems by small ETO Co.	2010	Emerald
		Discuss whether the modularity concept can be applied to product-related service	2010	Emerald
		Design and develop a support system for maintenance SCs	2007	Emerald
		Assess the e-business adoption in mfg. SMEs	2008	Emerald
		Understand the factors affecting eB adoption and its impact on logistics-related processes	2009	Emerald
Journal of Organizational Computing and Electronic Commerce	1	Use e-commerce innovation model to analyze and develop e-business dynamic capabilities	2008	Taylor & Francis
Journal of Organizational Change Management	4	Investigate e-business and organizational change	2003	Emerald
		Develop a process model for the migration of traditional firm to an eB strategy and architecture	2005	Emerald
		Consider the changing nature of work and IT mgt. in the e-business era	2005	Emerald
		Introduce the special issues on org. transformation and e-business implementation	2005	Emerald
Journal of Operations Management	40	Explore the impact of VE and IT alignment in agile manufacturing	2005	Elsevier
		Examine theoretical perspectives in SCM coordination	2008	Elsevier
		Define the concurrent engineering and create an instrument to assess it	2001	Elsevier
		Describe a framework for integrated product development and competitive capabilities	2002	Elsevier
		Propose a complex adaptive supply networks systems	2001	Elsevier

		Brief the history of ERP	2007	Elsevier
		Document the effect of ERP, SCM, and CRM systems on corporate performance	2007	Elsevier
		Examine the capabilities that enhance outcomes of an episodic SC collaboration	2011	Elsevier
		Examine if simultaneous utilization of internal mfg. and external flexibility can create synergies	2012	Elsevier
		Explore the interplay of supplier-supplier and network focusing on cooperation & coopetition	2011	Elsevier
		Evaluate the mediated power and outsourcing relationships	2012	Elsevier
		Test the contingency effects of EU on the relationship between SCI and ops. performance	2011	Elsevier
		Test the effects of supplier-to-buyer and inter-org. identification on operational performance	2011	Elsevier
		Explore time-based competition in make-to-stock SCs for functional products	2012	Elsevier
		Report the cross-functional alignment in supply chain planning	2011	Elsevier
		Explore internal and external supply chain linkages	2011	Elsevier
		Theorize and test structural model incorporating AM, JIT, and operational and firm performance	2011	Elsevier
		Reexamine the link between lean inventory adoption and firm performance	2011	Elsevier
		Specify a contingent view of e-collaboration and performance in mfg.	2009	Elsevier
		Investigate the relationship between Internet retailer margins and product distribution service	2008	Elsevier
		Examine the impact of e-business technologies in SCI and on operational performance	2007	Elsevier
		Examine the linkages between IT for SCI, trading partner relationship and structural change	2007	Elsevier
		Study the impact of e-business technologies on org. collaboration and performance	2007	Elsevier
		Investigate the integration of information sharing and SC practice in SCM	2007	Elsevier
		Examine customization and real time information access in integrated eB SC relationships	2007	Elsevier
		Explore the SC collaboration and its impact on collaborative advantage and firm performance	2011	Elsevier
		Investigate the role of institutional pressures and org. culture in adopting eSCM	2010	Elsevier
		Examine the relationship between JIT mfg. practices and performance outcomes	2010	Elsevier
		Identify factors that facilitate and inhibit supplier integration	2010	Elsevier
		Investigate the effects of institutional forces and trust in adopting SC information integration	2010	Elsevier
		Examine supplier-supplier relationships in buyer-supplier-supplier triads	2010	Elsevier
		Address how the enterprise technologies help mitigate the challenges of offshore governance	2008	Elsevier
		Address hopes for the future of OM (editorial)	2001	Elsevier

		Uncover the integration strategy impact on competitive capabilities and business performance	2003	Elsevier
		Develop new structured knowledge about international mfg. networks	1998	Elsevier
		Examine the relationships among IT, inventory, and profitability	2007	Elsevier
		Study the relationships between SCI, operational and business performance	2010	Elsevier
		Frame the supply network structure in formalization, centralization, and complexity	2002	Elsevier
		Argue the impact of internal integration and relationship commitment on external integration	2011	Elsevier
		Investigate supplier and customer integration strategies in global mfg.	2001	Elsevier
Journal of Supply Chain Management	23	Develop and identify a taxonomy with supply chain strategies	2009	Wiley-Blackwell
		Competitive advantage from integrating ERP and TQM	2005	Wiley-Blackwell
		Global sourcing organization integration	2009	Wiley-Blackwell
		Discuss social network in supply chain context	2009	Wiley-Blackwell
		Theorize buyer-supplier-supplier relationships in supply networks	2009	Wiley-Blackwell
		Investigate the relationships between Internet-based IT and global SC integration	2010	Wiley-Blackwell
		Examine the role of dynamic capabilities in global supplier management processes	2010	Wiley-Blackwell
		Draw on the social network perspective to explore social capital	2010	Wiley-Blackwell
		Develop a model depicting the key factors of cooperative norms in buyer-supplier relationship	2008	ABI/Inform Global
		Evaluate the performance of third-party logistics arrangements	2004	ABI/Inform Global
		Build a coherent and testable model to create a sustainable SC management	2009	Wiley-Blackwell
		Investigate how industrial buyers align their relationships with suppliers to the purchase	2011	Wiley-Blackwell
		Increase rigor in SCM research by deriving an interpretive structure of presenting GT studies	2011	Wiley-Blackwell
		Evaluate the effect of resources/capabilities on sustainable supply mgt and performance	2011	Wiley-Blackwell
		Investigate B2B interpersonal trust formation during the supplier selection process	2008	Wiley-Blackwell
		Address the way in which 3PL providers develop IT capability and the resulting impact	2008	Wiley-Blackwell
		Investigate the mechanisms through which IT influences SC collaboration performance	2011	Wiley-Blackwell
		Develop the notion that TPCMs impact knowledge sharing in buyer-supplier relationships	2011	Wiley-Blackwell
		Analyze the current practices and key challenges to domestic supplier integration	2011	Wiley-Blackwell
		Provide cutting-edge theories and models of supply networks (editorial)	2009	Wiley-Blackwell
		Explore approaches to manage the supplier-supplier interface in product development	2011	Wiley-Blackwell

		Provide an understanding of SC collaboration dynamics	2012	Wiley-Blackwell
		Estimate the inter-firm linkages and profitability in the automobile industry for SCM	2001	Wiley-Blackwell
Journal of Strategic Information Systems	1	Propose an integrative model to understand value creation in web services	2006	Elsevier
Journal of Service Science & Management	1	Explore the reverse logistics ops. mgt. based on VEs and complaint service mgt.	2008	Scientific Research
Journal of the Association for Information Systems	1	Analyze the dynamics of information collaboration focusing on blended IT value propositions	2011	AISeL
Journal of the European Economic Association	1	Study the determinants of vertical integration and technology	2010	MIT Press
Leader to Leader	1	Examine the successful M&As beyond the financial issues	2009	Wiley-Blackwell
Management Accounting Research	1	Draw on a virtual integration-the management control system in a multinational enterprise	2008	Elsevier
Management Decision	3	Explore the extended manufacturing enterprise paradigm	1994	ABI/Inform Global
		Explore the VI and economic performance by presenting a managerial capability framework	2002	Emerald
		Establish a framework for the inter-firm market orientation with related concepts	2011	Emerald
Managerial Finance	1	Discuss e-business and e-commerce evolution from a strategic perspective	2001	Emerald
MIS Quarterly	2	Investigate the special issues on IT and knowledge mgt.	2005	Psu.edu
		Identify possible risks of conflict in the IOS and suggest strategies for collaboration mgt.	1996	ABI/Inform Global
MIS Quarterly Executive	1	Examine the techniques used to monitor and improve the IS alignment and performance	2002	N/A
Management Research News	1	Examine the impact of ERP on orgs. and discuss critical issues concerning ERP/ERPII system	2006	Emerald
Management Research Review	2	Explore trends in the use of internet-supported sustainability reporting	2010	Emerald
		Identify a requirement for a new SMS model for global business orgs.	2010	Emerald
Online Information Review	1	Investigate the new ICT systems to describe the development of ERP systems adoption	2005	Emerald
Organization Science	4	Examine the network structure in virtual organizations	1999	Informs
		Analyze the collaborative incentives in interdivisional relationships and postmerger integration	2008	Informs
		Discuss the vertical integration and rapid response in fashion apparel	1996	informs
		Develop a model of technology and capability transfer during acquisition implementation	2002	Informs
Pacific Asia Journal of the Association for Information Systems	1	Identify how the IT function can create and enable agility in existing ISs	2010	AISeL
Procedia Computer Science	1	Analyze the challenges in constructing a dynamic monitoring framework for SOA	2010	Elsevier
Perspectives of Innovations, Economics & Business	1	Present the challenges of globalization from various of perspectives	2009	Prague Development Center
Public Organization Review	2	Develop a model of knowledge group to create synergy across the public sector	2010	SpringerLink
		Illustrate the virtual governance networking policies based on a comparative analysis	2010	SpringerLink

Production Planning & Control	14	Discuss developments of bilateral enterprise collaborations and new emerging mfg. paradigms	2001	Taylor & Francis
		Review communications technologies for the extended enterprise	1998	Taylor & Francis
		Outline a framework in information infrastructure design to support the EE	1999	Taylor & Francis
		Describe the concept of extended enterprise cooperation	1998	Taylor & Francis
		Present how vertical integration and make-or-buy decisions support enterprise collaborations	2001	Taylor & Francis
		Discuss the inter-organizational R&D project collaboration using CEG concept	2012	Taylor & Francis
		Explore the issue of loyalty and commitment of team workers in industrial collaboration	2001	Taylor & Francis
		Look at what is needed to allow SMEs to participate fully in SC integration	2001	Taylor & Francis
		Deal with trust in e-commerce and measures to increase it	2001	Taylor & Francis
		Give an overview of major scientific approaches to inter-enterprise relationships	2001	Taylor & Francis
		Address the characteristics and challenges of the next generation of ERP systems	2003	Taylor & Francis
		Describe the extended enterprise – a context for manufacturing	1998	Taylor & Francis
		Describe a new approach to EE engineering and operation-embedding KM and work execution	2001	Taylor & Francis
		Improve customer-supplier relationship management in a decentralized intelligent SC network	2007	Taylor & Francis
Robotics and Computer-Integrated Manufacturing	2	Present lessons learned for building agile and flexible scheduling tool in EE	2006	Elsevier
		Discuss the transformation of mfg. business model – from cloud computing to cloud mfg.	2012	Elsevier
Revista Informatica Economică	1	Analyze the integration capabilities of BI platforms and suggest the integration solutions	2008	Revistaie.ase
Rand Journal of Economics	1	Analyze VI to compare outcomes under upstream competition and monopoly	2005	ABI/Inform Global
Review of Economics and Statistics	1	Examine the important linkage between VI and technological innovation	1980	MIT Press
Research Policy	1	Analyze and compare the various collaborative governance structures including the VI	1991	Elsevier
Supply Chain Management	1	Focus on the practices of SCI	1996	MCB University Press
Supply Chain Management: An International Journal	22	Propose the agile SC transformation matrix to achieve agility in supplier-buyer SC	2007	Emerald
		Identify the barriers in the SME community to the adoption of online SC solutions	2008	Emerald
		Analyze the benefits, barriers, and bridges to successful collaboration in strategic SCs	2008	Emerald
		Highlight the problems on demand mgt. in VC with a framework for analysis and improvement	2009	Emerald
		Understand the flexibility and adaptability in supply chains	2009	Emerald
		Identify and design SC solutions according to the customers' demand chains	2009	Emerald
		Analyze whether the US mfg. outsourcing pendulum is swinging away from China	2009	Emerald
		Summarize suggestions and ideas for the industries planning to implement lean SC – production	2009	Emerald
		SCM in SMEs – combine technology and customized strategy in supplier	2009	Emerald

		relationship mgt.		
		Investigate whether the reverse logistics models can be applied in developing countries	2009	Emerald
		Study the RFID technology adoption and supply chain performance for logistics companies	2009	Emerald
		Identify the SC risks and highlight the SC risk management implementation	2009	Emerald
		Identify the up-stream SC relationship risk to develop a trust building model via risk evaluation	2009	Emerald
		Investigate the strong working relationships between firm, supplier and customers	2009	Emerald
		Examine the impact of alignment between SC strategy and EU on SCM performance	2009	Emerald
		Investigate the role of firm size in using e-procurement to achieve SCI	2008	Emerald
		Discuss the collaborative SC and value chain analysis in the UK	2008	Emerald
		Highlight the short-term profitability by transportation service providers and CRM	2007	Emerald
		Present the relationship between SC linkages and SC performance	2007	Emerald
		Examine the relationships between the level of trust and relevant constructs in SCM	2005	Emerald
		Use the customer-supplier mfg. relationship to develop lean and green suppliers	2005	Emerald
		Review the literature relating to SCM integration and implementation	2005	Emerald
Software, IEE Proceedings	1	Develop a tool supporting for integrating EEs	2000	IEEE Xplore
Strategy & Leadership	1	Explore the collaborative innovation throughout the extended enterprise	2008	Emerald
Strategic Management Journal	6	Reflect on the diffusion of the 'resource-based view of the firm'	1995	JSTOR
		Focus on dynamic capabilities and more on the RBV of the firm	2000	Wiley-Blackwell
		Introduce the CLC and articulate patterns and paths in the evolution of org. capabilities	2003	Wiley-Blackwell
		Support the notion of balancing VI and strategic outsourcing can achieve superior performance	2006	Wiley-Blackwell
		Examine the created value in long-term performance of horizontal M&As	1999	Wiley-Blackwell
		Identify advantages & disadvantages of choosing vertical financial ownership vs. other VI ways	1992	JSTOR
Sloan Management Review	1	Propose a framework for marketing productivity based on make-or-buy decisions and VI	1986	ProQuest
Systems Research and Behavioral Science	1	Develop a KM system to manage the knowledge of ERP implementation process	2006	Wiley-Blackwell
Technovation	3	Analyze the development approaches of B2B virtual communities	2011	Elsevier
		Look at the technological issues and challenges related to e-commerce and VEs	2002	Elsevier
		Investigate the introduction and innovation of new or improved services by manufacturers	2012	Elsevier
The Bell Journal of Economics	1	Test the transactions cost theory of VI	1982	JSTOR
The Database for Advances in Information Systems	1	Use GT approach for inductive theory building about virtual team development	2001	ACM

Turkish Journal of Electrical Engineering & Computer Sciences	1	Identify the agile ISs development method usage in practice	2004	Tubitak
The Journal of Industrial Economics	1	Discuss the vertical integration and the market for repair parts	1968	Wiley-Blackwell
Total Quality Management & Business Excellence	4	Review and identify the structuring business process improvement methodologies	2005	Taylor & Francis
		Demonstrate a web-based methodology to measure the level of TQM implementation	2007	Taylor & Francis
		Provide a model that relates QMPP with IS and purchasing performance	2008	Taylor & Francis
		Argue the information integrity is imperative besides quality assurance	2004	Taylor & Francis
Transportation Research Part	1	Real-time e-supply chain management (editorial)	2003	Elsevier
VINE: The Journal of Information and Knowledge Management Systems	4	Identify major areas to help org. transformation to achieve sustainable performance	2006	Emerald
		Explain how KM is an essential part of an information management initiative	2006	Emerald
		Identify a unified approach to agile knowledge-based enterprise decision support	2006	Emerald
		Provide a practical framework for employing KM principles to improve org. performance	2006	Emerald
Work Study	1	Discuss the central features of virtual corporation	1998	Emerald
Totally 167 journals and 796 journal articles				

Table IV. Classification of Literature on ERP and Collaborative Enterprise Governance

Theme	Author(s)	Year	Focus of study/contribution	Unit of analysis	Theoretical perspective	Applied research methodology	Industry sectors
Designing and building ERP systems (ERPI, ERPII, ERP capabilities, cloud-based ERP, etc.)	Ayal and Seidmann	2009	Investigate the business value of integrating enterprise information systems in large scale clinical context by measuring financial, operational, and marketing aspects	ERP, EDI	IT and organizational capability	Case study, Longitudinal data set	Clinical
	Banker *et al*.	2010	Evaluate the IT impacts that transcend organizational boundaries by demonstrating cross-organizational IT impacts	Cross-organizational IT (ERP) collaboration	Economic theory	Case studies, Interviews	Public accounting
	Beheshti	2006	Examine the impact of ERP on organizations and discuss critical issues that should be considered by managers and decision makers who are considering implementing an ERP/ERPII system	ERP, ERPII	IT and organizational capability, Benefit-based view	Literature review	Not applicable
	Benlian and Hess	2011	Compare the relative importance of evaluation criteria in proprietary and open-source enterprise application software (EAS) selection	Open-source, ERP	Evaluation-based view	Adaptive conjoint (analysis) study, Online survey	Not applicable
	Bose *et al*.	2008	ERP and SCM systems integration can improve operations, provide efficient inventory tracking and picking, and reduce the lead time	ERP, Supply chain management	Configuration theory, IT and organizational capability	Case studies	Valve manufacturing (China)
	Bull	2010	Offer the insights on the use of CRM systems and the strategic impact on the processes of (dis)intermediation to improve customer service	CRM systems	IT and organizational capability	Interpretative case studies	Insurance
	Collins *et al*.	2010	Identify a set of 'DSS Desiderata' that are important for building systems in organizations that wish to implement the Smart Business Network (SBN)	DSS, Inter-organizational networks	Network theory, IT and organizational capability	Conceptual, case applications	Not applicable
	Davenport	1998	Discuss a set of strategic issues on designing and managing the enterprise systems integration in the enterprise	Enterprise systems	Configuration theory	Conceptual, Case applications	ERP vendors, PC, Manufacturing
	Davis and O'Sullivan	1998	Introduce and describe the principle technologies which will probably play a leading role in the information infrastructure of extended enterprises	Extended enterprise, EDI, Supply chain management	IT and business alignment, Configuration theory	Conceptual, case applications	Food, Retail
	Davis and	1999	Outline a framework to offer an important	Extended	New framework	Conceptual	Not applicable

	O'Sullivan		roadmap in the modular design of the information infrastructure to support the extended enterprise	enterprise IS, Supply chain management	development, Configuration theory		
	Demirkan *et al*.	2010	Examine the performance of an SaaS set up under different coordination strategies between the ASPs and AIPs in SC network	SaaS, Cloud computing, Supply network	Relational view, SCM	Conceptual, Simulation experiments	Cloud-based ERP provider (e.g. SAP, NetSuite)
	Dwivedi and Mustafee	2010	Identify the current advances in ICT and its expected influence on the adoption of cloud computing	Cloud computing, Open source software (OSS)	Low-cost access based view, High performance computing based view	Conceptual, Case applications	IT
	Frank	2004	Describe an architecture for a distributed ERP system where it is possible to improve performance, local autonomy, and availability by having local but integrated ERP systems in different functional locations	Distributed ERP systems, e-commerce systems	Extended transaction models, Configuration theory	(No-) Replication methods	ERP software companies
	Johansson and Sudzina	2008	Build up the knowledge about reasons for small and mid-sized enterprises (SMEs) to adopt open source enterprise resource planning (ERP) systems	ERP, open source applications, SMEs	Cost perspective, IT and business alignment	Conceptual, Case applications	Software developer
	Hanseth and Lyytinen	2010	Propose a design theory that tackles dynamic complexity in the design for Information Infrastructure (IIs) defined as a shared, open, heterogeneous and evolving socio-technical system of Information Technology (IT) capabilities	Information infrastructure, Internet, EDI	IT design theory, Complex adaptive systems (CAS), Configuration theory	Conceptual	Not applicable
	Hauser *et al*.	2010	Propose Event-Driven Service-Oriented Architecture, which combines the benefits of component-based software development, event-driven architecture, and SOA	SOA, Event-Driven Architecture (EDA)	Configuration theory	Conceptual	Not applicable
	Hendricks *et al*.	2007	Document the effect of investments in ERP, SCM, and CRM systems on a firm's long-term stock price performance and profitability measures	ERP, SCM, CRM	Benefit-based view, IT and financial performance view	Sample analysis, Financial benefits analysis	ERP vendors
	Katzan Jr.	2010	Provide a conspectus of the major issues in cloud computing privacy	Cloud computing, SaaS	Configuration theory, Strategic management	Conceptual	Not applicable
	Koh *et al*.	2008	Achieve the benefits and impediments to success of the new ERPII management tools; propose the collaborative structure types for information exchange	ERPII	IT and business alignment	Questionnaire survey	ERP vendors

	Lee *et al*.	2003	Look at the enterprise integration with ERP and EAI, and compare internal and external approaches to enterprise business integration	ERP, EAI	IT and organizational capability	Conceptual, Case applications	Software
	Mohamed *et al*.	2010	Propose an architecture to build integrated B2B e-Commerce hub solutions and inter-organizational systems (IOS) based on Service Oriented Architecture (SOA)	e-commerce, SOA, EDI, IOS	Bottom-up/top-down approaches, Configuration theory, New architecture development	Case studies	Oil and gas
	Palaniswamy and Frank	2000	Show the benefits of implementing an ERP system in enhancing the performance of an organization – manufacturing performance	ERP	IT and organizational capability	Case studies, Grounded theory (observation)	Metal, Financial services, Electric motors, Fiberglass, Food
	Park and Kusiak	2005	Propose an ERP operations support system (EOSS) that aims to achieve and maintain the process integration of ERP	ERP, Process integration	Configuration theory, Process integration perspective	Portfolio modeling	Not applicable
	Ramrattan and Patel	2010	Propose an analytical development matrix assisting web developers in emergent organizations to develop web-based information systems	Web-based IS, Dynamic changing organizations	IT and organizational capability, Contingency and configuration theory	Action research	High education
	Samaranayake	2009	Provide an integrated approach for business process improvements to improve ERP system through enhanced process integration, automation, and optimization	ERP, BPR	Configuration theory, Process-oriented view	Event-driven process chain (EPC)	Not applicable
	Sammon and Adam	2005	Present the concept of organizational prerequisites for enterprise-wide systems integration as a means to manage the ERP/data warehouse (DW) projects	ERP, ERPII, DW	IT and organizational capability, Configuration theory	Literature review	Not applicable
	Tarantilis *et al*.	2008	Present a Web-based ERP system developed for attacking business problems and managing real-world business processes ranging from simple office automation procedures to complicated supply chain planning	Web-based ERP	New systems development, IT and business alignment	Case study	(Metallurgical) Construction
	Wang *et al*.	2006	Present a unified feature-oriented and component-based ERP systems model in which the high efficiency for system construction and reconfiguration is supported	ERP	Configuration theory, New systems development	Algorithm, Case applications	Air-conditioning, Mining, Alcohol brewing

			by multiple grained component coexistence				
	Wei *et al*.	2009	Analyze the characteristics of ERP and PDM integration to better support these two systems integration for independent enterprise network manufacturing systems	ERP, PDM	Configuration theory, Relational view	Conceptual	Not applicable
Managing ERP systems (ERP implementation, ERP systems management, strategic issues, organizational issues, etc.)	Aladwani	2001	Suggest that the marketing concepts and strategies are adaptable to meet the complex social problem of workers' resistance to ERP implementation	ERP, Change management	IT and business alignment	Conceptual	Not applicable
	Al-Mashari *et al*.	2003	Present a novel taxonomy of the critical success factors in ERP implementation process; and argue that ERP benefits are realized when a tight link is established between implementation approach and business-wide performance measures	ERP (CSFs)	CSF-based view, Benefit-based view, Business process management, Taxonomy view	Case studies	PC software
	Alshawi *et al*.	2004	Investigate the feasibility of minimizing the heavy customization required by most ERP implementations by selecting the best modules from each vendor and integrating them using EAI technologies to form one (integrated) system	ERP, Resource management	Strategic management, IT and business alignment, RBV	Case study, Semi-structured interviews	Telecommunication
	Baki and Cakar	2005	Determine the criteria used in ERP selection process and identify the most important criteria for the manufacturing firms	ERP	Selection criteria-based view	Questionnaire	Automotive
	Beatty and Williams	2006	Provide a list of the most common recommendations and best practices for ERPII project	ERPII	IT and organizational capability	Conceptual	Not applicable
	Beheshti	2006	Examine the impact of ERP on organizations and discuss critical issues that should be considered by managers and decision makers who are considering implementing an ERP/ERPII system	ERP, ERPII	IT and organizational capability, Benefit-based view	Literature review	Not applicable
	Benlian and Hess	2011	Compare the relative importance of evaluation criteria in proprietary and open-source enterprise application software (EAS) selection	Open-source, ERP	Evaluation-based view	Adaptive conjoint (analysis) study, Online survey	Not applicable
	Beretta	2002	Propose a methodological approach to designing process-based performance measurement systems that can help management to enact the potentialities of ERP systems	ERP	Process-based management view, New methodological approach development	Case study	Chemical

	Berg and Stylianou	2009	Support for the importance of the impact of both competitive strategy and company size on different decision factors focusing on information technology/systems	Information systems, Outsourcing	IT and organizational capability, Competence theory	Questionnaire survey	Banks, SAP outsourcing vendor
	Capaldo and Rippa	2009	Propose a methodological approach aimed at identifying technical and organizational capabilities firms should have prior to and during the ERP implementation processes	ERP	IT and business alignment, Contingency theory	Conceptual, Focus group, Validity assessment	Telecommunication
	Chen	2009	Provide valuable insights into the practice of ERP implementation and explore how this can facilitate the organization development of new ventures	ERP	IT and organizational capability, Contextualism	Interviews, Case study	IC design
	Chou and Chang	2008	Examine ERP performance at the post-implementation stage, particularly from the perspective of managerial intervention	ERP	Strategic alignment, Operational alignment	Cross-sectional questionnaire survey, Partial least square (PLS)	Technology, Manufacturing, Electronics, Construction, Financial, Telecommunication
	Daniel *et al*.	2004	Discuss the potential role of third party organizations in facilitation of inter-organizational Web service adoption and use	SOA, Open standards, IOS	Relational view, Competence theory	Exploratory case study	Electronics
	Deep *et al*.	2008	Provide valuable insight into the details of ERP selection, focusing on the peculiarities of the SME made-to-order sector	ERP, SMEs	IT and organizational capability, Competence theory	Case study	Conveyor and elevator (Small sized manufacturing)
	Doom *et al*.	2010	Examine the critical success factors of ERP implementations in small and medium-sized enterprises	ERP, SMEs	CSF-based view	Questionnaire, Interviews, Multiple case research	Latex foam, Vegetable oils, Tyres and wheels
	Gargeya and Brady	2005	Identify factors critical to the success (SAP) ERP system implementation	ERP (CSFs), MRP	CSF-based view	Content analysis, Case applications	Software, Oil, Chemical, Semiconductors, Aeronautics
	Gulledge and Deller	2009	Address the gap between managers and technologies by evaluating how SOA and related investments can add business value	SOA, ERP	Service-oriented view	Conceptual, Case applications	Superplatform vendor
	He	2004	Assess major ERP challenges in China and, consequently, to help make the right ERP decisions in pursuit of a sustainable competitive advantage	ERP	RBV, CSF-based view	Executive survey (sample)	State-owned enterprises (SOEs), SMEs (China)

	Ibbott and O'Keefe	2004	Concern with the role of trust in IOS, and the impact this has on planning the development and implementation of the IOS	IOS, Trust	TCE, Social perspective	Documentations, Interviews, Case studies	Cellular network technology
	Katzan Jr.	2010	Provide a conspectus of the major issues in cloud computing privacy	Cloud computing, SaaS	Configuration theory, Strategic management	Conceptual	Not applicable
	Laframboise and Reyes	2005	ERP and TQM are complementary resources that lead to competitive advantage and improved organizational performance	ERP, TQM	RBV, SCM (Supplier-buyer relationship)	Qualitative case studies	Aerospace
	Lee *et al*.	2010	Determine the critical success factors for successful SOA implementation and to describe the practices that lead to the presence of these factors	SOA (CSFs)	Holistic implementation view	Systemic literature review, Interviews, Content analysis, Frequency analysis	Finance, Construction, ICT
	Li *et al*.	2008	Examine the relationship among TQM, ERP implementation and firm performance; and provide a better understanding about the synergistic relationships between TQM and ERP implementation	ERP, TQM	Relational view, Quality control	Questionnaire survey, Structural equation modeling	Manufacturing
	Lin and Rohm	2009	Demonstrate that significant differences of CSFs of the ERP systems implementation do exist in the perception of managers and end-users	ERP (CSFs)	IT and organizational capability, Change management	Field questionnaire survey, Interviews, Case study	Pharmaceutical (China)
	Lyytinen and Damsgaard	2011	Propose a new approach to investigate inter-organizational information systems (IOIS) adoption, which is laid out consisting of dyadic, hub and spoke, industry and community configurations	IOIS	Configuration theory	Conceptual, Configuration analysis, Structural analysis	Not applicable
	Malhotra and Temponi	2010	Identify key decisions necessary in selecting and implementing ERP systems (integration); and recommend the best practices for small businesses	ERP, Small business	IT and business alignment, Decision making view	Primary and secondary sources, Interviews, Case studies	Manufacturing SMEs
	Mandke and Nayar	2004	Business model operating in complex and changing environments should not only require the quality assurance but also need the information integrity to achieve competitive advantage	Information integrity, Quality information system	Open system view of business process, Strategic management	Cost benefit analysis, Critical analysis	Not applicable
	Markus *et al*.	2000	Successful multisite ERP implementations should address the interactions and trade-offs among the four different levels: business strategy, software configuration, technical platform, and management execution	ERP	Contingency and configuration theory, IT and business alignment	Conceptual	Not applicable

	Maurizio *et al*.	2007	Review the factors and methods used to integrate multiple ERP systems to comply with the SOA in an EAI environment focusing on business warehouse application	ERP, EAI, SOA	Control over ERP/EAI landscape	Case study	Law
	Meissonier and Houze´	2010	Conceptualize the 'IT Conflict-Resistance Theory' to cope with conflict situations and to express tacit causes of resistance during IT (ERP) pre-implementation	IT (ERP) implementatio n	Management and organization theory	Action research, Case applications	Broadcasting
	Momoh *et al*.	2010	Highlight ERP implementation challenges from a critical failure perspective and proportion of the failures	ERP	CSF-base view, Executive perspective	In-depth literature review	Not applicable
	Müller *et al*.	2010	Identify opportunities and limitations of SOA concepts and technologies when applied to Business Intelligence applications	BI, SOA, Data warehouse	IT and business alignment	Delphi study, Questionnaires, Statistical analysis (MRT)	Not applicable
	Newman and Zhao	2008	Describe and analyze the process of introducing ERP systems in SMEs and especially their decisions concerning business process re-engineering (BPR)	ERP, BPR, SMEs	BPR-based view, IS development perspective	Case studies, Semi-structured interviews, Documentary analysis, Observation	Clothing (China)
	Nour and Mouakket	2011	Propose a new classification framework to investigate and assign CSFs to a different perspective, namely the stakeholders of an ERP systems	ERP (CSFs), Stakeholder perspective	Stakeholder perspective, CSF-based view	Conceptual, Stakeholder analysis	Not applicable
	Olson and Zhao	2007	Focus on discussion of major critical success factors for ERP upgrade projects from the CIOs' perspectives	ERP (CSFs)	CSF-based view, CIOs' perspective	Semi-structured interviews	Manufacturing, Agriculture, Education, Healthcare, Bank, Distillery, etc.
	Pan *et al*.	2011	Identify, assess and explore potential risks that can affect long-term viability of ERP systems in the post-implementation and exploitation phase	ERP	Risk management	Case study, Questionnaire survey, Interviews	Steel (China)
	Sharif *et al*.	2005	Investigate and describe key issues associated with an ERP-led EAI initiative	ERP, ERPII, EAI	Evaluation and configuration-bas ed theory, New model development, Relational view	Case study, Secondary data, Interviews	Manufacturing (industrial products)
	Subramoniam *et al*.	2009	Identify business process re-engineering (BPR) problems, causes and approaches used in implementing ERP solutions	ERP, BPR, MRP	Relational view, Process re-engineering	Conceptual	Not applicable

	Tsinopoulos and Bell	2010	Develop a model for overcoming the key barriers to the implementation of supply chain integration systems by small engineering to order (ETO) companies	Supply chain integration systems, SMEs	Technology acceptance model (TAM), Decision theory	Case studies, Observations, Interviews	Manufacturing (machinery, nuclear, safety equipment)
	Wagner and Antonucci	2009	Describe the first large-scale, public sector ERP implementation; identify issues, success factors, implementation strategies, and lessons learned as compared to private sector	ERP, eGovernment	Process theory	Longitudinal case study, Semi-structured interviews	Governmental agency
	Yang and Su	2009	Provide a critical insight into the relationship between the benefits of ERP systems implementation and the impacts on firm performance of SCM	ERP, Supply chain management	IT and business alignment	Multi-item instrument development, Survey data with case applications, Structural equation modeling	IT (China – Taiwan)
ERP systems evolutionary trend (impacts/benefits of ERP, competitive advantage, sustainability, future ERP, etc.)	Al-Mashari	2003	Present a new agenda to further the research on the ERP phenomenon by reviewing available studies and exploring future research avenues (e.g. ERP vendors will extend the systems to include we-based apps)	ERP	Taxonomy-based view, Change management	Conceptual	Not applicable
	Anussornnitisarn and Nof	2003	Analyze the implications of e-Work requirements to the design of future ERP systems	ERP	Configuration theory, Process-based view	Conceptual, Modeling, Research project	Not applicable
	Chen	2001	Analyze several critical planning issues for ERP systems; and identify new opportunity and future trend of ERP systems	ERP	Evolutionary view, IT and business alignment	Conceptual, Case applications	ERP vendors
	Daniel and White	2005	Explore the expected future role and use of the information systems including electronic hubs, web services, ERP systems and enterprise portals	IOS, ERP, Web services, e-hubs, Enterprise portals	Configuration theory, Evolutionary view	Delphi (technique) study	IOS experts, IS managers
	Demirkan *et al.*	2010	Examine the performance of an SaaS set up under different coordination strategies between the ASPs and AIPs in SC network	SaaS, Cloud computing, Supply network	Relational view, SCM	Conceptual, Simulation experiments	Cloud-based ERP provider (e.g. SAP, NetSuite)
	Jacobs and Bendoly	2003	Briefly discuss the research streams and suggest some ideas for related future research on ERP developments and directions for operations management research	ERP	Evolutionary view	Conceptual	Not applicable
	Jacobs and	2007	A brief history of ERP; discuss the major	ERP	Evolutionary view	Interviews	ERP vendors

	Weston Jr.		impact of ERP developments and its future generations				
	Kumar and van Hillegersberg	2000	Discuss the future ERP evolutionary trends should converge web-based enterprise-wide information and extensive database to foster inter-organizational integration	ERP	Experience and evolution-based view	Conceptual, Case applications	ERP vendors
	Møller	2005	Formalize and capture the ERPII concept and the next generation enterprise systems (ES)	ERPII	Evolutionary view, Configuration theory	Retrospective analysis	ERP vendors
	Mueller *et al.*	2010	Suggest SOA economic potential model to describe the causal relationships between SOA's features and its business benefits which are mainly driven by operational and IT infrastructural improvement	SOA, ERP	IT and economic view	Conceptual, Case applications	Multiple industrial sectors
	Rajagopal	2002	Explain the emerging role of ERP in organizations and explain the associated contextual factors with the innovation and diffusion of various ERP systems types	ERP	New research model development	Case studies, Interviews	Manufacturing
	Sharif	2010	Bring together of the recent discussions within the business and computing press on social networking, open source and utility computing for ERP solutions in the cloud	SaaS, ICT computing, SOA, ERP, ERPII	Evolutionary view, Cloud-based view	Conceptual, Case applications	Software
	Wang *et al.*	2006	Present a unified feature-oriented and component-based ERP systems model in which the high efficiency for system construction and reconfiguration is supported by multiple grained component coexistence	ERP	Configuration theory, New systems development	Algorithm, Case applications	Air-conditioning, Mining, Alcohol brewing
	Yang and Su	2009	Provide a critical insight into the relationship between the benefits of ERP systems implementation and the impacts on firm performance of SCM	ERP, Supply chain management	IT and business alignment	Multi-item instrument development, Survey data with case applications, Structural equation modeling	IT (China – Taiwan)
Designing and building inter-firm relationships and collaboration (enterprise struc~~ture,~~ enterprise	Anderson and Weitz	1986	Provide a framework for analyzing make-or-buy decisions and describe a set of variables and proposed relationships that might affect vertical integration decisions	MOB, Vertical integration	TCE, Strategic management	Conceptual	Not applicable
	Ahuja and ~~Carley~~	1999	Examine distinct dimensions of emergent network structure in virtual organizations; posit that the fit between task routineness	Virtual organizations, Network	Network theory, Organizational theory,	Questionnaire survey, Interviews, Content analysis,	Artificial intelligence architecture

strategy, core competence, etc.)			and network structure is associated with superior network performance		Configuration theory, RBV	Case study	
	Albani and Dietz	2009	Clarify notions in the inter-organizational cooperation area; cover the whole process of developing and investigating an enterprise network	Network	Network theory, SCM	Conceptual modeling of business process (UML and BPMN)	Not applicable
	Baramichai *et al*.	2007	Propose the Agile Supply Chain Transformation Matrix, and the implementation methodology for a systematic approach to achieve agility in the supplier-buyer supply chain	Agile supply chain management, Dyad	Contingency and configuration theory, Relational view, SCM	Case study, Quality function deployment (QFD)/AHP	Plastics manufacturing
	Binder and Clegg	2006	Propose a conceptual framework for the design and management of an enterprise (i.e. inter-firm) based on contingency planning of an enterprise (including VIE, EE, and VE)	Vertical integrated enterprises, Extended enterprises, Virtual enterprises	Network theory, Contingency and configuration theory, Competence theory, RBV, TCE	Grounded theory, Semi-structured interviews, Questionnaire survey	Automotive
	Binder and Edwards	2010	Propose the collaborative enterprise governance framework which is a significant contribution in the operation management area (VIE, EE, VE)	Enterprise (a.k.a inter-firm collaboration) management	Contingency and configuration theory, RBV	Grounded theory method	Automotive
	Bititci *et al*.	2004	Identify different levels of collaboration and categorized each one of the existing collaborative enterprise models according to the level of collaboration inherent within the network/enterprise	Network (supply chains, extended and virtual enterprises, clusters)	Value perspective, Network theory, Competence theory	Conceptual, Case applications	IT, Transportation
	Boardman and Clegg	2001	Discuss the paradigm of "structured engagement" for concurrent engineering within the extended enterprise	Extended enterprise	RBV, Competence theory, Holonic thinking	Action research	Aerospace, Automotive
	Borgatti and Li	2009	Apply network concepts to both "hard" (e.g. materials flow) types and "soft" types of ties (e.g. information sharing) of ties in the supply chain context	Supply network management	Social network theory	Social network analysis	Not applicable
	Browne and Zhang	1999	Review the thinking behind the extended enterprise and virtual enterprise models of manufacturing systems; identify the characteristics of each and the similarities and differences between them	Extended enterprise, Virtual enterprise	Value chain based view, Network theory	Conceptual	Not applicable
	Busquets	2010	Propose the concept of Orchestrating Smart	Power,	Power theory,	Abduction	Banks and insurers

			Business Networks as a managerial function shaping structural dynamics for innovation	Network	Configuration theory	methodology, Exploratory case studies, Interviews	service provider
	Cambra-Fierro *et al*.	2011	Provide a conceptual framework to clarify and extend the concept of inter-firm market orientation (IMO) along different inter-firm learning dimensions	Inter-firm network	Relational view, Network theory, Organizational theory, SCM	Case studies, Semi-structured interviews, Secondary data, Coding	Technology
	Cao and Zhang	2011	Uncover the nature of supply chain collaboration and explore its impact on firm performance based on a paradigm of collaborative advantage	Supply chain, Collaborative advantage	TCE, Collaborative advantage view, Network theory, RBV, Relational view, ERBV	Web survey, Structured interviews, Confirmatory factor analysis, Structural equation modeling	Manufacturing (PC, Furniture, Rubber, Metal, Electronics, Transportation, Instruments)
	Chen *et al*.	2007	Investigate the Collaborative Planning, Forecasting and Replenishment (CPFR) performance and alternatives used in the adoption of IT-based inter-enterprise collaboration strategies	Inter-enterprise, Supply chain	SCM, Relational view, Performance view	Simulation	Manufacturing (manufacturer-retailer)
	Chen *et al*.	2008	Define and clarify basic concepts and developments of architectures for enterprise integration and interoperability	Enterprise integration, Network, Inter-operability	Configuration theory, Evolutionary view	Conceptual	Not applicable
	Cheng *et al*.	2011	Examine the effect of changes at the manufacturing plant level on other plants in the manufacturing network; and investigate the role of manufacturing plants on the evolution of a manufacturing network	Manufacturing network	Network theory, Relational view	Case studies, Longitudinal secondary sources, Semi-structured interviews	Manufacturing (Pipes, Joints and fittings, Doors, Pumps)
	Childe	1998	Explore the concept of the extended enterprise, in which manufacturing companies co-operate closely to maximize the benefits of business they are all involved in	Extended enterprise, Alliance	Relational view, SCM	Conceptual, case applications	PC technology
	Chituc *et al*.	2009	Describe a conceptual framework towards seamless interoperability in a collaborative-competitive economic networked environment	Network, e-business, Inter-operability,	Collaborative and competitive economic view, Business enabler, Network theory	Conceptual, Case application	Footwear
	Chung *et al*.	2004	Offer a new business model of networked enterprise for global sourcing	Network, Supply chain	Economic network theory, Strategic sourcing	Case study	Toy

	Currie and Parikh	2006	Develop an integrative model for understanding value creation in web services from a provider's perspective	Web services, Business value. Vendor perspective	RBV, Strategic management, DCV	Conceptual	Not applicable
	Duan *et al*.	2009	Examine how the process-based view of outsourcing is a way to realign a process with better resources and facilitate global division of labor and specialization	Business process outsourcing (BPO), Value chain	Value chain based view, Production economics theory, RBV, TCE	Event study, Database	(BPO) announcements
	Fawcett *et al*.	2012	Build and enrich theory regarding how decision makers construct a dynamic supply chain collaborative capability	Supply chain	Systems design (relational view, etc.), Competence theory, RBV, DCV, Change management	Semi-structured interviews, Case studies, Grounded theory (coding)	Retailer, Finished-goods assembler, Direct-materials supplier, Service provider
	Fujii *et al*.	2000	Propose a Distributed Virtual Factory (DVF) concept that enables precise evaluations of the whole manufacturing system	Distributed virtual factory, Agile manufacturing	Cost analysis, Network theory, Configuration theory	Activity Based Costing (ABS) method, Simulation, Algorithm	Not applicable
	Hansen	2009	Describe the evolution of buyer-supplier relationships from adversarial toward relational, or service-centered	Dyad, Change management	Value chain based view, Relational view	Mixed method (e.g. field notes, interviews, company reports, survey)	Retail, Electronics, Capacitors, Metal
	Harland and Knight	2001	Enrich and develop the work on network management roles and activities, and their influencing factors	Network, Competences	Network theory, Competence theory	Action research	Health service
	Harrigan	1984	Propose a framework that develops the dimensions of vertical integration strategies and propose key factors augmenting their uses within various scenarios	Vertical integration strategies	Industrial economics, Strategic management, Contingency and configuration theory	Conceptual	Not applicable
	Harrigan	1985	Propose a new look at vertical integration and the dimensions that comprise it; and develop a framework for predicting when firms use make-or-buy decisions	Vertical integration, Make-or-buy (MOB)	Strategic management	Archival data, Field interviews, Delphi-method questionnaire	Multiple (Acetylene, Coal, Leather, Food, etc.)
	Holweg and Pil	2008	Examine three theoretical perspectives in SCM research and use these to understand changes in information flows accompanied a shift from build-to-forecast to build-to-order	Dyad	RBV, CAS, AST, DCV, SCM	Case studies	Automotive

	Jagdev and Browne	1998	Consider and describe the emergence of the extended enterprise which represents a new way of doing business, and requires appropriate business process reengineering	Extended enterprise	Value chain based view, SCM, Strategic management	Conceptual	Manufacturing
	Jagdev and Thoben	2001	Discuss recent developments in the nature of enterprise collaborations and the resulting emergence of new manufacturing paradigms	Bilateral (Supply Chain, Extended enterprise, Virtual enterprise)	RBV, Network theory	Conceptual	Not applicable
	Jagdev *et al*.	2008	Introduce the extended enterprise and virtual enterprise concepts and structures, and highlight the integration issues and challenges; and show a semantic web services (SWS) technology	Extended enterprise, Virtual enterprise	Network theory, Configuration theory	Conceptual	Not applicable
	Kaihara and Fujii	2002	Propose a virtual enterprise coalition based on multi-agent paradigm in agile manufacturing environment	Virtual enterprise, Agile manufacturing	Network theory, RBV	Negotiation algorithm, Simulation	Not applicable
	Karlsson and Sköld	2007	Argue that future directions of manufacturing strategy will gain from taking a network perspective with its foundations in actors, resources, and activities	Network, Extraprise	Network theory	Empirical base (literature, field studies)	Automotive
	Katzy and Dissel	2001	Give the insights and applicable 'know-how' for designing and changing business roles as virtual enterprise to have the agility in supporting short-term business opportunities	Virtual enterprise (e.g. consortia, 1st tier supplier nets)	Competence theory, RBV	Longitudinal case studies	Telecommunication
	Li and Williams	1999	Illustrate how the development of inter-firm networks has facilitated the emergence of new inter-firm collaboration in strategic areas	Inter-firm network	Network theory, Relational view	Case studies, Survey	Retailing, Motor manufacturing, Electronics
	Lockett *et al*.	2011	Provide a detailed investigation into a Product Service Systems (PSS) supply chain; highlight the complexity of roles and relationships among the organizations within it	Dyadic network	Network theory, PSS-oriented perspective	Case studies, Semi-structured interviews	Manufacturing
	Luke *et al*.	1989	Set forth a scheme for classifying inter-organizational forms and for identifying the quasi firm with its distinctive features	Quasi firms	Network theory, TCE, RBV	Conceptual	Not applicable
	~~Mahoney~~	1992	Identify the underlying advantages and disadvantages of choosing vertical financial	Vertical integration	TCE, Agency theory	Conceptual, Case applications	Manufacturing, Retail, Aerospace,

			ownership relative to vertical contracts				Automobile
	Manthou *et al*.	2004	Develop a Virtual e-Chain model, presenting a supply chain collaboration framework where the necessary modules are designed in order to guide the partners of a virtual network to achieve strategic and tactical capabilities	Virtual network, Supply chain management, e-business	Configuration theory, IT and organizational capability	Conceptual, Portfolio modeling	Not applicable
	Martinez *et al*.	2001	Propose a distributed and non-hierarchic control structure with a multi-agent system based solution for the overall control of virtual enterprise	Virtual enterprise	RBV, Competence theory, DCV	Conceptual, Project-based	Not applicable
	Mckone-Sweet and Lee	2009	Provide complementary typologies of SC strategy; explore the relationship between the SC strategy and contextual factors, competitive priorities and firm performance	Supply chain	SCM, Configuration theory, RBV	Case studies, Cluster analysis	Electronic, Transportation, Machinery
	Neuman and Samuels	1996	Reveal that the vision of supply chain integration – of seamless linkages from factory to retailer – is widely shared; but the implementation of this vision is not occurring with any urgency	Supply chain	SCM, Performance view	Conceptual	Manufacturing, Retail
	Noke and Hughes	2010	Provide an understanding of how mature manufacturers utilize different strategies to overcome resource constraints and create a new product development (NPD) capability to assist in repositioning	NPD, SMEs	DCV, Value chain based view, Network theory	Case studies, Semi-structured interviews	Engineering and manufacturing, Magnets, Nylon fabric
	O'Neill and Sackett	1994	Describe the extended manufacturing enterprise paradigm and practice; indicate EE model applicable in sectors where the importance of customer service is increasing	Extended enterprise	Configuration theory, Competence theory	Conceptual, Case applications	Aerospace
	Peyrefitte *et al*.	2002	Propose that a better understanding of the relationship between vertical integration and economic performance may be made by considering the role of managerial capabilities in directing integration	Vertical integration, Economic performance	Strategic management theory, Managerial knowledge perspective	Conceptual	Not applicable
	Ray *et al*.	2009	Explicate the moderating impact of two measures of competitive environment – demand uncertainty and industry concentration on the relationship between IT and vertical integration (VI)	Vertical integration, IT, Demand uncertainty	Relational view, IT and business alignment	Database, Sample analysis, Equation models, Variables measurement	PC, Petroleum, Fashion industry
	Rosenzweig	2009	Establish e-collaboration as a mechanism by which manufacturers can develop and maintain strong ties with primary customers	e-collaboration, Supply chain	Relational view, Contingency theory,	Web-based survey, Partial least squares (PLS) analysis,	Manufacturing (B2B), Consulting

			to achieve a better performance		Competence theory	Interviews	
	Sawhney and Parikh	2001	The digitization of information, combined with advances in computing and communications, has fundamentally changed how all networks operate, human as well as technologies	Network	Network theory, Configuration theory, Strategic management	Conceptual, Case applications	Not applicable
	Schroth and Schmid	2009	Propose a service-oriented reference architecture for organizing and implementing electronic cross-company collaboration	Cross-organizational collaboration, IOS, e-commerce	Configuration theory (modularity)	Case study	Public administration
	Shi and Gregory	1998	Develop new structured knowledge about international manufacturing networks by analyzing the networks, classifying the configurations and identifying the capabilities	Network, Competitive capabilities	Network theory, Configuration theory	Knowledge-based research, Case studies, Survey, Field observation	Pharmaceutical, Snack food, Engineering
	Singh and Power	2009	Provide an insight into how firms can develop a level of collaboration capability to have strong working relationships with their suppliers and customers	Supply chain, Dyad	Relational view, SCM	Survey, Telephone interviews, Structural equation modeling, Case applications	Manufacturing
	Svahn and Westerlund	2009	Show that firms' purchasing strategies depend on the nature of their supply relationships and the motive for purchasing	Network, Supply chain	Industrial network theory, Industrial buying behavior	Conceptual	Not applicable
	Tate and Ellram	2009	Present a managerial framework that facilitates successful supplier selection and ongoing management for purchasing services from offshore suppliers	Outsourcing, Supply chain	SCM, TCE, Risk management view	Case studies, Interviews, Coding (NVivo)	Service provider
	Trautmann *et al.*	2009	Provide insights on how companies apply different integration mechanisms to manage global sourcing strategy by arguing information processing issues	MNCs, Purchasing units	Organizational design, IPF, Contingency theory	Case studies, Validity assessment	Gas, Pharmacy, Automotive
	Trienekens and Beulens	2001	Give an overview of major approaches to inter-enterprise relationships which can be used for understanding and designing inter-enterprise collaboration	Inter-enterprise relationships	SCM, TCE, Agency theory, Network theory, RBV	Conceptual	Not applicable
	Tuusjärvi and Möller	2009	Examine the multiplicity of norms in inter-company cooperation in the context of SMEs	Inter-company cooperation, SMEs	Network theory, Organizational theory	Qualitative longitudinal case study, Interviews	Metal
	Wernerfelt	1995	Reflect on the diffusion of the 'resource-based view of the firm' into academic and practitioner thought	Firm resources	RBV	Conceptual	Not applicable

	Wu *et al.*	2010	Validate the emerging conception of supplier-supplier co-opetition; and highlight the role of the buyer in managing supplier-supplier coopetition relationships	Triads (buyer firm, supplier firm)	Relational view, DCV	Interviews, Questionnaire survey, Confirmatory factory analysis	Aerospace-related manufacturing
	Yu and Krishnan	2004	Present an agent-based model of agile manufacturing cells which are used as building blocks of a responsive, robust, and reconfigurable agile manufacturing system	Agent-based system, Agile manufacturing	Agent-based view, Configuration theory	Conceptual	Not applicable
	Yusuf *et al.*	2004	Discuss the nature of an agile supply chains and explore its attributes (including Internet-change drivers and business performance) and capabilities	Agile supply chain, Agile manufacturing	RBV, Competence theory, Supply chain integration	Questionnaire survey (SPSS)	Manufacturing
	Zhang	2011	Develop a taxonomy of agile manufacturing strategies, which suggest the existence of three basic types of agility strategies: quick, responsive, and proactive	Agile manufacturing	Competence theory, Configuration theory	Questionnaire, Case studies	High-tech optical/microwave devices, Instrument, Cooker
Managing inter-firm relationships and collaboration (collaboration governance, enterprise transformation, sustainability, dynamic capabilities, etc.)	Aláez-Aller and Longás-García	2010	Examine changes over time in outsourcing decisions by incorporating the individual plants viewpoint; interpret the evolution from sole sourcing to split sourcing	Dyad	Relational view, DCV	Case studies, Questionnaire, Deductive quantitative tools	Automotive
	Arnold *et al.*	2010	Explore the impacts of global supply chain partners' absorptive capacity, B2B e-commerce business risk on an organization's willingness to commit to and share information with supply chain partners	Global supply chain, inter-organizational relationships	Relational view, SCM, RBV	Survey, Structural equation modeling	Construction, Energy, , Insurance, Aerospace, Transportation, Telecommunication
	Baines *et al.*	2011	Investigate the vertical integration practice of manufacturers who are successful in their adoption of servitization	Vertical integration, Servitization	SCM, Decision making view	Cast studies, Semi-structured interviews	Manufacturing (product-centric services)
	Bernardes	2010	Indicate that the SCM function may contribute to sustainable competitive advantage and develop social capital in dyadic network interactions	Dyadic network, Social capital	Relational embeddedness, Social network perspective	Web-based survey, Case studies, Structural equation modeling	Fabricated metal, Machinery, Electronic equipment
	Binder and Clegg	2006	Propose a conceptual framework for the design and management of an enterprise (i.e. inter-firm) based on contingency planning of an enterprise (including VIE, EE, and VE)	Vertical integrated enterprises, Extended enterprises, Virtual enterprises	Network theory, Contingency and configuration theory, Competence theory, RBV, TCE	Grounded theory, Semi-structured interviews, Questionnaire survey	Automotive
	Binder *et al.*	2008	Propose a collaborative frontloading framework to improve the competitiveness of inter-firm R&D collaboration in automotive	Inter-firm network	Network theory, Configuration theory, RBV	Exploratory study, Semi-structured interviews, Grounded	Automotive

			supply networks			theory, Questionnaire survey	
	Bordonaba-Juste and Cambra-Fierro	2009	Illustrate a successful strategy of supply chain management in a SME, combing technological innovation and appropriate information communication systems with suppliers	Supply chain, SMEs	SCM, Relational view	Case study, Semi-structured interviews	Winery
	Cai *et al*.	2010	Investigate the effects of companies' institutional environment on the development of trust and information integration between buyers and suppliers	Dyad, Supply chain	SCM, Institutional theory, Trust-based view	Interviews, Questionnaire survey, Structural equation modeling	Manufacturing (Electronics, Machinery, Metal, Chemicals, Food, Apparel, Furniture, etc.) (China)
	Camarinha-Matos and Pantoja-Lima	2001	A workflow based approach is presented to support coordination in virtual enterprises; the model consider on flexibility and configurability as the key aspects	Virtual enterprise, multi-level coordination	Configuration theory, RBV	Conceptual, Action research (project-based)	Software engineering
	Caridi and Cigolini	2002	Introduce a new method to ensure adequate safety stocks in materials requirements planning (MRP) environments to improve materials management effectiveness towards agile enterprise	MRP, Agile enterprise	Demand/stock management view (dampening method)	Simulation	Not applicable
	Cheng	2011	Suggest that the role played by relational benefits is critical in ensuring the information sharing as it reinforces the connectedness between supply chain members and mitigates the dysfunctional conflicts in the process and inter-organizational relationships	Inter-organizational relationships, Information sharing, Supply chain	RBV, Political economy perspective, SCM	Questionnaire survey, Chi-square analysis, Structural equation modeling	Manufacturing
	Chiang *et al*.	2012	Investigate the strategic sourcing and firm's strategic flexibility – as two potentially key drivers of a firm's supply chain agility	Supply chain	Strategic sourcing and flexibility, DCV, SCM	Survey, Interviews, Pilot study, Partial least squares (PLS) technique	Manufacturing
	Choi and Wu	2009	Analyze the three-way interactions among the buyer and its suppliers; and theorize the basic behavioral patterns in the triadic context in supply networks	Triads	Balance theory, Structural-hole concept, Relational view	Building theoretical propositions	Aerospace, Automotive
	Choi *et al*.	2001	Argue for a balance between control and emergence in managing supply networks and inter-firm relationships	Network	CAS, Complexity theory	Conceptual	Not applicable
	Christopher and Lee	2004	Argue that SC "confidence" and "end-to-end" visibility improvement can mitigate supply chain risk and increase the quality of supply chain information	Supply network	SCM	Conceptual, Case applications	Semi-conductor

	Clegg *et al*.	2012	Discuss the importance of collaboration with suppliers and partners during R&D technology projects, which can be accomplished using the collaborative enterprise governance (CEG) concept (VIE, EE, VE)	CEG (VIE, EE, VE), Supply chain	Contingency and configuration theory, Relational view	Grounded theory, Case study, Interviews	Automotive
	Co and Barro	2009	Develop a model for predicting each of the two types of stakeholder management strategies – aggressive strategies and cooperative strategies, and dynamics in supply chain collaboration	Supply chain, Dyadic relations	SCM, Stakeholder theory, Field theory, Management theory	Survey, Factor analysis	Transportation
	Cousins and Crone	2003	Present the strategic frameworks to help both customer and suppliers implement and sustain an obligation contracting approach in the inter-firm relationships	Inter-firm, Network, Alliances	TCE, Relational view	Literature review, Sample frame, Interviews, Modeling, Longitudinal study	Automotive
	Doğan	2009	Examine the price and connectivity incentives of the upstream networks, and incentives for vertical integration between an upstream network provider and a downstream firm	Vertical integration, Network	Network theory	Algorithm	Not applicable
	Flynn *et al*.	2010	Examine the relationship between internal, customer and supplier integration and both operational and business performance	Supply chain integration	Contingency and configuration theory, SCM, Performance view	Questionnaire survey, Interviews, Observations, Variables measurement	Arts and crafts, Chemicals, Electronics, Food, Metal, Rubber, etc.
	Forslund and Jonsson	2009	Explain to what degree supplier relationship obstacles and operational tool obstacles hinder performance management (PM) process integration	Dyad, Performance management, Supply chain	Relational view, Performance view	Survey (web-based questionnaire)	Manufacturing
	Gou *et al*.	2003	Develop a framework for virtual enterprise operation management to address business integration for virtual enterprises	Virtual enterprise	Configuration theory, New framework development	Modeling (Unified Modeling Language (UML) sequence diagram and Petri nets)	Not applicable
	Grefen *et al*.	2009	Describe the approach, architecture and technology required for the dynamic business network process management in instant virtual enterprises	Virtual enterprise, e-business, Supply chain	RBV, DCV, Configuration theory, IT and business alignment	Case study	Automotive
	Halldorsson and Skjøtt-Larsen	2004	Stress the importance of developing competencies in the relationship between the outsourcing company and the third party logistics (TPL) provider	TPL, Dyad	RBV, Competence theory	Conceptual, Case applications	Automotive, Logistics
	Jain and	2008	Investigate technologies, systems and	Network,	SCM, Network	Industrial interviews,	Manufacturing

	Benyoucef		paradigms for the effective management of networked enterprise (supply chain networks), especially long supply chains	Supply chain	theory, Strategic management	Literature review	
	Khoo *et al*.	2010	Examine and elaborate the issues of Information Security Governance (ISG) framework of an enterprise information system	Information security governance, Enterprise information systems	Configuration theory, New framework development	Conceptual, Case applications	Law
	Klein	2007	Examine e-business supply chain management relationships between service providers and clients focusing on the performance impacts of customization and real time information access	Inter-firm dyads, Supply chain, Outsourcing	Relational view, RBV	Online survey, Measurement validation and hypothesis testing	Manufacturing, Banking, Insurance, Wholesale, Education, Healthcare, Publishing/Broadcasting
	Krishnamurthy and Yauch	2007	Propose a theoretical model of leagile manufacturing as it applies to a single corporate enterprise with multiple business units	Lean and agile manufacturing	Lean and agile-based view, Organizational theory	Exploratory case study, Observation, Written records, Interviews	Field engineering and on-site auditing services (electronics, nuclear power, food, pharmaceutical, oil, and gas)
	Lawson and Potter	2012	Examine the dynamics of knowledge transfer within inter-firm new product development projects; show how transfer is influenced by the buyer firm's learning intention, supplier's response, characteristics of the relationship and knowledge to be transferred	Buyer firm, Supplier firm, Knowledge transfer	Knowledge-based view, Relational view, Absorptive capacity perspective	Sample, Structural equation modeling	Automotive, Aerospace, Pharmaceutical, Electrical, Chemical, Manufacturing
	Lefaix-Durand *et al*.	2009	Present how the construct of relationship value (RV) has the potential to help suppliers understand how to create superior value in their customer relationships and ultimately improve their competitiveness	Dyad	Relational view, Competence theory, Relationship value	Multiple case studies, Semi-structured interviews	Wood product manufacturer
	Lewis *et al*.	2010	Provide insights into how organizations can combine both classic and extended resource-based advantage in seeking to establish long-term competitive advantage	Resource, Competitive advantage	RBV, ERBV	Longitudinal case study, Interviews,	Food service
	Lockström *et al*.	2010	Identify factors that facilitate and inhibit supplier integration	Dyad	Relational view	Multiple case studies, Interviews, Coding (Grounded Theory)	Automotive (China)

	Lockstrom *et al*.	2011	Analyze the current practices of, and key challenges to, domestic supplier integration in the Chinese automotive industry from the buyer's perspective	Buyer's perspective, Supply chain	RBV, TCE, Relational view, SCM	Case studies, Semi-structured interviews, Survey, Grounded theory (NVivo)	Electronics, Shipbuilding, Automotive, etc. (China)
	Madlberger	2009	Reveal that key drivers of engaging in inter-organizational information sharing are active information policy, top management commitment, and internal technical readiness	IOS, Information sharing	Organizational theory, RBV, TCE, SCM	Quantitative questionnaire survey, Variables measurement	Retail, Manufacturing
	Martinez *et al*.	2001	Propose a distributed and non-hierarchic control structure with a multi-agent system based solution for the overall control of virtual enterprise	Virtual enterprise	RBV, Competence theory, DCV	Conceptual, Project-based	Not applicable
	Martins *et al*.	2004	Propose the construction of a virtual enterprise (VE) with an embedded Quality Management System (QMS) encompassing all aspects of the VE management and operation	Virtual enterprise, Quality management	Organizational theory	Conceptual, Case applications	Automotive
	Ono and Kubo	2009	Propose a causal model to explain why and how manufacturers intend to extend cooperative relationships with distributors	Dyad	TCE, Relationship marketing (RM), Relational view	Case studies, Questionnaire, Structural equation modeling	Automobile, Food, Fiber, Paper, Chemical, Medicine, Rubber
	O'Reilly and Finnegan	2010	Explore how the performance of electronic marketplaces is impacted by strategic, contextual and structural factors in inter-organizational networks	Inter-organizational (dyadic) networks, e-marketplace	Strategic alignment view, Organizational theory	Case studies, Semi-structured interviews	Telecoms, Cotton, Coal, Electricity
	Ounnar *et al*.	2007	Propose a decentralized self-organized control model based on the concept of a holarchic system that aims at improving the customer-supplier relationship	Dyad, Supply chain	Relational view, SCM, New methodology development, Performance view	Analytic hierarchy process (AHP) method	Not applicable
	Panteli and Sockalingam	2005	Present a framework for understanding the dynamics of trust and conflict within the context of virtual inter-organizational arrangements	Virtual inter-organizational alliances, Trust and conflict, Knowledge sharing	Strategic alliance, Calculus-based trust (CBT), Knowledge-based trust (KBT), Identification-based trust (IBT)	Conceptual	Not applicable
	Pateli and Lioukas	2011	Employ a property rights (PR) approach to explain the impact of certain relationship- and firm-specific effects on the governance choice	Alliance, ICT	PRT, TCE, RBV, Strategic alliance	Questionnaire survey, Variables measurement	ICT

	Pearcy and Giunipero	2008	Investigate firm size as an explanatory variable in the e-procurement application decision that can be used to facilitate supply chain integration	Supply chain, e-commerce	SCM, IT and organizational capability	Questionnaire survey	Food, Paper, Chemicals, Rubber, Metals, Transportation equipment, etc.
	Poler *et al*.	2008	Propose a new structured planning and forecasting collaboration model for networked manufacturing enterprises	Network	Network theory, Forecasting and decision making view	Simulation	Not applicable
	Post *et al*.	2002	Develop a new "Stakeholder View" that is useful for analyzing and managing the complex extended enterprises	Extended enterprise	Stakeholder perspective	Case studies	Diesel engines, Electronics/semiconductors, Biotechnology, Energy
	Purchase *et al*.	2011	Offer an approach to delineate the characteristics of enterprise transformation; argue that there is an increasing need for an integrated enterprise perspective	Enterprise (inter-firm relationships), Core competence	Transformation based view, Network theory	Empirical case study	Defense sector (ministry)
	Reuter *et al*.	2010	Extend insights of the dynamic capabilities view to analyze how the purchasing and supply management function integrates sustainability aspects in the global supplier management processes	Buyer firm, Supply Chain,	DCV, Competence theory, SCM, RBV	Inductive multiple case study, Adaptive behavior model, Survey, Interviews	Chemical
	Richardson	1996	Demonstrate the elements of organization needed to link flexible and fast cycle manufacturing with rapid learning about demand and customer satisfaction within the vertical integration context	Vertical integration, Rapid response	Relational view, Organizational theory, Strategic management	Case studies, Interviews	Fashion apparel
	Rothaermel *et al*.	2006	Carefully balance vertical integration and strategic outsourcing when organizing for innovation helps firms to enrich the product portfolio and product success, and achieve superior performance	Vertical integration, Outsourcing	Performance view, Strategic sourcing	Longitudinal panel dataset, Database	Microcomputer
	Sarkis *et al*.	2007	Develop a framework and a decision model for managing agile virtual enterprises partner selection and partnership formation	Agile virtual enterprise	Strategic alliance formation, RBV	Analytical network process (ANP), AHP	Not applicable
	Soon and Udin	2011	Highlight that local manufacturers value the flexibility aspect of supply chains to stay competitive during demand uncertainties and being responsive to customers	Supply chain, Response flexibility	Value chain based view, SCM, Value chain flexibility view	Semi-structured interview questionnaires, Case study database	Electronics
	Squire *et al*.	2009	Provide novel insights into the impact of	Supply chain,	ERBV, Relational	Mail survey, Sample	Fabricated metal,

			supplier capabilities on buyer responsiveness through the supply chain collaboration	Dyad	view	(database), Questionnaire, Hierarchical regression model	Machinery, Medical, Automotive, Furniture
	Stevenson and Spring	2009	Examine flexibility in a network of inter-connected supply chains	Dyad, Inter-firm network, Supply chain	SCM, Relational view, Network theory	Exploratory case study, Semi-structured face-to-face interviews	Commercial aircrafts, Rubber mouldings, Fabricated steel, LED, etc.
	Sutton	2006	Propose an overall framework for risk assessment and management across the inter-organizational relationships; highlight the need to shift from an "enterprise-centric" view to an "extended enterprise' view	Extended enterprise, e-commerce. Risk management	Relational view, SCM, New framework development	Conceptual, Case applications	Automotive
	Vallespir and Kleinhans	2001	Present a structured set of items and models for supporting vertical integration and make-or-buy decisions	Vertical integration, Extended enterprise, Make-or-buy	Relational view, Competence theory	Conceptual, Case applications	Consultants, Industrialists
	Weber	2002	Propose a means of measuring an organization's need for and ability to develop an agile business strategy within the context of a virtual organization	Virtual organization, Supply chain	Organizational theory, SCM, Performance view	Variance analysis, Marketing performance analysis	Not applicable
	Wilhelm	2011	Argued that the buyer is able to exert influence not only on the coopetition level – within horizontal SC relations but that the coopetitive tension in the overall network can be managed through the active establishment and maintenance of such relations	Network (buyer firm, supplier firm), Coopetition	Network theory	Multiple case studies, Semi-structured interviews, Qualitative content analysis	Automobile
	Wu and Barnes	2012	Present a four-phase dynamic feedback model for supply partner selection in agile supply chains (ASCs)	Agile supply chain, Partner selection	Dempster-Shafer and optimization theories, Decision making view	Conceptual	Not applicable
	Wu *et al*.	2010	Validate the emerging conception of supplier-supplier co-opetition; and highlight the role of the buyer in managing supplier-supplier coopetition relationships	Triads (buyer firm, supplier firm)	Relational view, DCV	Interviews, Questionnaire survey, Confirmatory factory analysis	Aerospace-related manufacturing
ERP and inter-firm collaboration strategy nexus (ERP ~~support~~ strategic	Aerts *et al*.	2002	Argue the mobile agent-based ICT architecture will provide the required flexibility to support the co-ordination in a virtual enterprise	Agent-based ICT, Virtual enterprise	Network theory, IT and organizational capability	Conceptual , Case applications	Aviation
	Akyuz and	2009	Discuss the requirements for forming an	e-supply	Network theory,	Conceptual, Case	IT

networking, inter-organizational information systems, ERP adoption at SMEs, ERP-CEG linkages, etc.)	Rehan		e-supply chain from different perspectives	chain, ERP, BPR	IT and business alignment, Configuration theory	applications	
	Amrani *et al*.	2006	Develop a theoretical distinction between cross-functional integration and cross-functionality which couples nature of inter-organizational processes; and test and discuss the impact of ERP implementation strategy on cross-functionality	ERP, Cross-functionality, BPR	Network theory, (ERP) Implementation strategy, BPR-based view,	Interviews, Survey questionnaire, Case studies	Air transport, Automotive, Salt, Customized vehicles, Plastics
	Ash and Burn	2003	Use a strategic framework to evaluate the management of ERP enabled e-business change	ERP, e-business	Organizational theory, Relational view, New research model development	Multiple case studies, Interviews	Bank, Biotech, PC (Dell)
	Brandon-Jones and Carey	2011	Examine the extent to which user-perceived e-procurement quality (EPQ) influences both system and contract compliance	e-commerce, e-procurement, IS	IT and business alignment, TCE	Questionnaire survey, Ordinary least squares (OLS) regression	Not applicable
	Buonanno *et al*.	2005	Enhance the understanding of the factors influencing the adoption and evolution of ERP systems within SMEs with respect to large companies	ERP, SMEs	IT and business alignment, Organizational transformation	Questionnaire, Interviews	Manufacturing, Services, Trade
	Caldeira and Ward	2002	Identify factors enabling or inhibiting the adoption and use of information systems and technology (IS/IT) in manufacturing SMEs; understand how these factors interrelate in determining relative success in the adoption and use of IS/IT	SMEs, IT, IS	IT and business alignment, CSF-based view	Case studies, Interviews, Coding, Cluster analysis	Footwear, Textiles, Wine, Mould
	Cao and Dowlatshahi	2005	Show the link between ERP and VE and indicate their alignment has positive influences on business performance in an agile manufacturing setting	Virtual enterprise, ERP, Agile manufacturing	IT and business alignment, Network theory, Competence theory	Questionnaire survey, Interviews, Case studies	Manufacturing, Construction
	Cao and Hoffman	2011	Explore the relationship between the alignment of VE strategies, IT support and firm performance by comparing operations manager and general manager's perceptions	Virtual enterprise, IT	IT and business alignment	Questionnaire survey, Validity assessment	Mining, quarrying, and oil & gas, Construction, Manufacturing, Transportation
	Chengalur-Smith *et al*.	2012	Web-based supply chain applications provide immediate information capabilities information sharing and business systems	Web-based supply chain applications,	IT and business alignment	Questionnaire survey, Database, Partial least squares	GE(OPS)

			leveraging, which yields business benefits	Relational concurrence, Information sharing		(PLS) analysis	
	Chi *et al*.	2010	Argue that while network structure provides firms with the opportunity to tap into external resources, the extent to which they are actually exploited depends on firms' IT-enabled capability; develop a theoretical model to examine the relationships between IT, network structure, and competitive action	Inter-firm network, IT, Competitive action	Social network theory, Competence theory, DCV, RBV	Secondary data (database), Action coding, Variables measurement	Automobile
	Choy *et al*.	2004	A server-based enterprise collaborative management system is constructed using EAI technology for supplier relationship management (SRM)	Dyad, EAI, SRM, Supply chain, MRP	Relational view, Configuration theory	Case study and applications	Fans, Heaters, Humidifiers, Air cleaners, etc.
	Davis and O'Sullivan	1998	Introduce and describe the principle technologies which will probably play a leading role in the information infrastructure of extended enterprises	Extended enterprise, EDI, Supply chain management	IT and business alignment, Configuration theory	Conceptual, case applications	Food, Retail
	Deep *et al*.	2008	Provide valuable insight into the details of ERP selection, focusing on the peculiarities of the SME made-to-order sector	ERP, SMEs	IT and organizational capability, Competence theory	Case study	Conveyor and elevator (Small sized manufacturing)
	Demirkan *et al*.	2010	Examine the performance of an SaaS set up under different coordination strategies between the ASPs and AIPs in SC network	SaaS, Cloud computing, Supply network	Relational view, SCM	Conceptual, Simulation experiments	Cloud-based ERP provider (e.g. SAP, NetSuite)
	Doom *et al*.	2010	Examine the critical success factors of ERP implementations in small and medium-sized enterprises	ERP, SMEs	CSF-based view	Questionnaire, Interviews, Multiple case research	Latex foam, Vegetable oils, Tyres and wheels
	Esteves	2009	Develop a benefits realization road-map for ERP usage in the context of small and medium-sized enterprises (SMEs)	ERP, SMEs	Benefit-based view	Exploratory survey, Interviews	Not applicable
	Faisal	2011	Discuss how to make an organizational process integration and industrial collaboration with cloud-based ERP systems in the context of small businesses	Web-based ERP, SaaS, SMEs	New systems development, IT and business alignment	Case studies	Textile manufacturing
	Fawcett *et al.*	2011	Investigate the mechanisms through which IT influence supply chain collaboration performance	e-commerce, Supply chain	RBV, DCV, SCM	Case studies, Survey, Interviews, Content analysis, Structural	Retail, Manufacturing, Service provider

						equation modeling	
	Frohlich	2002	Argue that e-supply chain integration can improve the firm performance; and clarify the most crucial barriers to web-based supply chains	e-integration, Supply chain	SCM	Questionnaire survey, Structural Equation Modeling	Food, Automotive, Aerospace
	Gallivan	2001	Examine the open source software (OSS) 'movement' as an example of a virtual organization and argue that various control mechanisms can ensure the effective performance of autonomous agents who participate in virtual organizations	OSS, Virtual organization	Network theory, Social perspective	Content analysis, Secondary analysis of published case studies (electronic archives, database)	Not applicable
	Gallivan and Depledge	2003	Understand the relationship of IOS use to trust and control in electronic partnerships	IOS, Trust, Control	Social perspective, New framework development	Structured content analysis, Analytic induction, Case studies	PC, Automotive, Financial, Food, Semiconductor
	Gunasekaran and Ngai	2004	IT has a tremendous influence on achieving an effective SCM; supply chain integration is driven by the need to streamline operations to achieve quality service to customers	IT, Supply chain, Virtual enterprise	IT and business alignment, SCM	Literature survey	Not applicable
	Haug *et al*.	2010	Clarify the different ERP system strategies for companies in parent-subsidiary supply chains and the consequences of choosing the different strategies	ERP, Supply chain	IT and business alignment, SCM	In-depth literature review, Case studies, Questionnaire survey, Interviews	Steel, Machinery, Construction, Wood, Plastics, Food
	Helo *et al*.	2006	Propose an integrated web-based logistics management system for agile supply demand network design (ASDN)	Web-based systems, Network	Network theory, Configuration theory, IT and business alignment	Case study, Modeling	Electrical product
	Ho and Lin	2004	Introduce a critical success factor framework for an integrated enterprise systems implementation in the collaborative manufacturing environment	Integrated enterprise systems, Triads	CSF-based view, Configuration theory	Case study	Personal healthcare
	Ibrahim and Ribbers	2009	Provide detailed insights focusing on how trust based on partner competence and trust based on partner openness influence the use of IOS-related resources	IOS, Trust	RBV, TCE	Case studies, Interviews, Questionnaire	Automation, Food, Commodity (Bath room)
	Jaiswal and Kaushik	2005	Companies deploying ERP systems across the value chain need not only re-engineer business processes but also to innovate new business network policies to strengthen partnerships and create value to consumers	Business network systems (e.g. ERP, CRM, EDI, IOS)	Transaction based view, Relational view, Knowledge based view	Empirical case study	Food, Chemicals
	Jean *et al*.	2010	Report on how suppliers use IT as a strategic	Dyad, IT	RBV, Contingency	Survey, Interviews,	Electronics

			resource to govern their international exchange relationships with multinational enterprise customers		theory, TCE, Relational view	Confirmatory factor analysis (CFA), Structural equation modeling	
	Kesharwani *et al*.	2009	Present the key business issues concerning interoperability connection with ERP systems standards with a sight to developing sustainable solutions beneficial to all the organizations	Interoperability, ERP	Configuration theory, Strategic management	Conceptual	Not applicable
	Ko *et al*.	2009	Suggest that the information exploitation capability (IEC) might function as a mediator between electronic collaboration and firm performance	Supplier firm, IOIS	Relational view, Performance view, Strategic management	Internet-based and paper-based survey, Structural equation modeling	Electronics
	Koh and Simpson	2005	Examine how responsive and agile the existing ERP systems are to change and uncertainty, and to identify the types of change and uncertainty in SME manufacturing environments	ERP, SMEs, Uncertainty	Change management, Competence theory, IT and business alignment	Literature review, Questionnaire survey, In-depth telephone interviews, Multi-stage cluster sampling method, ANOVA	Manufacturing (SMEs)
	Kovacs and Paganelli	2003	Give web-based software solutions for design, planning and operation management of complex, networked organizations by improving visibility and real-time coordination control	ERP, SCM, SMEs, multi-company projects	Contingency and configuration theory, IT and organizational capability	Conceptual, Pilot case studies	Engineering, Automotive
	Kumar and van Dissel	1996	Identify possible dangers of conflict in the inter-organizational systems (IOS) arena and to suggest strategies for minimizing the likelihood of conflict	IOS, Relational view	TCE, Organizational theory, IT and organizational capability	Conceptual	Not applicable
	Lai *et al*.	2008	Develop an integrated model to understand how third-party logistics (3PL) providers can develop their IT capability, and how IT capability affects competitive advantage	IT capability, 3PL	RBV, Competence theory, Technology orientation view	Questionnaire, Partial least-squares (PLS), Structural equation modeling	Ministry of Communications (MOC), International Freight Forwarders Association (China)
	Law and Ngai	2007	Present a model of key organizational factors and business process improvement (BPI) that must be managed properly for successful ERP adoption	ERP, Business process	IT and organizational capability, BPR/BPI	Postal questionnaire survey, Non-parametric statistical methods,	Manufacturing, Finance, Wholesale, Retail, Transportation,

						Correlation analysis	Construction
	L.A. Lefebvre and E. Lefebvre	2002	Look at some of the technological issues and challenges related to e-commerce and the emergence of virtual enterprises	e-commerce, Virtual enterprises	Configuration theory, Transition economy view	Conceptual, Case applications	IT
	Morabito *et al*.	2010	Suggest that IS integration generates an organizational competitive advantage through the mediation effect of the "IT organizational assimilation capacity"	Information systems, Competitive advantage	IT and organizational capability	Questionnaire survey, Regression analysis	Family-owned SMEs
	Muscatello *et al*.	2003	Investigate the ERP implementation process in small and midsize manufacturing firms	ERP, SMEs	Holistic implementation view, IT and organizational capability	Case studies, Interviews, Direct observation	Chemical, Inorganic coating, Electronics
	Olsen and Sætre	2007	Argue that there may be problems by enforcing a standard ERP system on a 'no-standard' niche company, and that there are alternatives that should be carefully examined	Niche companies, ERP, SMEs	IT and business alignment	Case studies, Action research	Heavy mechanical equipment, Oil, 'Engineer-to-order'
	Palacios *et al*.	2006	Develop an IT-based agile, flexible and dynamic scheduling tool for multi-site manufacturing environments in the extended enterprise	Extended enterprise, Agile manufacturing	IT and business alignment, New systems development	Case studies	Furniture, Food
	Pasandideh *et al*.	2010	Consider the retailer-supplier partnership through a vendor-managed inventory (VMI) system and develop an analytical model to explore the effect of important supply chain parameters on the cost savings realized from collaborative initiatives	VMI, Supply chain, Dyad	IT and business alignment, Relational view, SCM	Modeling	Not applicable
	Pavic *et al*.	2007	Offer a conceptual understanding of the development of e-business focusing on the SME's willingness and ability to adapt to changes in the business environment created by e-business and the internet	e-business, SMEs	Competence theory, Evolutionary view, IT and business alignment	Literature review, Multiple case studies, Semi-structured interviews	Wire rope, Motor vehicle
	Perona and Saccani	2004	Explore the customer-supplier relationships management through the adoption of techniques and operational processes supporting integration	Dyad, Integration techniques and tools	Relational view, IT and business alignment	In-field research, Questionnaires, Interviews, Case studies	Appliance OEMs, Component manufacturers
	Poba-Nzaou and Raymond	2010	Manage risk at the ERP adoption stage, SMEs can proceed in a rather intuitive, informal and unstructured manner, that is explicitly based however upon an architecture of basic	ERP, SMEs, Risk management	IT and organizational capability	Interpretive case study, Semi-structured interviews, Coding,	Thermal equipment, Bio-agriculture, Technical

			principles, policies and practices			Intra-/inter-case analysis	equipment, Rubber
	Ponis and Spanos	2009	Propose an ERPII system to support virtual enterprises, which should combine with SOA to provide the necessary degrees of flexibility and agility	ERPII, Virtual enterprise, SOA	Configuration theory, IT and organizational capability, Network theory	Conceptual, Case applications	Not applicable
	Power and Singh	2007	Examine the nature of the relationship between application of Internet technologies for integration of supply chain activities, trading partner relationships, and the need for structural change	IT (EDI, EAI), Supply chain, Structure	TCE, RBV, Socio-technical Systems, Knowledge-based view, Stakeholder theory, Organizational learning	Questionnaire survey, Structural equation modeling	Bar-coding, electronic product code (EPC) and product numbering
	Rai and Tang	2010	Expand the competitive dynamics perspective and the IOS by integrating them to develop the understanding of the role of IT and process capabilities in leveraging external resources for competitive advantage	IOS, Inter-organiza tional relationship	Competence theory, DCV, Configuration theory, Relational view	Questionnaire survey, Validity assessment	Automotive, Chemicals, Electronic
	Rajaguru and Matanda	2009	Extend the body of knowledge on inter-organizational information systems, inter-organizational integration and SCM	IOIS, IOA, Supply chain management	Relational view, IT and business alignment, SCM	Case studies, Questionnaire, Validity assessment	Food, Hard retailing
	Saeed *et al.*	2011	Develop a comprehensive and unique conceptualization of IOS characteristics; and examine the IOS configuration choices with different supply chain integration profiles	Dyadic relationship, IOS, Supply chain	RBV, Configuration theory, IT and business alignment	Case-based detailed interviews, Case studies, Cluster analysis, Multiple survey	Not applicable
	Sanders	2007	Show that firm use of e-business technologies impacts performance both directly and indirectly, and by having a positive impact on intra- and inter-organizational collaboration	Intra- and inter-organiza tional collaboration, e-business, Supply chain	IT and organizational capability	Questionnaire survey, Structural equation modeling	Manufacturing
	Serve *et al.*	2002	Emphasize how to apply B2B as an enhancement to streamline supply chain process management; propose to take advantage of the B2B system capability to help businesses move toward VEs	B2B, Supply chain, Virtual enterprises	Network theory, IT and business alignment	Conceptual, Case applications	High-tech
	Shiau *et al.*	2009	Develop measurements to assess the ERP adoption of small and medium-sized enterprises (SMEs)	ERP, SMEs	Behavioral decision theory, IT and	Cost-benefit analysis, Questionnaire survey, Structural	Ministry of economic affairs

					organizational capability	equation modeling	
	Smart	2008	Establish whether supply chain integration is an identified goal for the firms involved and to evaluate the extent of integration achieved through the new e-business mechanisms	e-business, Supply chain	SCM, Relational view	Case studies, Theoretical sampling approach, Interviews	Electronics, Telecommunication, Airline, IT
	Snider *et al*.	2009	Explore the critical success factors (CSFs) of ERP system implementation in small and medium-sized enterprises (SMEs)	ERP, SMEs	CSF-based view	Multiple case studies, Survey, Coding	Chemicals, Electronics, Plumbing and heating
	Soares *et al*.	2000	Describe the requirements analysis and system specification of an Order Promise module to be used for production and operations planning of a virtual enterprise	Virtual enterprises, Decision support systems (DSS)	IT and organizational capability, Configuration theory	Conceptual, Case applications	Semiconductor
	Sultan	2011	Suggest that cloud computing is likely to be an attractive option for many SMEs due to its flexible cost structure and scalability	Cloud computing, SMEs	IT and business alignment	Case study, Interviews, Email communications, Literature	IT (Microsoft-focused SME)
	Tarafdar and Qrunfleh	2009	Characterize two levels ("strategic" and "tactical") at which IT-business alignment takes place and identify the associated processes and aspects	IT (ERP), Alignment strategies	IT and business alignment, Contingency and configuration theory	Case studies, Interviews, Thematic analysis and code development	Healthcare, Tableware, Engineering
	Thun	2010	Evaluate the alignment of the use of Internet-based IT applications with the process-oriented integration in global supply chain management	Supply chain integration, e-business	SCM, IT and business alignment	Questionnaire survey, Circular arc analysis, Case applications	Manufacturing
	Triantafillakis *et al*.	2004	Provide a roadmap for implementing the appropriate data warehouse architecture and interoperation in web-based collaborative extended enterprise	Data warehouse, extended enterprise	Network theory, SCM	Materialized views (MVs)	Not applicable
	Tsou and Chen	2012	Develop a theory around the idea of inter-firm codevelopment competency in e-service innovation practices which demonstrates that knowledge and technology integration mechanisms (KIMs and TIMs) are associated with improved innovation	Inter-firm, KIMs, TIMs, e-service innovation	Resource dependency theory (RDT), Contingency theory	Questionnaire, Interviews, Field survey, Partial least squares (PLS) analysis	Financial and information service (IT department)
	Vannoy and Salam	2010	Propose a model that explicates the role of information systems in the process by which competitive actions or responses are conceived, enacted, and executed, and	Competitive actions, Response, Information	DCV, Competence theory, IT and organizational capability	Grounded theory, Semi-structured interviews	Global manufacturing

			resulting impacts on firm performance	systems			
	Westrup and Liu	2008	Argue that the ICTs used by joint-ventures (companies) do relate to their national roots	ICTs, Joint ventures	Process-based perspective, Social perspective	Case studies, Interview	Glass, Sugar
	Xu	2012	Discuss the essential features of cloud computing; and suggest two types of cloud computing adoptions – direct cloud computing adoption and cloud manufacturing	Cloud computing, Cloud manufacturing	Configuration theory	Conceptual	manufacturing
	Yam *et al.*	2007	Offer a business model of knowledge management system in networked enterprise for global product design, manufacturing and sourcing	Network, Knowledge management	DCV, Network economy, SCM	Case study	Toys

Appendix B: Detailed Analysis and Full Results based upon the Pre-Study Literature Review

Extant literature gaps and potential research fields on ERP and CEG

Although massive amounts of scholarly research have addressed the issues in respect to ERP systems and inter-firm structures and strategies, important and new significant issues require further theoretical and empirical investigation. In this section, the author discusses in detail the extant literature gaps and some potential research fields (i.e. future research needs) based on the pre-study literature review (approach), which motivates the need for the identified research topic of *managing enterprise resource planning and enterprise governance: a new contingency framework for the enterprisation of operations*. All the issues and existing literature gaps can be subsumed under the following headings, which form the rationale and focus of this research study.

Gaps in the ERP and CEG literature: a holistic view and keyword analysis

First of all, a “keyword analysis” was conducted to capture the recent trends of studying and researching ERP and inter-firm relationships (i.e. the *enterprises*) disciplines. The data presented in Table 1, ‘Journals & Key Terms Matrix’, indicates that the highest proportion in doing ERP researches over the last twenty-five years (1988 ~ 2012[21]) has been moving from the traditional ERP (*C*[22] = 168, 33.6 per cent) and latter ERPII (*C* = 146, 29.2 per cent) to ‘ERP and new IT/IS’ (i.e. the next generation ERP) (*C* = 186, 37.2 per cent). Simultaneously, the largest number of exploring the inter-firm relationships is prone to shift from simplistic and linear supply chain integration (*C* = 172, 17.2 per cent) and interoperability (*C* = 207, 20.4 per cent) into *enterprise management* (*C* = 634, 62.6 per cent) which comprises the vertical integrated enterprises (VIEs) (*C* = 151, 14.9 per cent), extended enterprises (EEs) (*C* = 218, 21.5 per cent), and virtual enterprises (VEs) (*C* = 265, 26.2 per cent).

Table 1 Journals & key terms matrix

Search Key Terms		**Selected Journals**	
		… International Journal of Operations & Production Management … Technovation …	
ERP Systems Sector		Frequency	Per cent
ERP	ERP	168	33.6
	ERPII	146	29.2
	ERP and new IT/IS	186	37.2
Total mentions		500	100
Inter-firm Sector		Frequency	Per cent
Inter-firm relationships (enterprises)	VIEs	151	14.9
	EEs	218	21.5
	VEs	265	26.2

21 Only 7 papers out of the 796 articles were published between year 1968~1987

22 *C* indicates the frequency that each search key term has been mentioned in sources (i.e. journal articles)

Subtotal mentions	634	62.6
Supply chain integration	172	17.2
Interoperability	207	20.4
Total mentions	1013[23]	100

The author also used the words 'dynamic capabilities' and 'enterprise transformation' as the searching key terms when pre-selecting the academic papers as a result of the theoretical perspective underpinning embedded in this research is a *contingency and dynamic view*. The corresponding searching results of 'dynamic capabilities' (*C* = 77) and 'enterprise transformation' (*C* = 75) were significant likewise, which therefore, can improve the author's understanding in terms of the key factors and facets that may influence the organizational dynamic change through both enterprise information systems and inter-firm structures and strategies development.

Apart from the analysis on 'search key terms significance and implications', Table III (*cf.* Appendix A) demonstrates the classification of all pre-selected papers – as mentioned above, totally 796 articles have been systematically sorted. A comprehensive 'pre-study literature review' approach would require that all 796 papers be reviewed in detail; this was deemed inefficient. Instead, the author's subjective assessment along with objective selection criteria and statistical methods (Berenson and Levine, 1989) were used to generate the final 255 publications which can be viewed as the 'best representative sample'. Full bibliographic details of the 255 articles selected for analysis are shown in the Appendix A – Table IV in order to make the pre-study literature review processes transparent, and allow independent assessment of the classification and analysis.

As can be seen from Table 2, 255 papers have spread over six major themes. On the one hand, a great extent to which the existing literature has addressed on ERP issues is still focusing on designing, building (*C* = 29, 10.8 per cent) and managing ERP systems (*C* = 41, 15.3 per cent) (e.g. ERP functional modules exploitation, ERP implementation, etc.). Although only a small number of contributions was engaging in investigating ERP evolutionary trend (*C* = 14, 5.2 per cent) (e.g. how ERP systems are connected with SOA and cloud computing technologies, future ERP systems, etc.), one might say that the topic on 'next generation ERP systems' has achieved a certain level of attention from both academia and practitioner (Daniel and White, 2005; Demirkan *et al.*, 2010; Sharif, 2010), and therefore, should be regarded as one of the most important future research needs in ERP discipline area.

On the other hand, most of the studies pertaining to inter-firm issues are concerning about designing, building (*C* = 61, 22.8 per cent) and managing inter-firm relationships and collaboration (*C* = 58, 21.6 per cent) yet, while less emphasis has been placed on studying inter-firm structures and strategies in terms of

[23] While 796 journal papers were pre-reviewed, some articles addressed more than one keyword and were, therefore, placed in multiple categories (i.e. search key terms)

the (ERP) IS management viewpoint. However, the classifications in Table 2 show that the largest grouping of articles was based in the ‘correlations between ERP (systems) and inter-firm collaboration strategy’ theme (*C* = 65, 24.3 per cent), which is a notable value. Despite these relevant 65 papers have tried to advocate the importance of exploring the interrelationships between ERP systems and inter-firm collaboration (Faisal, 2011; Jaiswal and Kaushik, 2005; Ponis and Spanos, 2009; Rajaguru and Matanda, 2009), which proves a great potential on this new research field, even all of them did not fully apply the *enterprise management* concept (Binder and Clegg, 2006) – the one that is employed in this research grounding on a contingency approach and strategic thinking.

Table 2 Number of articles in six key themes

Themes	Number of Articles	
	Number	Per cent
Designing and building ERP systems	29	10.8
Managing ERP systems	41	15.3
ERP systems evolutionary trend	14	5.2
Designing and building inter-firm relationships and collaboration	61	22.8
Managing inter-firm relationships and collaboration	58	21.6
ERP and inter-firm collaboration strategy nexus	65	24.3
Total Results	268[24]	100

Unit of analysis applied in research on ERP and CEG

Owing to the nature of the field, a suitable way to present the ERP concepts is to logically group them into “units of analysis” or “constructs”. Agreement on a common set of unit does not appear to exist. Different researchers use a myriad collection of defined unit of ERP or enterprise systems. However, according to the results of “unit of analysis” on designing, building and managing ERP systems, as well as the ERP developing trends illustrated in Table 3, the most seven popular units related to ERP themes were analysed and discussed. These are (i) ERP (*C* = 55), (ii) ERPII (*C* = 8), (iii) supply chain management (SCM) systems (*C* = 6), (iv) cloud computing (technologies) (e.g. SaaS) (*C* = 6), (v) service-oriented architecture (SOA) (*C* = 10), (vi) open source applications (OSS) (*C* = 4) and (vii) inter-organizational information systems (IOIS) (*C* = 5). However as competition increases and markets become more turbulent and dynamic, ERP – as the most prevalent enterprise information systems – have to be re-designed to facilitate the new operational strategies (e.g. extended and virtual enterprise structure and strategy) to have even greater flexibility and agility by incorporating new web-based information technologies.

Even if this notion has been discussed from the “post-ERPII” level by mentioning and analyzing the terms such as ‘Web-based ERP’ (Tarantilis *et al*., 2008) and ‘IOIS’ (Daniel and White, 2005; Lyytinen and

[24] While 255 journal papers were reviewed, some articles were categorised in more than one theme and were, therefore, placed in multiple disciplines

Damsgaard, 2011) in recent years, the *next generation ERP systems* has still not been defined with a *unified name* to act as a guide to the future IS research direction. This limitation of existing ERP theory can be overcome by shifting the analytical focus from the intra-organizational ERP to the inter-organisational ERP, and even the 'cloud-based' ERP concept and its impact on business performance. Hence, ERP systems have to be studied as situated inter-firm practices (i.e. enterprises) in the context of the (virtual) value network as overall unit of analysis.

Table 3 Classification of articles according to 'unit of analysis' (ERP themes)

Unit of Analysis	Count (mentions)
ERP	55
ERPII	8
Supply chain management (SCM) systems	6
Cloud computing (technologies) (e.g. SaaS)	6
Service-oriented architecture (SOA)	10
Open source applications (OSS)	4
Inter-organizational information systems (IOIS)	5

Due to the global competition and increasing complex world, the interconnected forces are pushing companies to rethink the basic operational processes, and develop new ways of interacting with their business partners (Jain and Benyoucef, 2008) across the entire global or virtual value chain. Nevertheless, referring to the collaborative enterprise governance area, most consequences (i.e. unit of analysis) identified in Appendix A – Table IV have still been analysed and discussed from the supply chain management (C = 38), dyadic (C = 19) and triadic (C =3) relations, individual firm (buyer or supplier/vendor) (C = 7), and inter-firm network (C = 23) levels (as shown in Table 4). This phenomenon can be criticized as there are lack of sufficient considerations and contributions to the *collaborative enterprise governance* (CEG) concept (Binder and Clegg, 2006) by embracing the core competence and resource-based views.

In spite of this, Table 4 reveals that the VIEs (C = 14), EEs (C = 13) and VEs (C = 20) (i.e. *enterprises*) have also been the main analysing units with relatively strong research attention in inter-firm relationships and collaboration disciplinary area, which affirms the mantra of "operations strategy has been developed from single firm level to dyadic and triadic relationships, and been upgraded into inter-organizational (enterprises) level" contended by many researchers (Eisenhardt and Martin, 2000; Gottfredson *et al*., 2005) and organisational improvers. Even so, one thing should be noted is that by critically reviewing the 255 articles, only a few papers (Clegg, 2012; Purchase *et al*., 2011) have actually applied the terms VIE, EE and VE or *enterprise* in the sense of Binder and Clegg (2006) and European Commission's (2003) definition; nearly all others just refer to them as general terms which still took shape based on supply chain management roots (Chen *et al*., 2008; Childe, 1998) or even simple contractual exchanges (Mahoney, 1992).

Table 4 Classification of articles according to 'unit of analysis' (inter-firm themes)

Unit of Analysis	Count (mentions)
Vertical integrated enterprises (VIE)	14
Extended enterprises (EE)	13
Virtual enterprises (VE)	20
Supply chain management	38
Dyadic relationships	19
Triadic relationships	3
Individual firm	7
Inter-firm network	23

Theoretical perspectives applied in research on ERP and CEG

It is generally accepted that theory development is an essential requirement for the research of any field (Kuhn, 1970; Wacker, 1998). To develop a better understanding, the 255 articles were analyzed to determine, in the first instance, if a theoretical perspective was apparent. Those articles that seemed to reflect theoretical perspectives were further analysed to ascertain if the theories were existing or new ones as well as whether they were commonly used or not. Where existing theories were being used, the author offered a suitably comprehensive list to demonstrate the classification and frequency of their occurrence. These consisted of theories in IT and business/organizational strategy (IT and organizational capability, IT and business alignment), economics (transaction cost economics – TCE, agent-based view), (general) strategic management (configuration theory, strategic management, resource based view – RBV & resource dependency theory – RDT, competence theory, dynamic capabilities view – DCV, value chain, critical success factors – CSF based view), sociology and organizational science (contingency theory, network theory, complex adaptive systems – CAS), and industrial marketing management (relational view). The results of classifying the articles according to theoretical stance are summarised in Tale 5.

As can be seen from Table 5, of all the articles (spanning both ERP and inter-firm themes) that adopted theoretical perspectives, none proposed original ERP and inter-firm theories. Instead, they were all grounding in existing theories. Closer examination of specific theoretical perspectives that were adopted showed that the configuration theory (C = 64), relational view (C = 51), RBV & RDT (C = 45), and network theory (C = 44) were most popular. Also, articles grounded in dynamic capabilities view (C = 17) and contingency theory (C = 15) were fairly under-represented. Very few publications attempted value chain-based view (C = 6), CAS grounding (C = 3) and agent-based view (C = 3).

Table 5 Classification of theoretical perspective

Theoretical Perspective	Count
IT and organizational capability	30
Contingency theory	15
Configuration theory	64

Network theory	44
Relational view	51
Complex adaptive systems (CAS)	3
Transaction cost economics (TCE)	21
IT and business alignment	36
Strategic management	14
Resource based view (RBV) & Resource dependency theory (RDT)	45
Competence theory	26
Dynamic capabilities view (DCV)	17
Value chain based view	6
Agent-based view	3
Critical success factors (CSF) based view	10
Total	385[25]

Specifically, for the field of ERP, the extent to which theories have been developed appears to be slight. In fact, most ERP research studies appears to have been largely practitioner-led, with theory following (Bull, 2010; Chen, 2009; Deep *et al*., 2008; Hendricks *et al*., 2007; Maurizio *et al*., 2007; Tarantilis *et al*., 2008). The most common applied theoretical perspectives are IT and business alignment, IT and organizational capability, configuration theory and CSF-based view. Accordingly, the author intends to make an original theory which can felicitously describe the next generation ERP, on the one hand, and link its relations to inter-firm structure and strategy, on the other hand.

Similarly, most studies on inter-firm always mainly focus on the very common conceptual representatives within the streams such as TCE (Anderson and Weitz, 1986; Cao and Zhang, 2011), RBV (Duan *et al*., 2009; Fawcett *et al*., 2012), Relational view (Cambra-Fierro *et al*., 2011; Hansen, 2009) and network theory (Albani and Dietz, 2009; Harland and Knight, 2001). Thereby, these papers overlook the potential of less commonly used concepts including the RDT (Tsou and Chen, 2012), ERBV (Lewis *et al*., 2010; Squire *et al*., 2009), CAS (Choi *et al*., 2001), and agent-based view (Yu and Krishnan, 2004). In addition, it should be acknowledged that the current pre-occupation with a few existing theories may not be sufficient to describe the inter-firm field completely – especially from an IS landscape.

Besides the above, may research studies about ERP and inter-firm fields in the literature take an isolated view of single theoretical concepts while neglecting the necessity for using a multi-perspective approach; even if this is widely postulated in the literature. As a result, as indicated by the identified topic and nature of this research, the author decided to apply an *interdisciplinary theoretical perspective* approach which prefers to cover the contingency theory, value chain, RDT (the ones that seem to be under-applied to date in ERP and inter-firm areas), competence theory, DCV, and configuration theory.

[25] While 255 journal papers were reviewed, some articles addressed more than one theory and were, therefore, placed in multiple categories (i.e. theoretical perspectives)

Methodology (and research methods) applied in research on ERP and CEG

Theories can be tested or inducted using a variety of methods. The specific research method paradigmatic stance (i.e. research methodology) adopted by researchers has a strong influence on the shape and form of the subsequent knowledge that is generated. As there have been various frameworks/models developed by many researchers (e.g. Burrell and Morgan, 1979), in which a raft of paradigms is comprised, the author decided to broadly divide the paradigmatic stances of 255 articles into positivism (which is aligned with functionalist paradigm), anti-positivism (e.g. Interpretivism, phenomenalism, post-modernism, radical structruralist, etc.), and multiple research method paradigms.

Table 6 demonstrates that there is a very strong usage of the positivist paradigm with 72.9 percent of the articles based on this paradigmatic stance (methodology). In contrast, 62 papers accounted for 24.3 percent used the anti-positivism (most of these using the interpretivism). Only a small proportion (*C* = 7, 2.7 per cent) of articles used the multiple research method paradigms.

The relative absence of non-positivist research has prevented a more reflective style of writing. This in turn has the potential to restrict the fields of information systems (e.g. ERP) and inter-firm (e.g. enterprise) to single paradigms, hence preventing their wider development and acceptance (Goles and Hirschheim, 2000). From the distribution patterns in Table 6, although a notable amount of the studies reviewed can be allocated to the empirical rather than theoretical research domain based on case studies, interviews or questionnaire surveys (Alshawi *et al*., 2004; Banker *et al*., 2010; Li and Williams, 1999; Lockstrom *et al*., 2011), much knowledge on the nature of ERP capabilities design & management and inter-firm structure & strategy conception and governance (i.e. design and management activities) either remains unexplored or is not supported by reliable empirical evidence (Benlian and Hess, 2011; Lefaix-Durand *et al*., 2009; Tarantilis *et al*., 2008). This can be explained with an inadequate qualitative theory building research on the topic (Ho *et al*., 2002), and therefore, a necessity for more prescriptive research that proposes normative rather than descriptive models and frameworks which can be further tested and modified (Burgess *et al*., 2006). This also conforms to the postulation and tendency to put more reliance on interpretive and qualitative or at least multiple research paradigmatic stances in the IS (ERP) and OM areas to overcome the positivistic hegemony and to allow for more holistic, strategic and contextual thinking (Beach *et al*., 2001; Naslund, 2002; New, 1997; Voss *et al*., 2002).

Table 6 Classification of paradigmatic stance

Paradigmatic Stance	Count	Per cent
Positivism (or functionalist stance)	186	72.9
Anti-positivism (e.g. interpretivism, phenomenalism, post-modernism)	62	24.3
Multiple research paradigmatic stances	7	2.7
Total	255	100

Greater epistemological insight into the field can be gained by examining the specific research methods (methodologies) that are used. With the purpose of detecting potential systematic patterns in the research literature, the research methods of 255 articles were divided into two groups: analytical and empirical adapted from Wacker's (1998) classification scheme. Analytical methods are further categorized as conceptual, mathematical or statistical while empirical methods including case studies, sampling, experimental design, interviews and questionnaire survey. Results of classifying the 255 papers according to research methods adopted are shown in Table 7.

The findings suggest that although a total of 8 different research methods were recorded from the pre-study literature review data analysis, the majority of studies employed empirical case studies, analytical conceptual, empirical interviews or empirical questionnaire survey (25.4, 18.2, 17.3 and 16.9 per cent, respectively). This is followed by analytical mathematical methods (C = 41, 9.2 per cent). Only a handful of articles used experimental design, analytical statistical, empirical sampling and *grounded theory (based) methods* (GTM) (4, 3.6, 3.1 and 2.2 per cent, respectively).

The distribution pattern of research methods is skewed (as shown in Table 7) as a result of the absence GTM and other three (i.e. experimental design, statistical and sampling methods). In ISM and OM fields, ground theory has proved to be extremely useful in developing context-based, process-oriented descriptions and explanations of information systems and operations management phenomena (Binder and Clegg, 2006; Myers, 1997; Vannoy and Salam, 2010). It offers relatively well-signposted procedures for data analysis, and potentially allows for the emergence of original and rich findings which are closely tied to the data and often omitted in ISM and OM studies that rely on variance models and cross-sectional, quantitative data (Orlikowski, 1993).

However, GT studies in ISM and OM, particularly ERP systems and inter-firm (enterprise) research fields have been criticized for having a relatively low level of theory development. Many studies in ERP and *enterprise management* use GT only as a coding method (Fawcett *et al*., 2012; Oliver *et al*., 2005; rather than actual GTM in the sense of Glaser and Strauss (1967). Although some papers (Lockstrom *et al*., 2011; Nah *et al*., 2005) claiming to be an explicit attempt to use the GTM, most of them are not considered as a rigorous approach to use GTM in ERP and *enterprise* research areas. On the other hand, it is acknowledged that today's complex and dynamic world calls for less hypothesis testing and more systematic observation to help managers deal with their actual problems. This is especially true for contemporary operations management as it is an applied discipline setting out to answer concrete problems that emerge within both production-based and service-oriented business industries.

Overall, as far as research methodology is concerned, the focus is only on a narrow range. Another issue of concern is the relative lack of mixed methods being used. To achieve triangulation, it is generally recommended that a number of methods be used to address research questions (Gable, 1994). The lack of mixed-methods could have an adverse impact on the development of the ISM and OM fields.

Table 7 Classification of research methods

Research Methods	Count	Per cent
Analytical		
Conceptual	81	18.2
Mathematical	41	9.2
Statistical	16	3.6
Empirical		
Case studies	113	25.4
Sampling	14	3.1
Grounded theory (based) method (GTM)	10	2.2
Experimental design (e.g. simulation)	18	4.0
Interviews	77	17.3
Questionnaire survey	75	16.9
Total	445[26]	100

Industry sector (and regional focus) applied in research on ERP and CEG

Anecdotally, the ERP and CEG literature appear to be concentrated in a handful of industry sectors. In order to improve the understanding of sectoral influences on ERP and CEG, the sample of 255 articles were classified according to the industry sector (and regional focus) in which they were primarily based. Table 8 shows that 23.9 percent of the articles were based in multiple industry sectors. In this group, papers were based on large numbers of firms operating in diverse industry sectors. The second and third largest groups of articles involved manufacturing and IT sectors (22.7, 10.2 per cent, respectively). Closer examination showed that for the majority of articles classified as manufacturing, most dealt with selling products in consumer markets (e.g. automobile, aerospace, etc.). With respect to IT sector, most dealt with software and ERP systems. The remaining handful of articles was spread across a broad range of industry sectors.

Table 8 also uncovers that few scholars used China (or Chinese companies) as the regional focus (or subject) for doing their research (C = 10, 3.9 per cent) on ERP and CEG. One could argue that unlike in Europe and USA, China was in transit from a planned economy to a more open market economy along with the entry to the World Trade Organisation; heavy investments in IT have been stimulated by local Chinese companies who were striving to become more globally competitive. With the aid of ICT (ERP) systems designed to enact new business processes, the strategic coordination of spatially different sites (or collaborative partners across the entire supply network) would be made easier by inter-firm relationships

[26] While 255 journal papers were reviewed, some articles used more than one research method and were, therefore, placed in multiple categories

management. These new research settings and other issues such as culture difference should be given more attention from both academia and practitioners in order to explore valuable findings.

Table 8 (Parts A and B): Classification of industry sectors (and regional focus)

Industry Sectors (and regional focus)	Count	Per cent
(a) *Industry category title*		
Transportation & storage	1	0.4
Manufacturing (e.g. automobile, aerospace)	58	22.7
IT (e.g. software, ERP vendors)	26	10.2
Financial service (e.g. public accounting, insurance, banking)	4	1.6
Agriculture & forestry	4	1.6
Oil & gas	1	0.4
Education	1	0.4
Construction	1	0.4
Mining, steel & metal	2	0.8
Telecommunication	3	1.2
Health, clinical service & pharmaceutical	4	1.6
Chemical	2	0.8
Electronics	12	4.7
Government, administration & defense	6	2.4
Law	2	0.8
Broadcasting	2	0.8
Retail trade (e.g. clothing, footwear, toy)	7	2.7
Multiple industry sectors	61	23.9
Not applicable	58	22.7
Total	255	100
(b) *Country and geographical regions*		
China	10	3.9
Others	245	96.1
Total	255	100

This have presented the pre-study literature review results and findings in terms of the keywords analysis, unit of analysis, theoretical perspective, applied methodology and industry focus, which demonstrates a rigorous approach and process of how the pre-study literature review was conducted (to find literature gaps).

Appendix C: Interview Guide

Aston Business School Research - Strategy, Structure and IS (English Version)

Doctoral Student Name: Yi Wan

Supervisor: Dr. Ben Clegg, Snr. Lecturer in Operations Management

University and Department: Aston Business School, Aston University, Operations and Information Management Group

Research Description: As recent trends in business and technology have focused on inter-organizational collaboration and the information systems (IS) that enhance them, many firms are seeking to reconstruct their enterprise structures alongside repositioning business strategy and establishing new IS architectures to achieve more effective and efficient business practice.

This research study will consider and investigate the impact that information technology (particularly Enterprise Resource Planning – ERP – systems) may have on the enterprise structure and strategy and *vice versa*.

Fieldwork Duration and Methods to be Used

We conducting a research study based in the printing industry and believe that your company will have some interesting and valuable things to say on the matter. Specifically, we would seek to interview a small number of key people involved in the processes of your company's strategy, organizational structure, and use of information systems (ERP), and map out the processes from both IT and enterprise strategy perspectives; this would build on the work that we have done to generate a set of useful findings. However, we are hoping to visit your company to gain a better understanding about your company's IS and overall strategy. Thus, the expected duration of this fieldwork would last between 5~7 days.

Interview Guide

If you are willing to participate in this study, we will need to ask some basic questions from six major dimensions to different key interviewees. The interview comprises of structured and semi-structured questions with open answers and should last about 1 hour. The following is a set of indicative questions that we will use.

Section 1: Industrial context and company situation?

Describe your industrial environment (e.g. main constraints, changes)?

Who are the major players in the industry (suppliers, customers, partners, competitors)?

Describe your company's position in the industry (changes over the past, future developing trend, critical enablers)?

Section 2: Company context and business strategy?

Describe your company's background (facts, products/services, strategic business goals)?

On what competitive basis do you deliver products and services to customers (e.g. quality, speed, flexibility, after-service, etc.)?

How does it enable you to differentiate from your competitors?

Would you consider these as your core competencies and why? If so, in what way are they supported by your enterprise structure and your use of information systems (such as ERP)?

What specifies a core competence to you (e.g. operations, information technology, etc.)?

How did you develop your competitive capabilities? What opportunities do they give you for the future? What are potential threats/risks to your competencies?

Section 3: Enterprise/organizational structure?

How would you describe your enterprise structure (traditional, flexible, etc.)?

(If applicable) how did you develop your enterprise integration (e.g. horizontal, vertical)?

Describe your value stream/supply chain description (operational processes, value members)?

Are there any social networks or informal activities in your company? Do they contribute to effective information flows across different functional divisions?

Section 4: Collaboration context?

Is it necessary to have good business collaboration with partners (main reasons, impact of partner relationships)?

How can collaboration between your company and partners be described (total autonomy or network cooperation, how many partners, duration of such kind relationships, how are resources shared, how you are connected with them, etc.)?

How do you consider a partner/ Do you assess their competence?

What makes good collaboration for you? What are the changes, benefits, difficulties and challenges of collaborative activities?

What was the evolutionary development of your collaborative activities?

Section 5: Use of information systems for the core processes?

What are your IT/IS platforms (legacy systems, other ancillary technological tools)?

What are the key reasons, successful factors, and challenges in launching and adopting ERP systems?

What was your practical approach (‘big bang’ or phased/incremental approach)?

Has ERP realized your current and future expected business strategies and organizational structure? Have any changes been made?

Section 6: Organisational management and people issues?

How did you align specific business goals with ERP systems development?

What was the role of top management support (e.g. staff training and mentoring, measurements for encouraging the employees' participation, knowledge sharing through knowledge/change management)?

Was there any third-parties assistance? Were any consultants involved?

Intended Outcomes: This research will explore how current and future ERP systems could influence enterprise structures and business strategy; and *vice versa*.

Confidential Issues: We do not require direct/detailed access to your software, or any client information or sensitive cost information, and are willing to sign non-disclosure agreements and pre-approve any questions with you. In return, we would be willing to share our benchmarked findings of other anonymous cases with you, and our general findings.

阿斯顿大学商学院

— 企业运营战略，组织运营结构和信息系统管理的学习研究(**Chinese Version**)

博士生姓名：万忆

导师姓名：Ben Clegg教授(运营与信息管理)；Prasanta Dey教授(运营与信息管理)

学校及部门：阿斯顿大学商学院，运营与信息管理部门

研究概述：今年来，商业及信息技术的发展更多趋向于企业或组织间的相互合作以及能够支持和加强这种策略联盟的信息化系统。许多公司试图对他们的企业结构进行重组和改革，重新定位新的商业战略和建立新的信息化系统以达到更快更高效的运营模式。

我们这项研究将重点深入探索信息技术(主要基于企业资源计划 — ERP系统)如何影响和改变企业的运营流程，组织结构和商业战略。以及建立在企业间相互合作基础之上如何更好的实现信息化管理所带来的核心竞争力。

学习研究的时间及方法：现阶段我们正在做一系列以生产制造业和服务导向型企业为主的案例分析。相信对于这个研究课题您的公司能够提供一些非常有价值和值得讨论的经验及想法。具体地，我们希望能够采访一部分参与您公司企业战略的制定，组织及核心运营结构的操作，和信息系统的使用的主管或主要负责人员。我们将基于采访的内容从战略和信息技术的观点及角度去规划和分析最适合您公司的业务运营流程。

采访及问题纲要

如果您和您的公司愿意参与到我们的这项研究学习中来，采访会涉及到一些基本问题。具体到以下六个方面：

1） 行业背景和公司发展现状

- 描述行业背景(在过去几年中遇到哪些挑战，公司有哪些改变)？
- 谁是主要的供应商，客户，合作合伙以及竞争对手？
- 您怎样定位公司在行业中的位置，未来的发展方向是怎样制定的？

2） 公司背景及发展战略

- 描述公司的背景(公司的主要产品或服务是什么，商业战略目标是什么)？
- 对于您的客户，您公司的最大竞争优势是什么(产品质量，递交的速度，业务的灵活性，售后服务等)？

- 相对于您的竞争对手，您公司具备了哪些自身的独特性？
- 如果您认为这些因素可以作为公司的核心竞争力，公司的运营流程和信息系统是如何支持它们的？
- 您将如何更好的发展这样的核心竞争力？未来会有哪些新的机遇或挑战？

3） 公司的组织结构

- 您如何描述公司的组织结构(各部门间是传统的上下交流或采取更灵活的水平交流)？
- 您如何看待和发展公司的持续并购及产业链延伸，和策略联盟的战略？
- 公司内外部，各部门之间存在非正式性的知识共享及有效的信息沟通么？

4） 与供应商，客户及合作伙伴的交流及合作

- 您认为与您的公司与其他公司的合作是必要的么？主要原因是什么？这样的合作会带来哪些影响？
- 在这样的合作关系或战略联盟下，您公司所处的位置是什么样的(主导地位，资源利用共享，相互依存等)？您公司是如何与战略伙伴合作的？
- 您会评估他们的能力从而选择最好最适合的合作伙伴么？
- 这样的战略合作给您的公司带来了哪些改变，收益，和新的困难或挑战？
- 您会如何更好的发展或加强这样的合作关系？

5） 使用信息系统服务运营流程

- 您公司的主要信息系统或技术平台是什么？
- 您认为公司实施 ERP 的主要挑战或成功的关键因素是什么？
- 您公司是采取渐进式实施 ERP 或一次性替代原有信息平台？
- ERP 能够满足您公司现有及未来的战略目标和运营流程么？它给公司带来的最大改变是什么？

6） 组织及公司职员的管理

- 您如何结合商业战略发展 ERP 系统或其它信息系统？
- 公司及高层主管是如何鼓励员工的参与度，加强对于员工的培训和知识共享的？
- 是否有第三方公司或咨询顾问协助您公司更好的实施和管理信息系统？

未来研究成果：这项研究将探索基于资源运营理论和策略联盟，当前及未来信息系统(ERP)如何影响，改变和管理企业的结构和商业战略。

保密协议：我们不会要求任何与您公司具体的系统软件信息，客户资料，或敏感及高度机密的财务信息。同时，我们愿意签署保密协议，您也可以提前审阅我们的采访内容是否符合贵公司的要求。作为回馈，我们愿意把所有研究成果和其他匿名公司的案例分析结论分享给您的公司。

忠心感谢您的参与和对这项研究的支持和帮助！

万忆

2011．7．18

Appendix D: Consent Form

(English Version)

Dear [Person's Name],

On [date], I interviewed you and I have now transcribed the interview. Prior to the data analysis stage, I would like to ask you to carefully read through the attached transcription, sign the approval form below and send it back to me.

I thank you for your participation and am happy to share the anonymous generic findings with you once the analysis has been completed. If you would like me to do this, please tick here ________.

Yours sincerely

Yi Wan
Doctoral Researcher
Operations and Information Management Group
Aston Business School
Doctoral Suite on SW11th floor, Room 1103

Fax +44 (0)121 204 3000
wany@aston.ac.uk

Statement of Consent

I, ____ declare that data and information given in attached transcription are a true and accurate account of the interview given on ____________________.

____
____
Date
Signature of Interviewee

(Chinese Version)

尊敬的**[**人名**]**：

在**[**采访日期**]**，我在贵公司对您做了采访，现在我已经整理好了采访的内容。在分析采访的资料及数据之前，我希望您能够仔细阅读附上的采访记录，签署以下的同意书并将其发送回给我。

感谢您的参与此次研究，在数据分析完成之后我也很高兴将研究的结论及成果以匿名的方式与您共享。如果您也希望可以分享此次研究成果，请在这里标记________。

此致　敬

万忆
博士生 研究助理 助教
英国（英格兰） 伯明翰
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运营与信息管理部门

传真（英国） +44 (0)121 204 3000
邮箱 wany@aston.ac.uk

同意声明

我，________________________________ 声明以下所附的采访记录中所有的数据和信息是真实及准确的，并认可它是通过采访________________所得.

____

____

日期
被采访人签字

Appendix E: Questionnaire Survey

(English Version)

Questionnaire Survey *(online only)*

Your expert help is needed for 10 minutes in top business school research!

Dear Colleague,

Aston Business School (Birmingham, UK), is conducting a study on managing enterprise resource planning (ERP) systems and inter-organizational business strategy and structures.

We would like to kindly ask you to spend about 10 minutes of your time to complete the following questionnaire. There are a number of statements which we would like to know your opinion on; they have been formed from extensive interviews with practitioners in the area from the UK and China.

Your answers will be anonymised to preserve your confidentiality. We can provide a summary of our findings if you wish.

We thank you for your time and help.

Instructions

We present a number of statements about managing ERP systems and inter-organisational structures and strategy. We would like you to rate each statement based on your practical experience by:

AGREEMENT: Stating how strongly you agree or disagree with the statement using the given scale from ‘strongly disagree’ to ‘strongly agree’.

IMPORTANCE: Stating how important you think the statement is for your business operations and information management using the given scale from ‘extremely low importance’ to ‘extremely high importance’.

Please evaluate the statements as honestly and openly as you can. At the end there is a brief section on demographical information.

Thank you for your help!

Screenshots of the questionnaire survey in English version (an excerpt)

Managing ERP Systems and Inter-organisational Collaboration

1%

Exit Survey O

We present a number of statements about managing ERP systems and inter-organisational structures and strategy. We would like you to rate each statement based on your practical experience by:

AGREEMENT: Stating how strongly you agree or disagree with the statement using the given scale from 'strongly disagree' to 'strongly agree'.

IMPORTANCE: Stating how important you think the statement is for your business operations and information management using the given scale from 'extremely low importance' to 'extremely high importance'.

Please evaluate the statements as honestly and openly as you can. At the end there is a brief section on demographical information.

Thank you for your help!

Continue

Aston Business School

Managing ERP Systems and Inter-organisational Collaboration

93%

O Back

Exit Survey O

1.Change in the manufacturing and service-driven industries is driven by a combination of dynamic globalization, internal organisational issues and general industrial forces

	Strongly disagree	Disagree	Mildly disagree	Neutral	Mildly agree	Agree	Strongly agree
Agreement	O	O	O	O	O	O	O

	Extremely low importance	Very low importance	Low Importance	Medium	High Importance	Very high importance	Extremely high importance
Importance	O	O	O	O	O	O	O

2. Increasing business complexity, cost-effectiveness and shorter turnaround time requires organisations to move towards more collaborative strategies

	Strongly disagree	Disagree	Mildly disagree	Neutral	Mildly agree	Agree	Strongly agree
Agreement	O	O	O	O	O	O	O

	Extremely low importance	Very low importance	Low importance	Medium	High importance	Very high importance	Extremely high importance
Importance	O	O	O	O	O	O	O

28. Organizational cultural diversity, trust issues and resistance to change have to be managed when adopting ERP systems, especially in inter-organisational collaboration

	Strongly disagree	Disagree	Mildly disagree	Neutral	Mildly agree	Agree	Strongly agree
Agreement	O	O	O	O	O	O	O

	Extremely low importance	Very low importance	Low importance	Medium	High importance	Very high importance	Extremely high importance
Im portance	O	O	O	O	O	O	O

29. Organisational behavior is a key challenge when adopting and managing web-based ERP systems in inter-organisational collaborations

	Strongly disagree	Disagree	Mildly disagree	Neutral	Mildly agree	Agree	Strongly agree
Agreement	O	O	O	O	O	O	O

	Extremely low importance	Very low importance	Low importance	Medium	High importance	Very high importance	Extremely high importance
Im portance	O	O	O	O	O	O	O

30. Any other comments on these propositions:

Aston Business School

Managing ERP Systems and Inter-organisational Collaboration

100%

G Back Exit Survey O

31. Have you been participating in the interviews?

O Yes
O No

32. How long have you been working in the current industry?

O Less than 5 years
O 5-10 years
O 10-15 years
O 15-20 years
O More than 20 years

33. Which functional department(s) have you had experience working in? (Please tick as many boxes as appropriate)

O Purchasing
O Research & Design
O Quality assurance

POWEREDBY QuestionPro

(Chinese Version)

问卷调查(*post only*)

Your expert help is needed for 10 minutes in top business school research!

尊敬的参与者：

英国伯明翰阿斯顿商学院正在进行一项关于如何实施和管理企业资源计划（ERP）系统和跨组织间战略合作的研究课题。

我们希望你可以抽出10分钟的时间来完成这份问卷。基于之前对英国和中国各行业人员所进行的采访，此问卷调查陈述了一些列理论性的命题，我们希望你可以认真阅读并给出自己的意见及观点。

为了确保行业的机密性，你的答案及个人信息将会以匿名的方式进行收集。如果你愿意的话我们可以将最后的的分析结果发送给你以作参考。

非常感谢你的参与和帮助！

问卷说明

我们提出了一系列关于管理企业资源计划（ERP）系统及跨组织间合作的结构及战略的理论陈述和命题。 希望你能够根据自己的实际经验，通过以下两方面来评估每一条理论陈述和命题：

赞成度**:** 通过所给定的数值范围从‘完全同意’到‘完全不同意’来选择你对理论陈述和命题的赞同或不赞同程度**(**请只勾选一项**)**。

重要性：通过所给定的数值范围从‘重要性极其高’到‘重要性极其低’来选择你认为理论陈述和命题的重要程度**(**请只勾选一项**)**。

请公正坦率地评估所有理论陈述和命题。在调查问卷的最后会有一个简短的部分需要填写用于统计参与者的基本资料。

谢谢你的合作！

企业资源计划（ERP）系统及组织间的战略合作管理

1. 动态全球一体化，组织内部和外部行业环境等因素将影响传统制造业和服务导向型产业的变革

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

2. 为了应对日益增长的商业复杂性，提高成本效益以及缩短产品周转和交付时间，公司需要与外部的企业或组织建立更多的战略合作

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

3. 跨组织间的合作关系会随着时间的改变而改变，这主要取决于参与战略合作的各组织自身的核心竞争力

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

4. 跨组织间的合作关系会随着时间的改变而改变，这主要取决于合作所交付的最终产品或服务

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

5. 在不同的特定产业环境下，企业需要选择相对应的合作关系及战略以建立最佳的跨组织间的合作或策略联盟

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

6. 和以有形产品为基础的跨组织间的合作相比，服务导向型的跨组织间的合作更倾向于采用虚拟企业战略

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

7. 同一企业可以采用不同的合作模型及战略，以实现同时在多个不同的供应链网络里建立跨组织间的战略合作

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

8. 在合作型供应链网络里需要明确规定各组织的责任义务及职能范围

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

9. 企业在与外部组织建立新的战略合作的同时需要对自身内部的商业流程进行调整或重组以适应新的变化

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

10. 在进行跨组织间合作的过程中，以传统生产制造为基础的公司更注重于产品系列多元化，产品质量以及商业流程的标准化

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

11. 在进行跨组织间合作的过程中，服务导向型的公司更注重于消费者的体验

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

12. 在合作型供应链网络中需要有一个具备核心能力的组织作为领导者或‘中间人’来完成监督，评估和管理其他组织间的战略协作的职责

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

13. 企业更愿意与那些在跨组织商业合作方面有过成功经验和良好记录的公司建立战略合作

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

14. 组织一旦具备了他们的合作伙伴所拥有的核心能力或达到类似于合作伙伴的核心竞争力的水平时，他们之间的合作关系将发生改变

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

15. 企业资源计划（ERP）系统在支持公司运营管理和商业流程方面所起的作用及扮演的角色已经由整合优化单一组织内部资源逐步发展成为支持多组织间的战略合作

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

16. 未来的企业资源计划（ERP）系统应当基于网络技术来设计研发，并且通过配置实施面向服务的体系结构（SOA）和云计算应用软件来替代传统意义上基于组织内部所实施的私有本地式安装企业信息系统

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

17. 按需企业资源计划（On-Demand ERP）解决方案使公司能够受益于通过跨组织间的系统整合以较低的个人投资成本来使用和共享相关的信息技术及资源

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

18. 以云计算为基础的企业资源计划（ERP）和面向服务的体系结构（SOA）间存在高度的兼容性，因此两者会被发展并整合成为一体化信息技术

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

19. 信息安全性及系统灵活性将成为关键因素影响企业资源计划（ERP）系统在跨组织间合作战略中的实施和使用

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

20. 跨组织间的战略整合要求参与在同一个合作型供应链网络中的不同组织都使用企业资源计划（ERP）系统

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

21. 跨组织间的战略整合要求参与在同一个合作型供应链网络中的不同组织使用相同的企业资源计划（ERP）系统以提高组织间的信息系统整合性和集成性

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

22. 越紧密的跨组织间的战略合作要求相应的企业资源计划（ERP）系统具备更高的集成整合性及灵活性

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

23. 基于网络的企业资源计划（ERP）系统的实施将越来越多地依赖于第三方咨询公司的操作运营，这将使得基于非网络的企业资源计划（ERP）系统供应商逐渐丧失在市场中的主导地位及对最终客户群的影响力

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

24. 相比于定制一款单一‘全能的’（ERP）解决方案，通过整合来自不同（ERP）解决方案的‘最佳类型应用软件’和功能模块可以更加有效地促进跨组织间的战略合作

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

25. 跨组织间战略合作的初始动机与目的是由各个组织自身的核心竞争力的优势及吸引力决定的

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

26. 不同组织间的合作可以创造出新的核心竞争力及特定的系统从而实现整套 ‘端对端’ 的产品—服务解决方案

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

27. 通过建立跨组织间的战略合作可以有效地降低成本，缩短产品交付时间，提高生产效率，增进运营灵活性以及对市场需求的反应力；还可以鼓励公司自主创新

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

28. 实施企业资源计划（ERP）系统，尤其在组织间合作的过程中实施 ERP 系统时，组织文化的差异性，组织间相互信任和隐私问题，以及员工对于组织变革的抵触和反抗情绪需要被重点考虑及管理

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

29. 组织自身的行为对于在跨组织间战略合作过程中实施和管理基于网络的企业资源计划（ERP）系统是很关键的挑战

赞成度	非常不同意	不同意	比较不同意	中立	比较同意	同意	非常同意
重要性	重要性极其低	重要性非常低	重要性低	重要性中等	重要性高	重要性非常高	重要性极其高

30. 你对以上理论陈述和命题是否有其它评论或意见：

31. 你是否有参加过之前的采访？

有	
没有	

32. 你在目前的行业领域工作了多久？

少于5年	
5–10年	
10–15年	
15–20年	
超过20年	

33. 你在以下哪些职能部门有过工作经验？（请尽可能多地选择合适的选项）

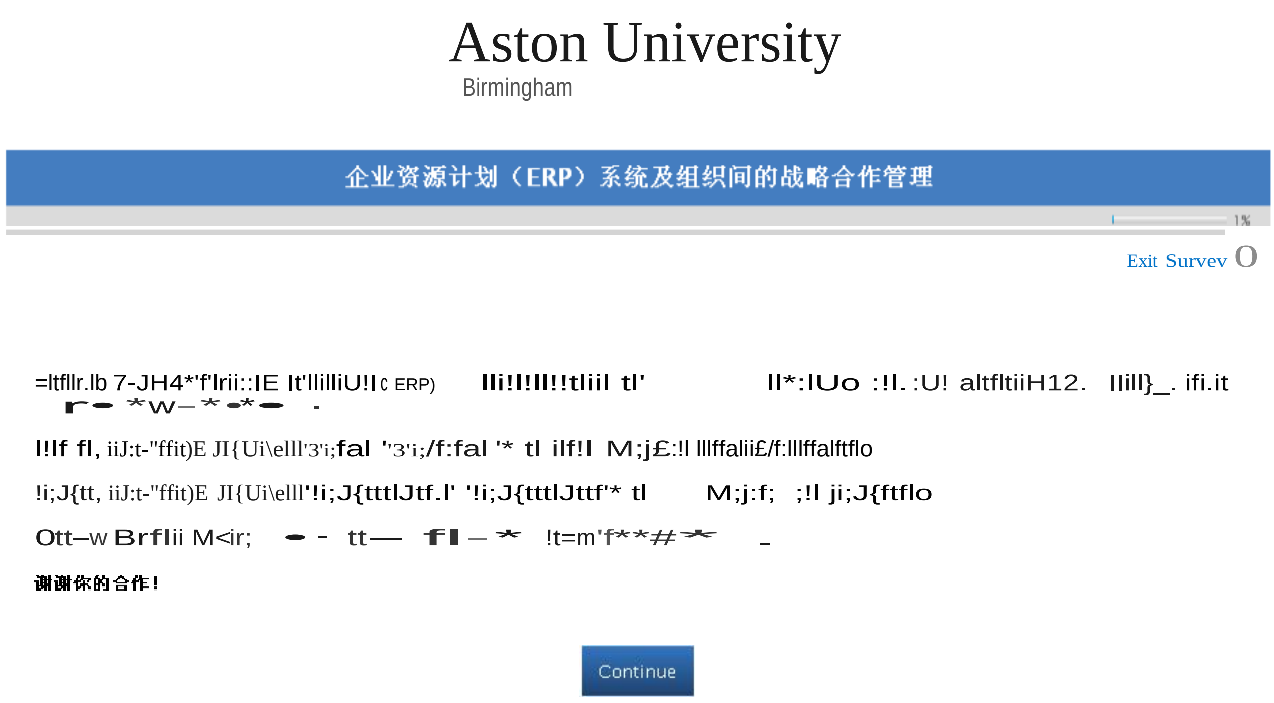
采购	
研发	
质量管理	
生产制造	
物流	
市场营销	
仓储物资管理	
战略制定和管理层的职位	
其它（请详细说明）	

34. 你目前在公司里主要担任或从事何种职务级别？（请只选择其中一项）

普通职员或办事员	
基层管理级别	
中层管理级别	
高级管理级别	
最高管理层或执行委员会	
其它（请详细说明）	

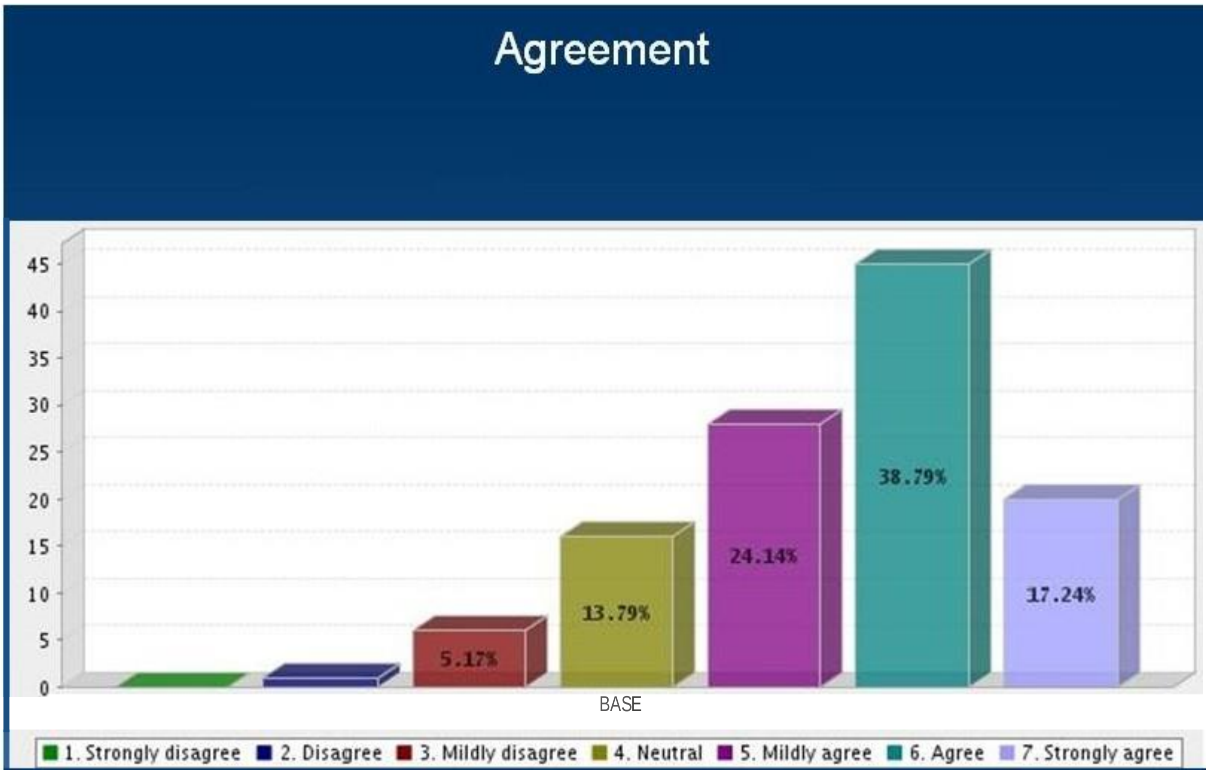
l;iJ 1}1j *(online only)*

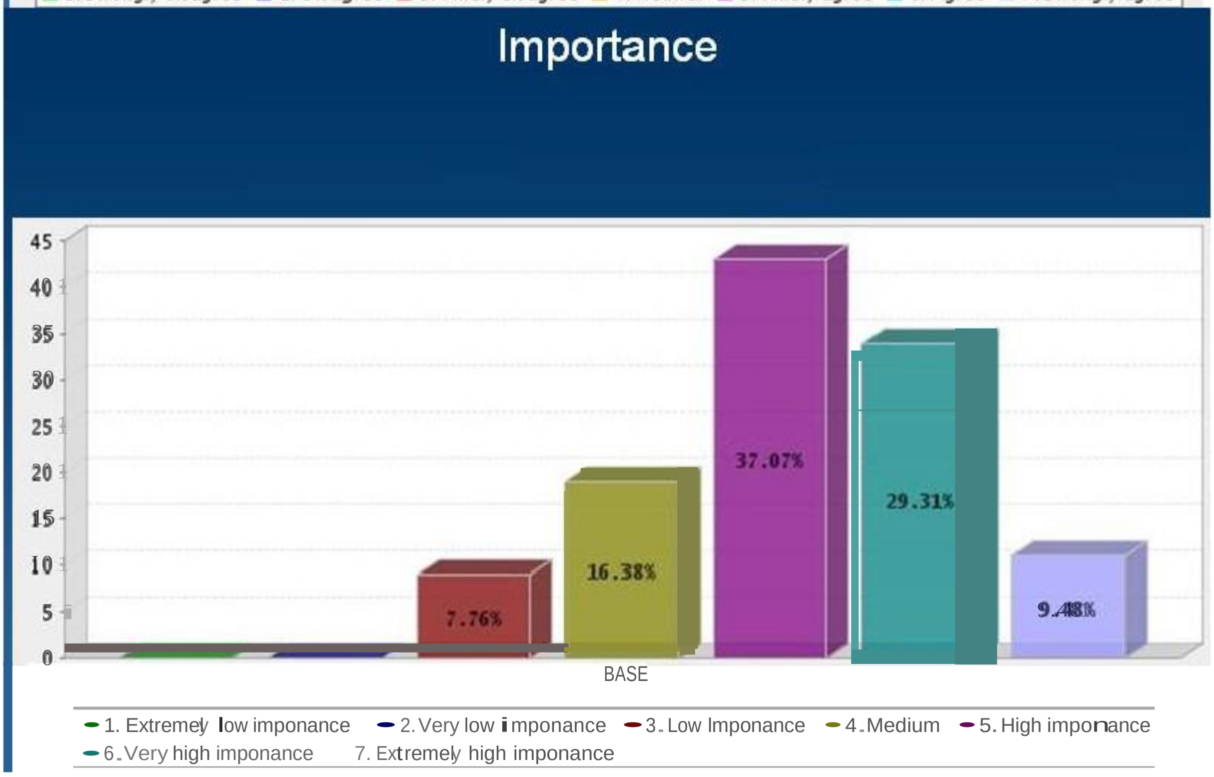
Screenshots of the questionnaire survey in Chinese version (an excerpt)



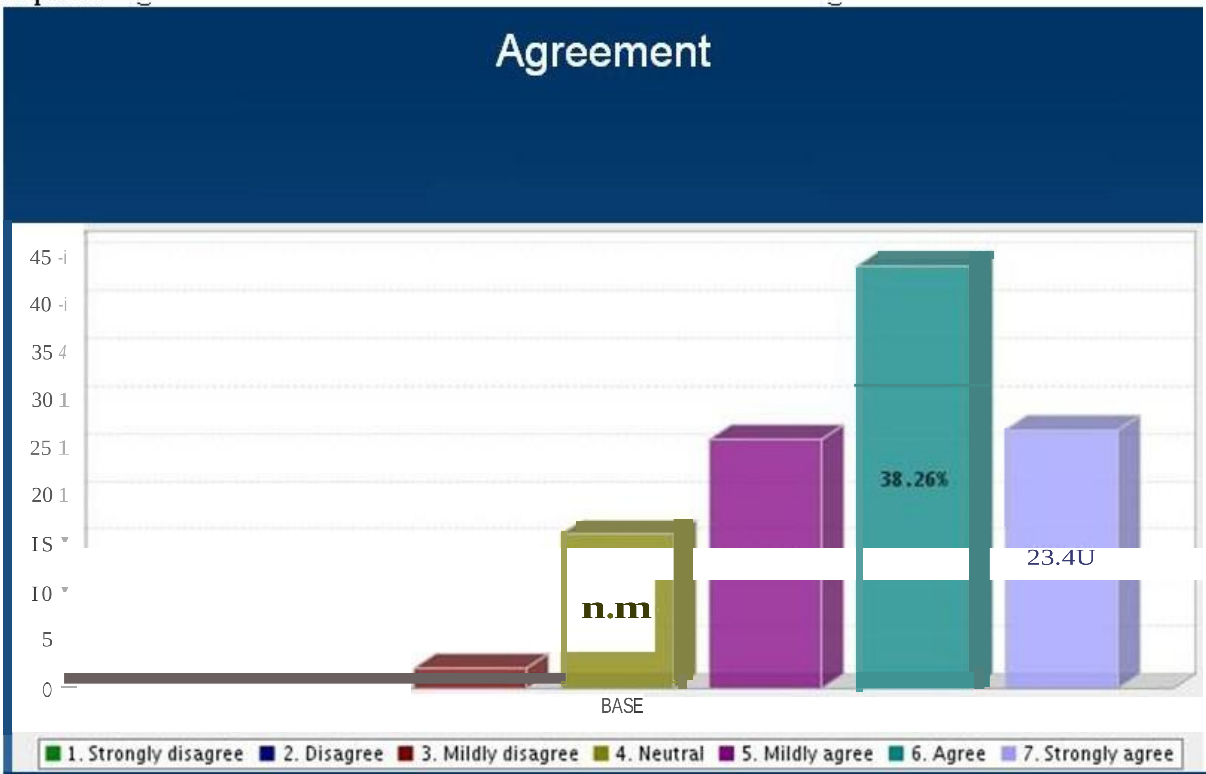
Survey Results (Bar Chart Screenshots)

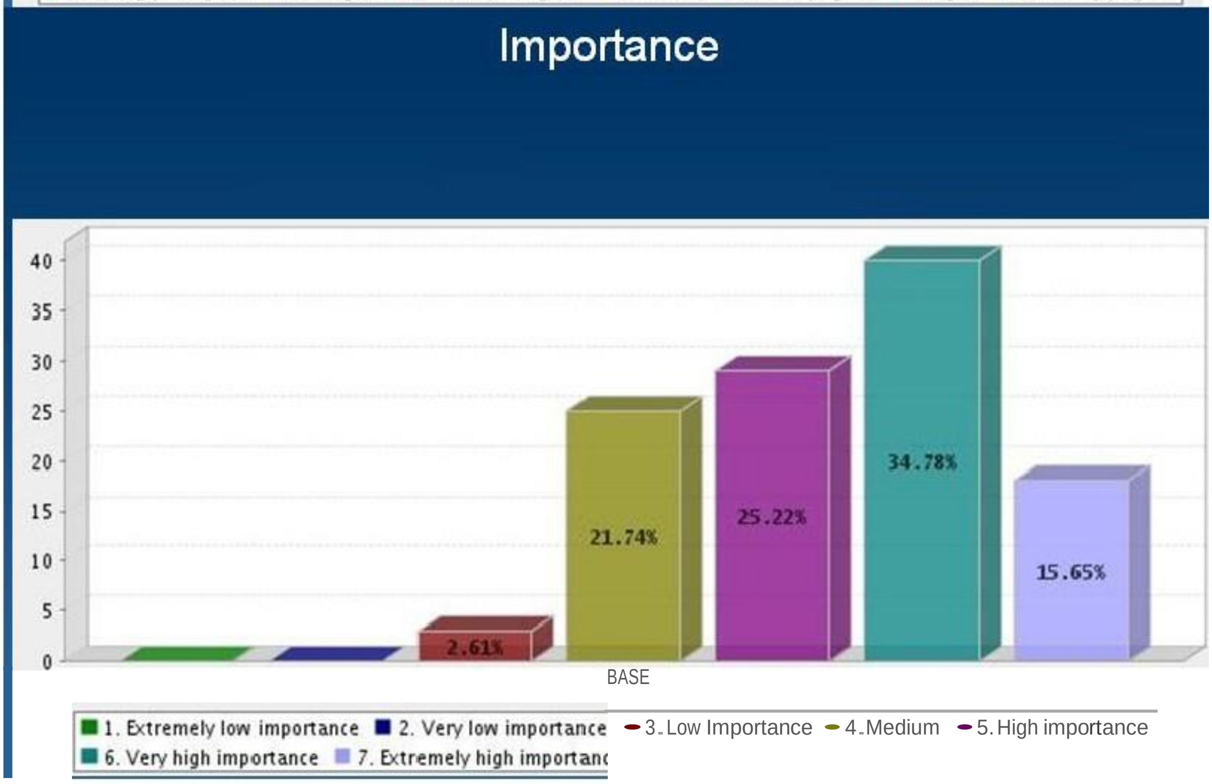
Proposition#!Change in the manufacturing and service-driven industries is driven by a combination of dynamic globalization, internal organisational issues and general industrial forces



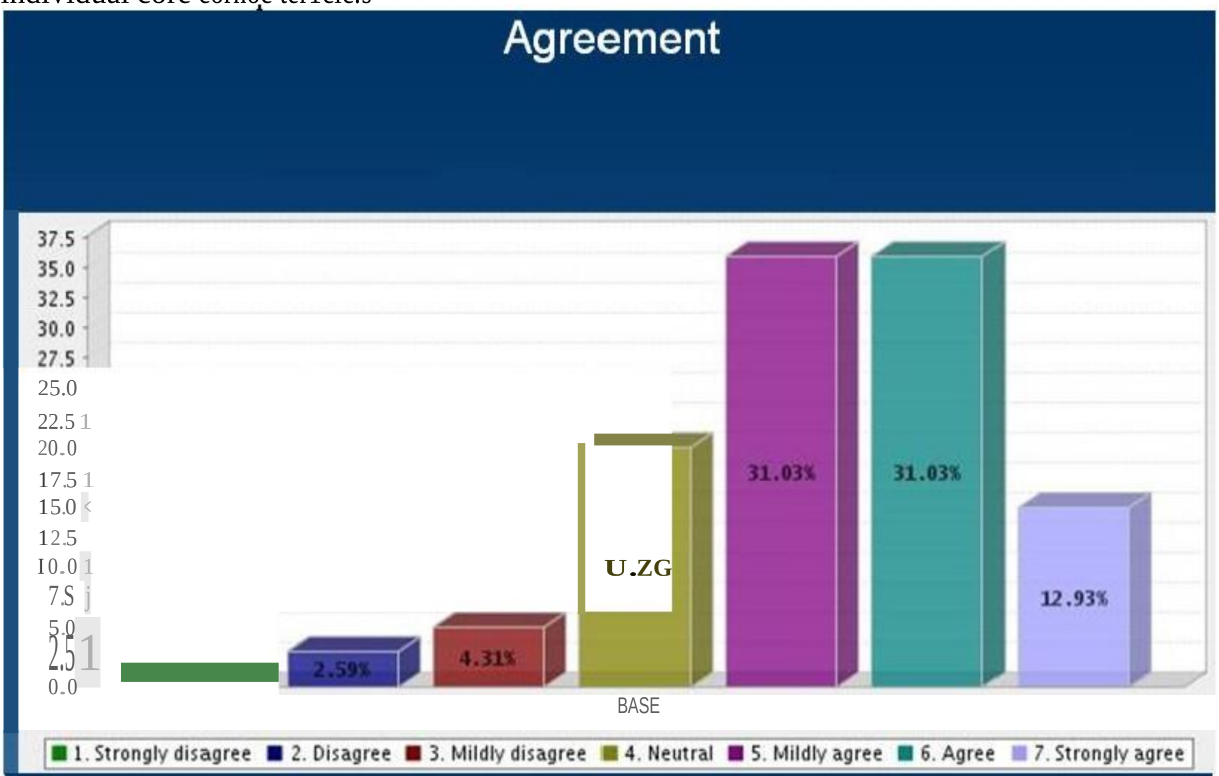


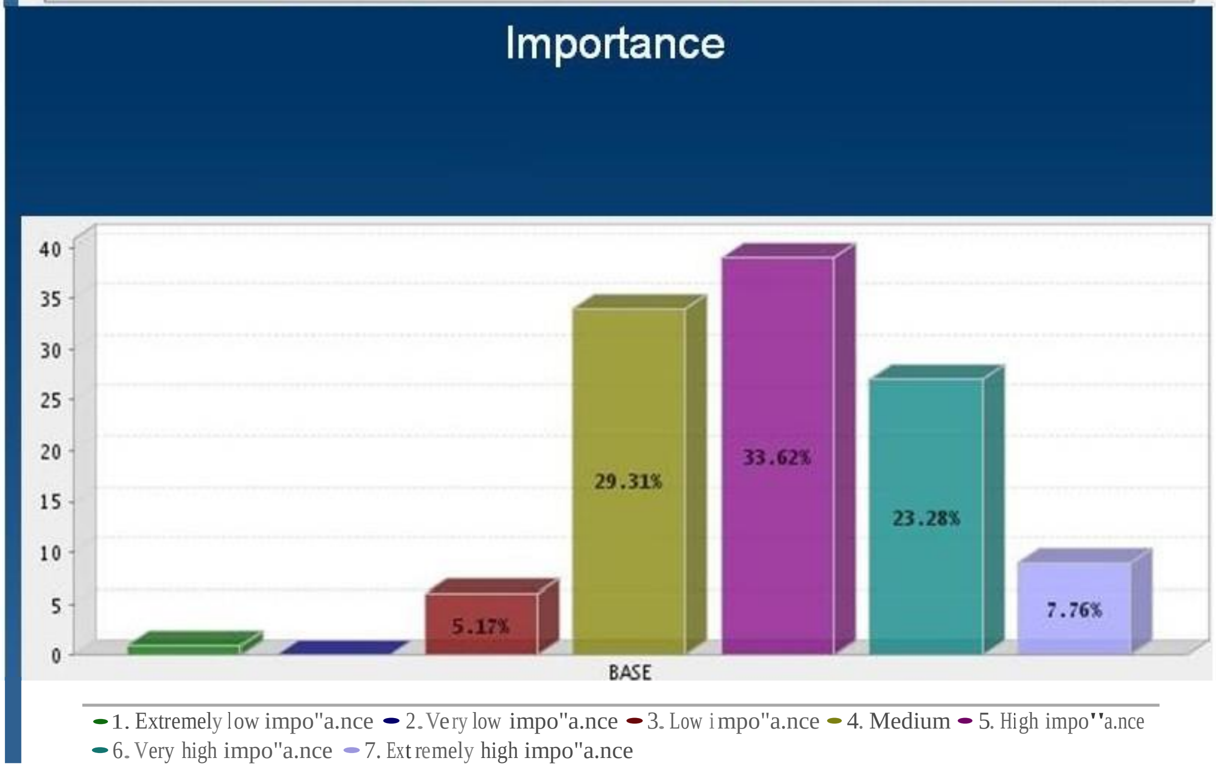
Proposition#2 Increasing business complexity, cost-effectiveness and shorter turnaround time requires or.e:anisa1lioris to move towards more collaborative stnLte nes



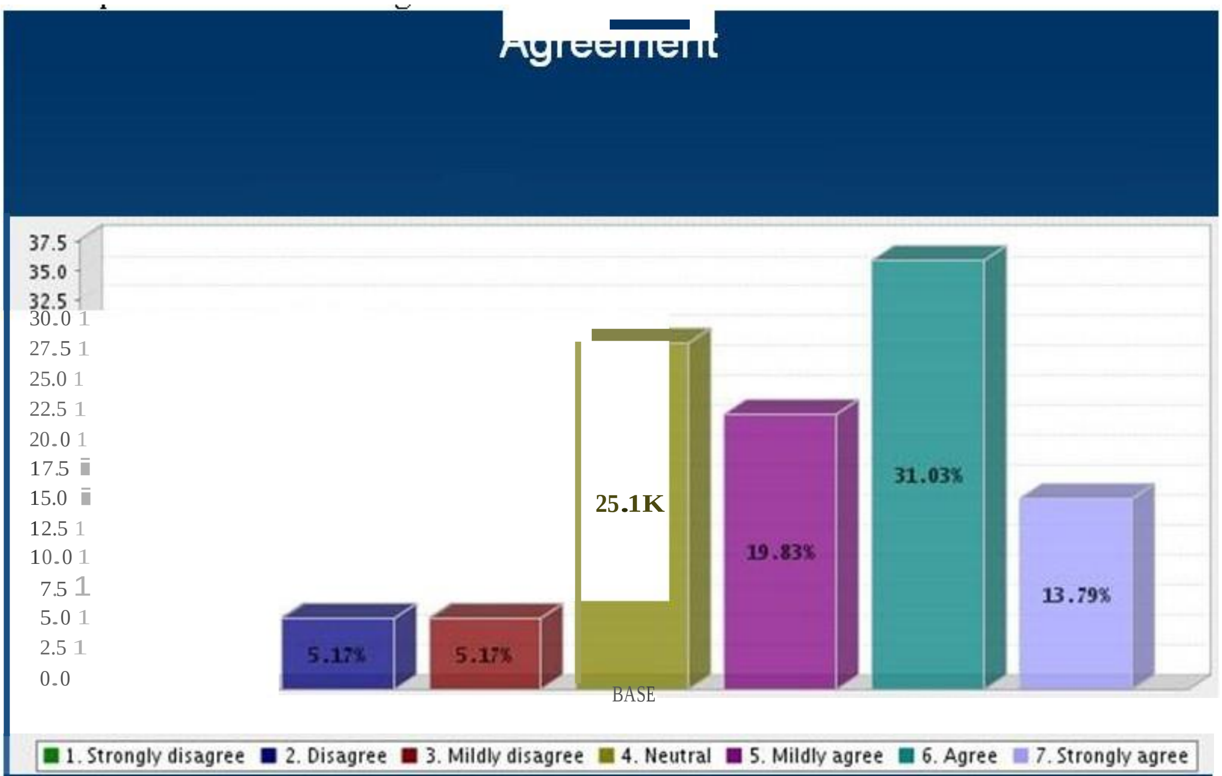


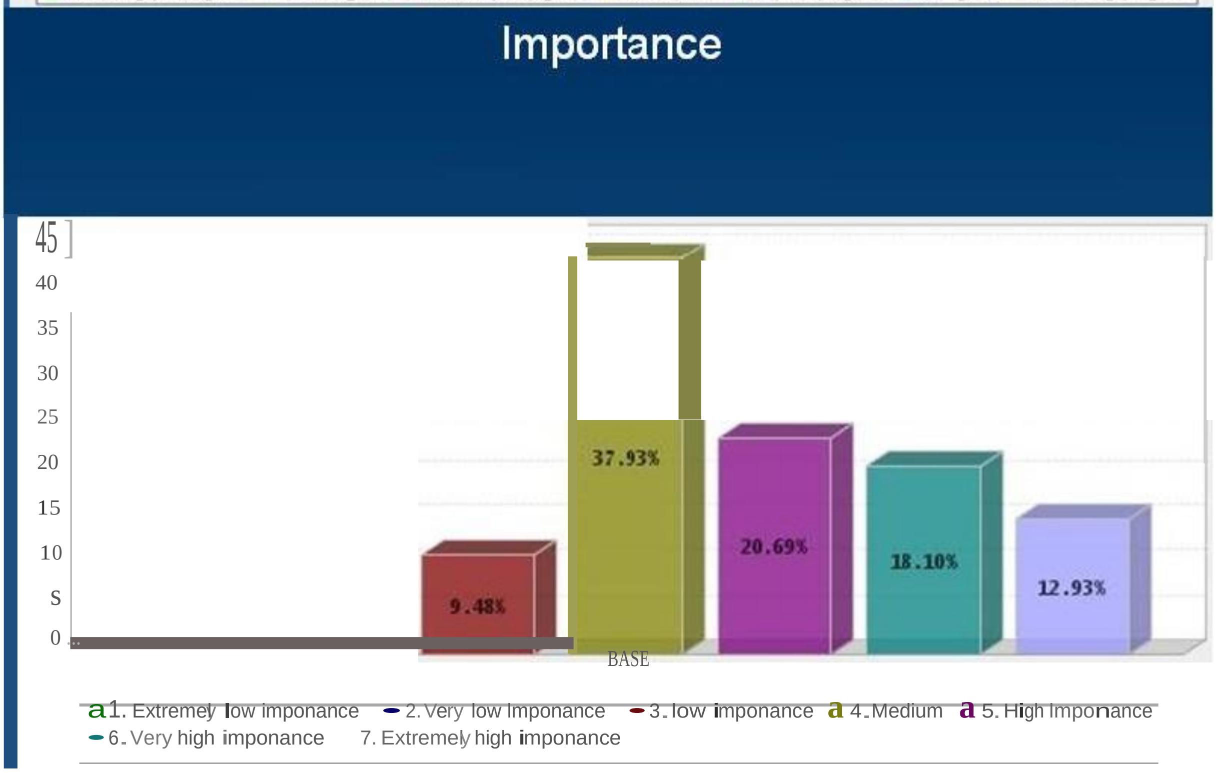
Proposition#J Inter-organisational relationships change over time, which is dependent upon individual core cornoc ter1cic:s



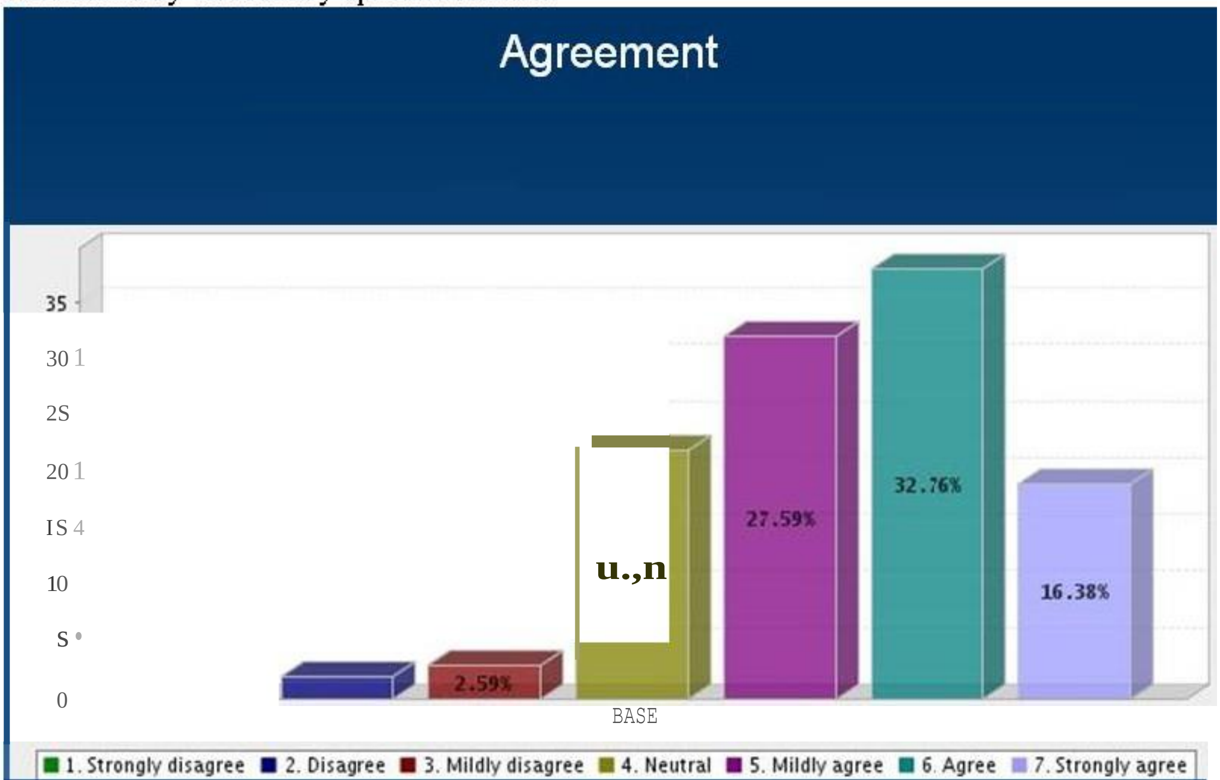


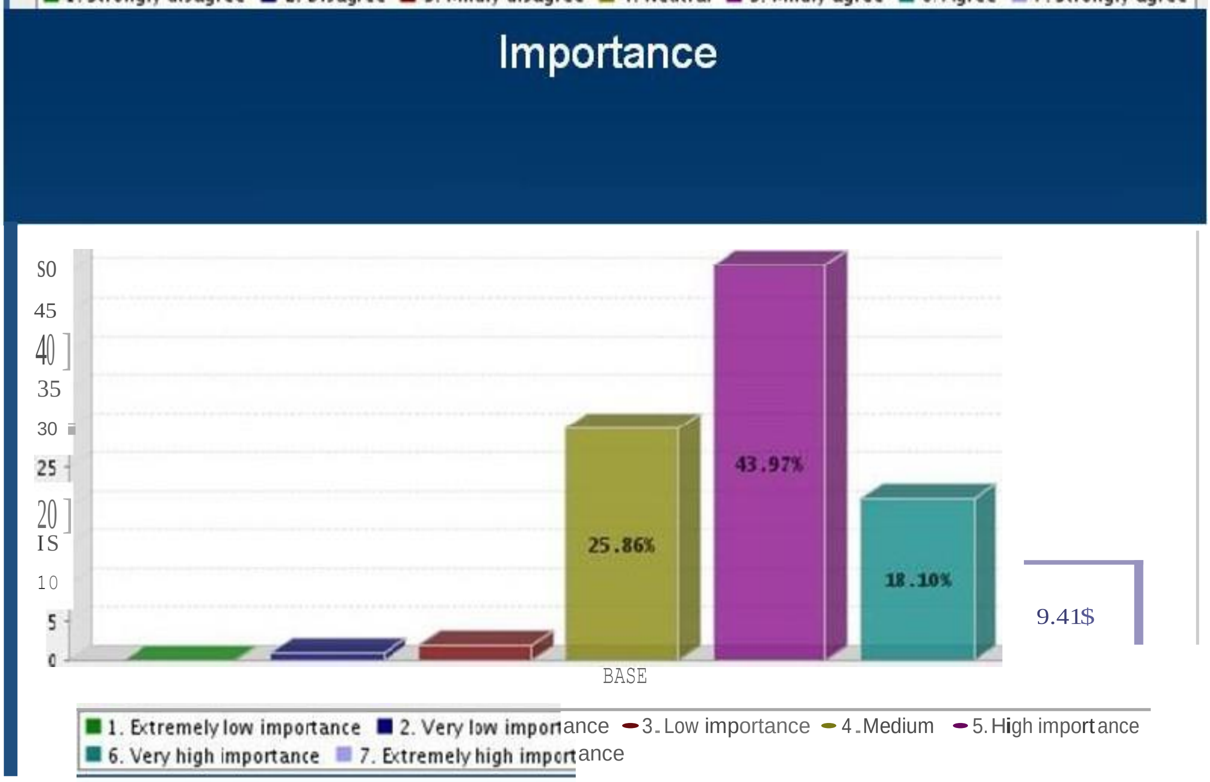
Proposition#4 Inter-organisational relationships change over time, which is dependent upon the end delivered



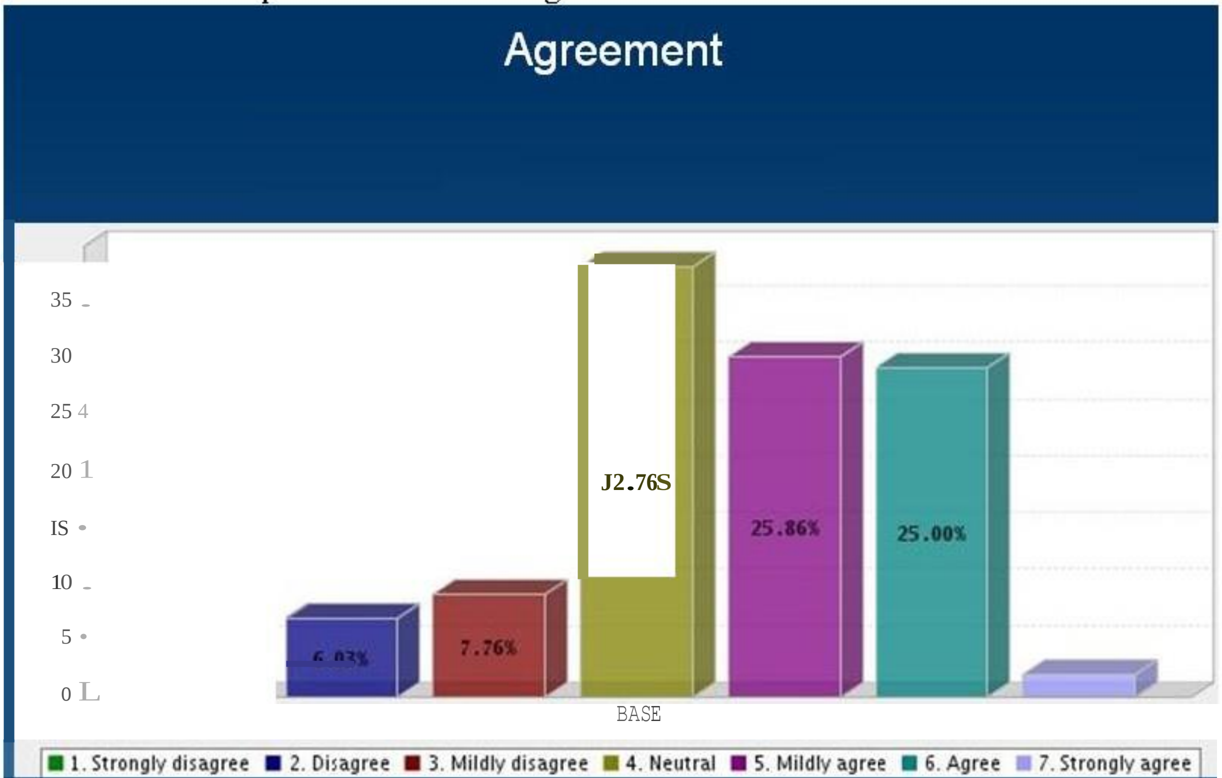


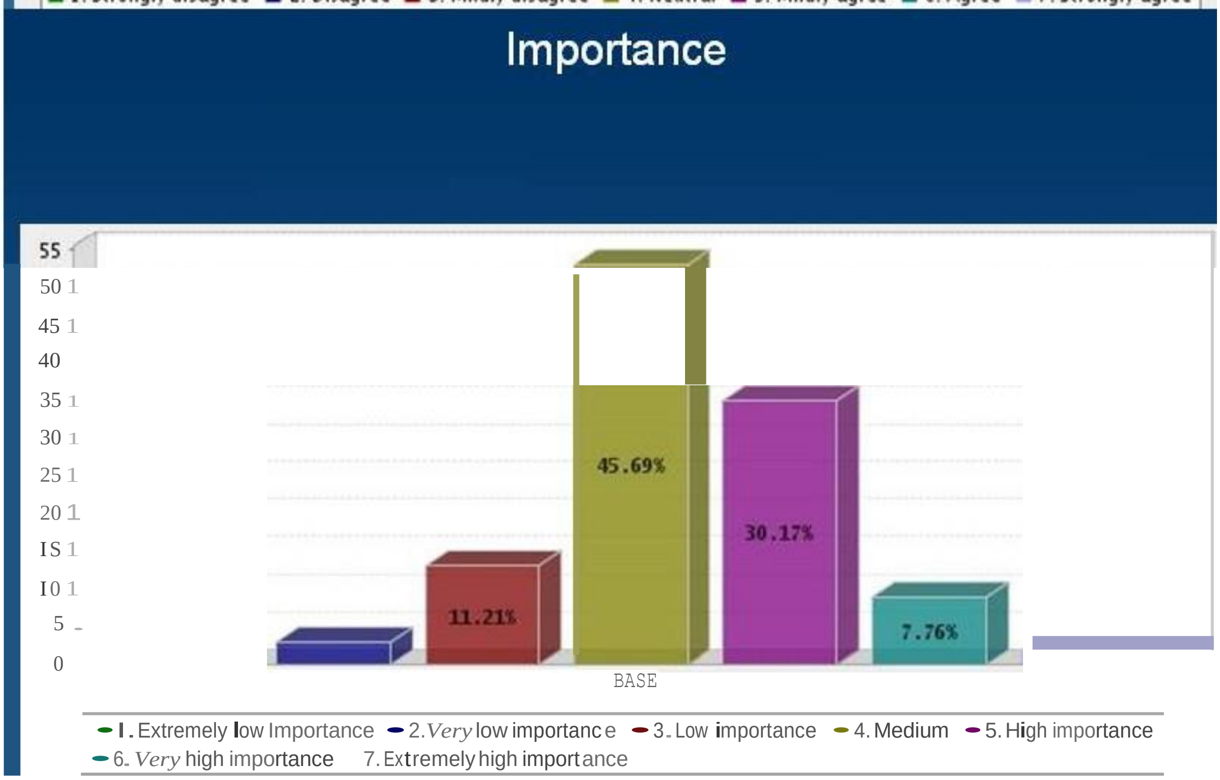
Proposition#5 Types of inter-organisational relationships and collaborative practices are determined [illegible]ific context



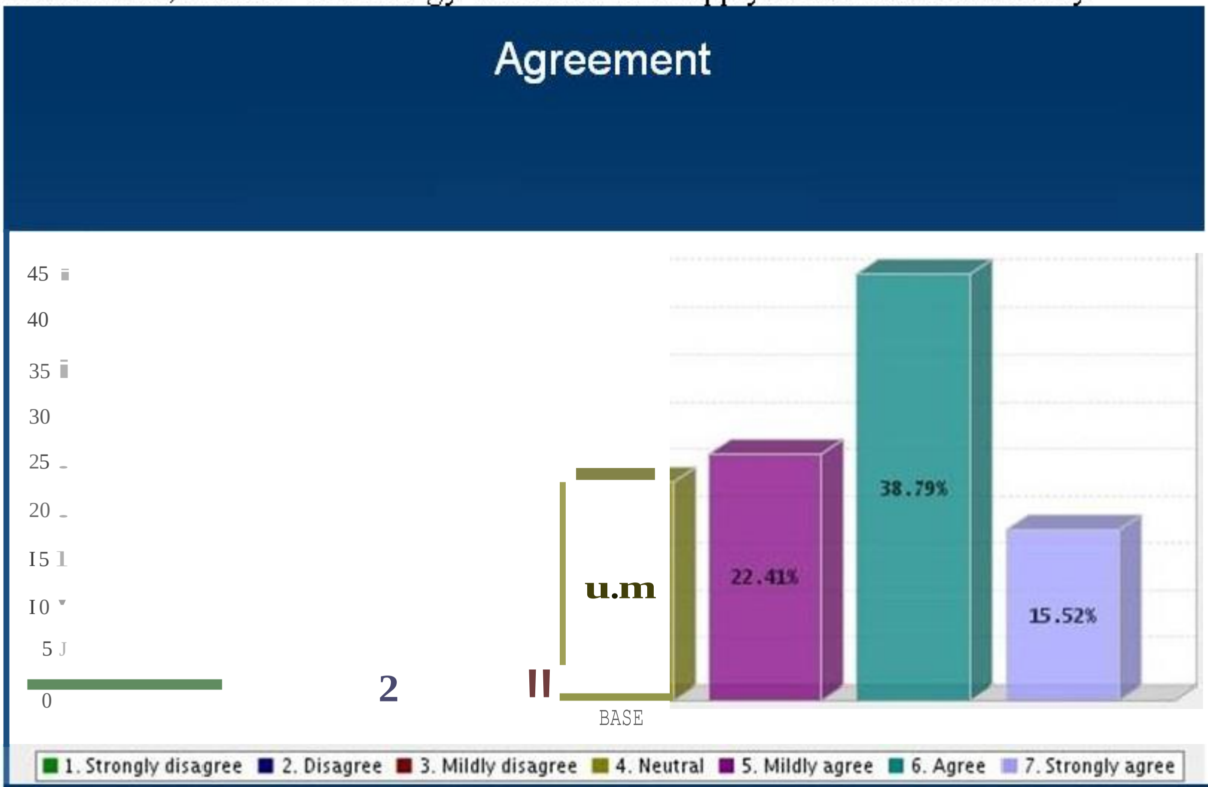


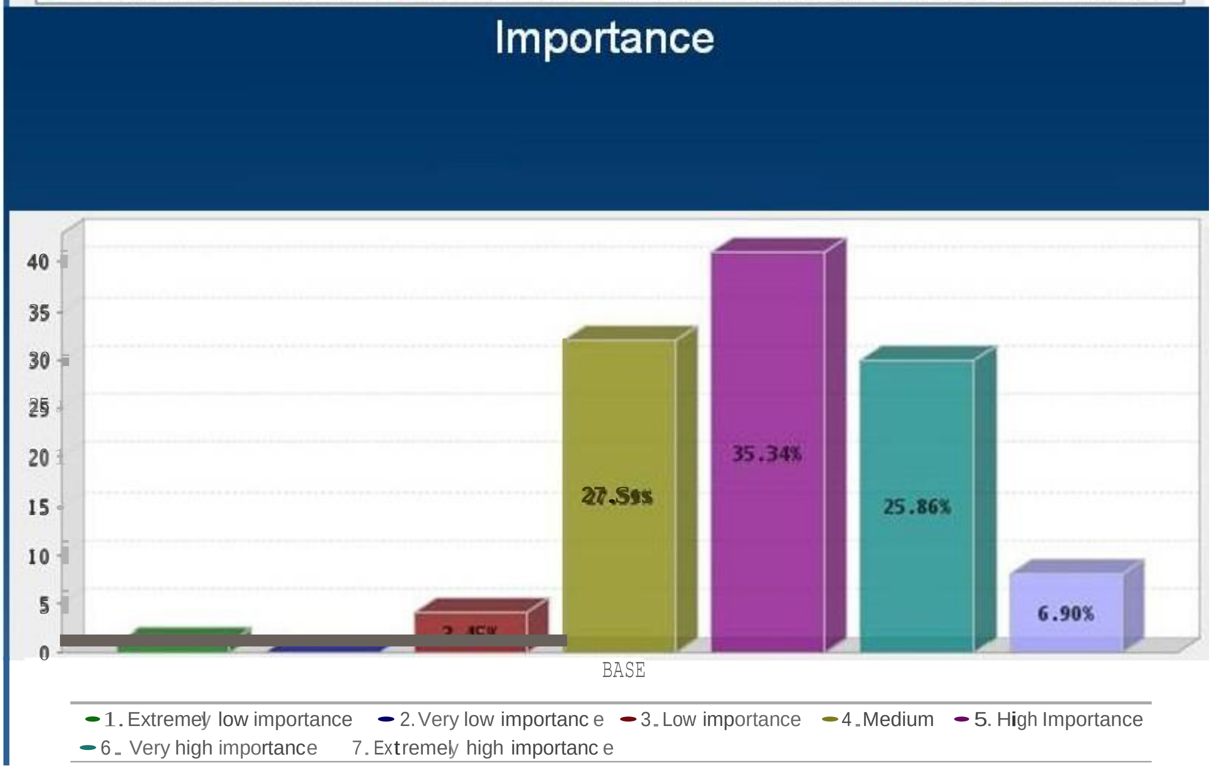
Proposition#6 Service based inter-organisational collaborations have greater propensity to become virtual than t based · collaborations



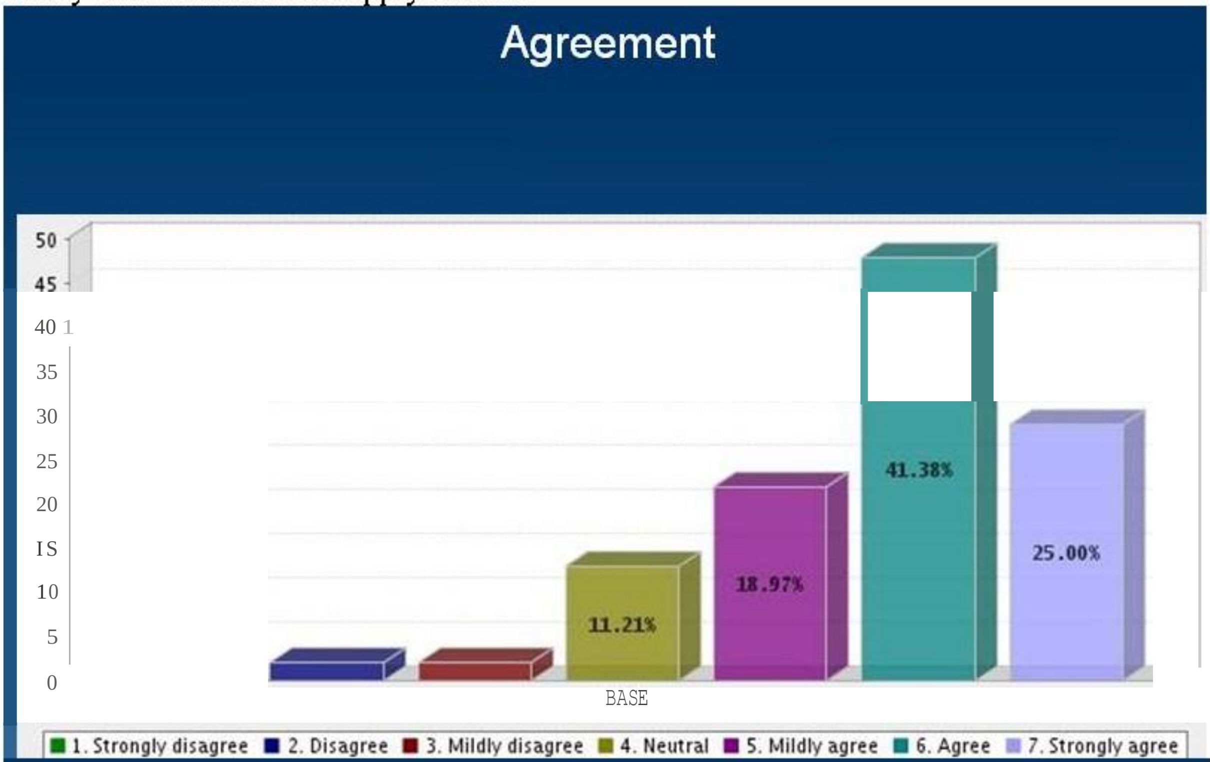


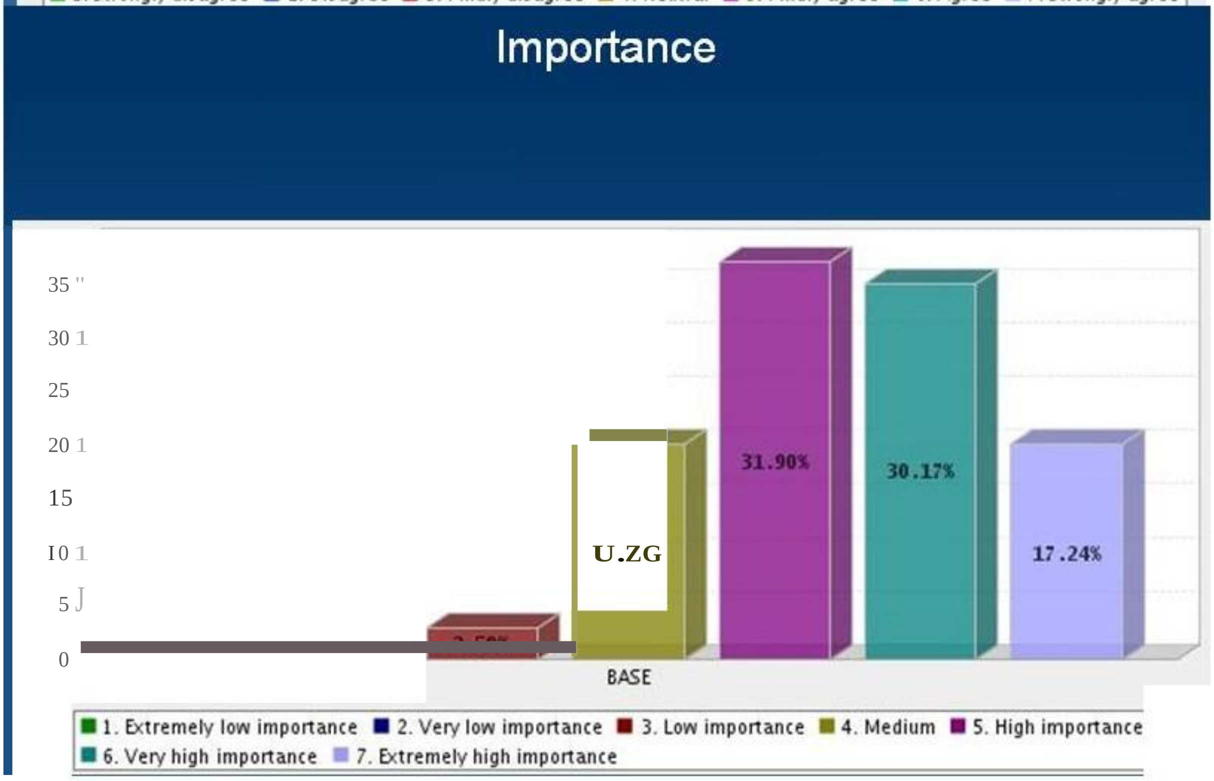
Proposition#7 Organisations could use different approaches to inter-organisational collaboration, structure and .... within different supply networks simultaneously



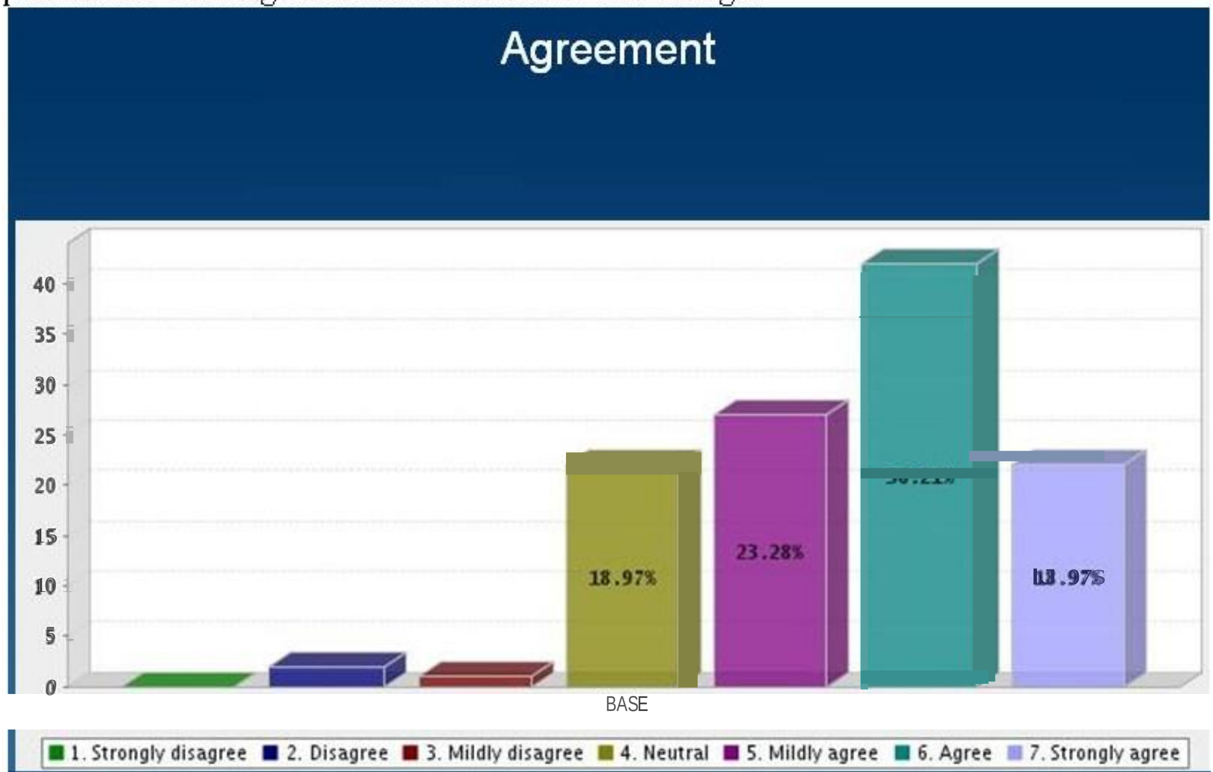


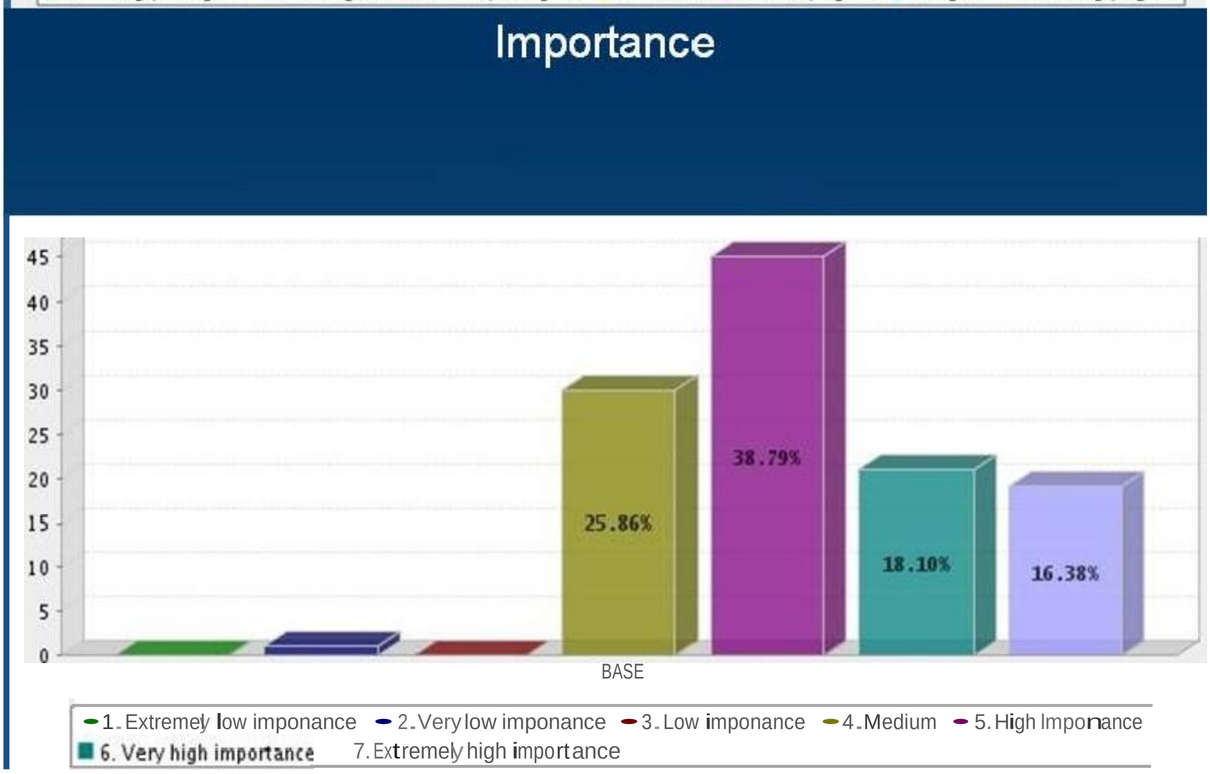
Proposition#8 Responsibilities and functional roles of each different organisation needs to be clearly defined within the [illegible] network



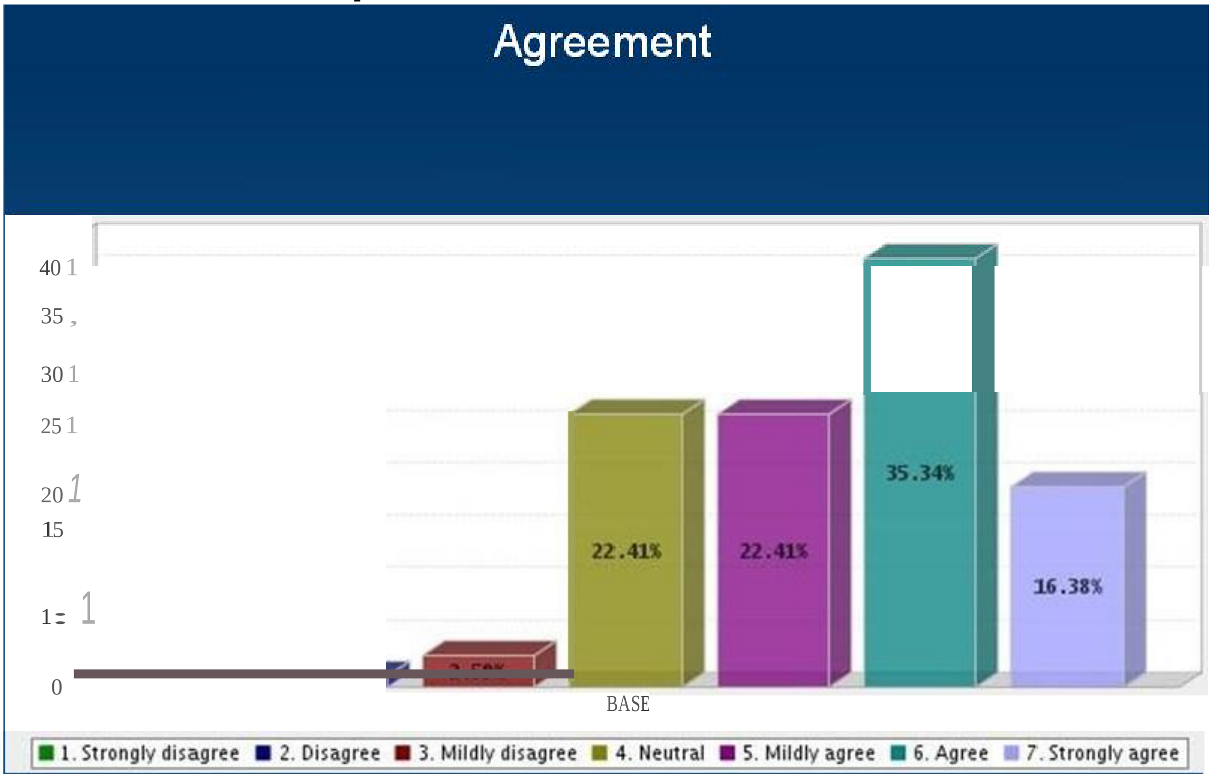


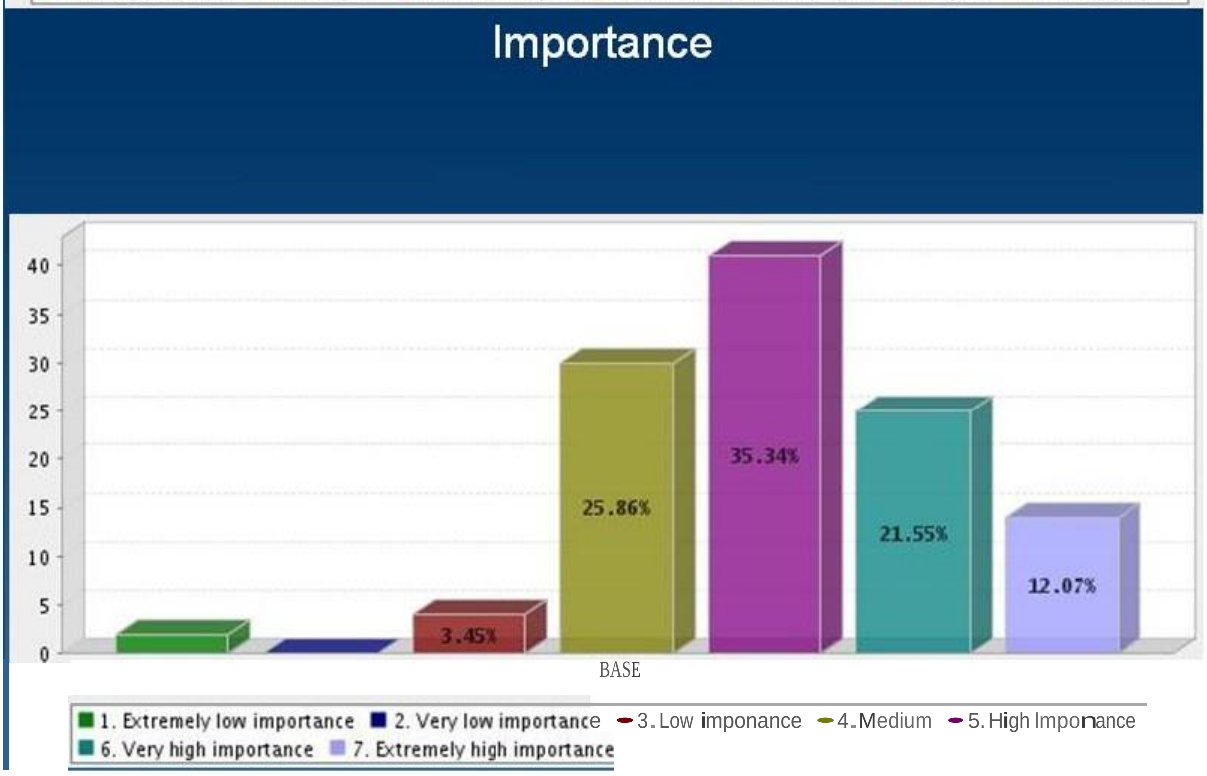
Proposition#9 Collaboration with new external organisations requires internal business processes to be reengineered to accommodate new changes



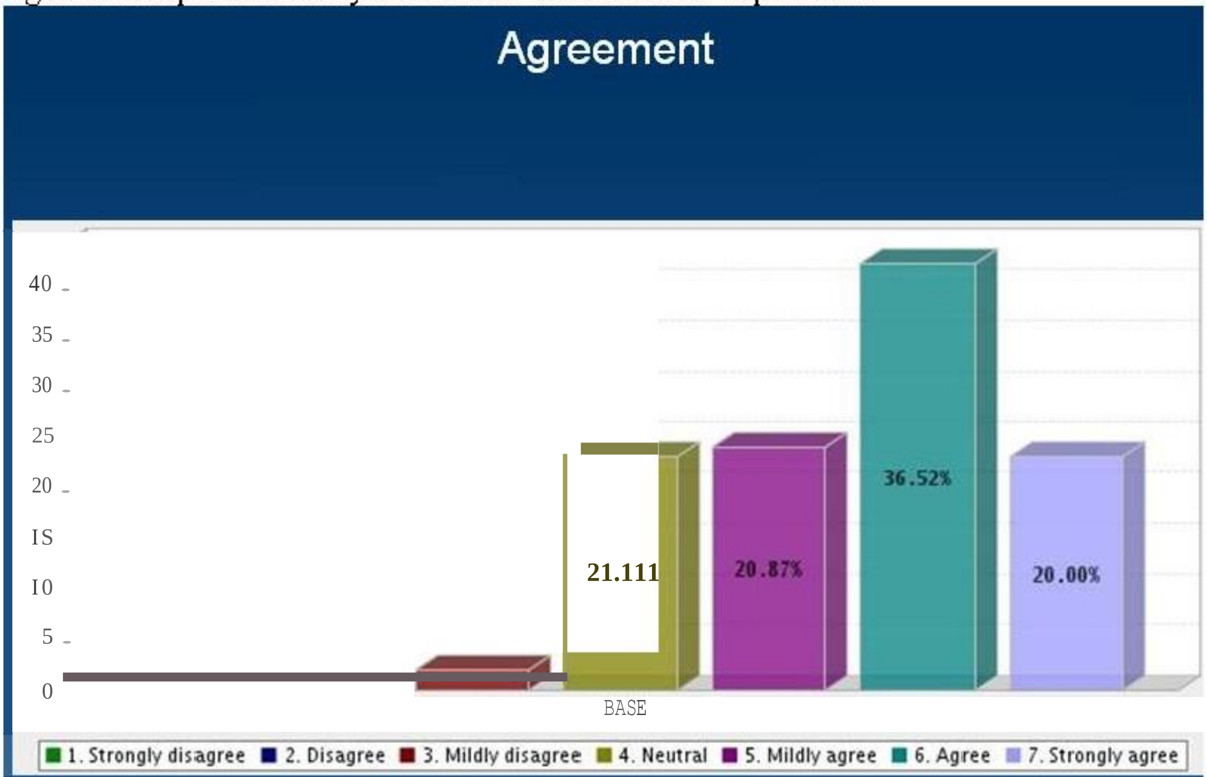


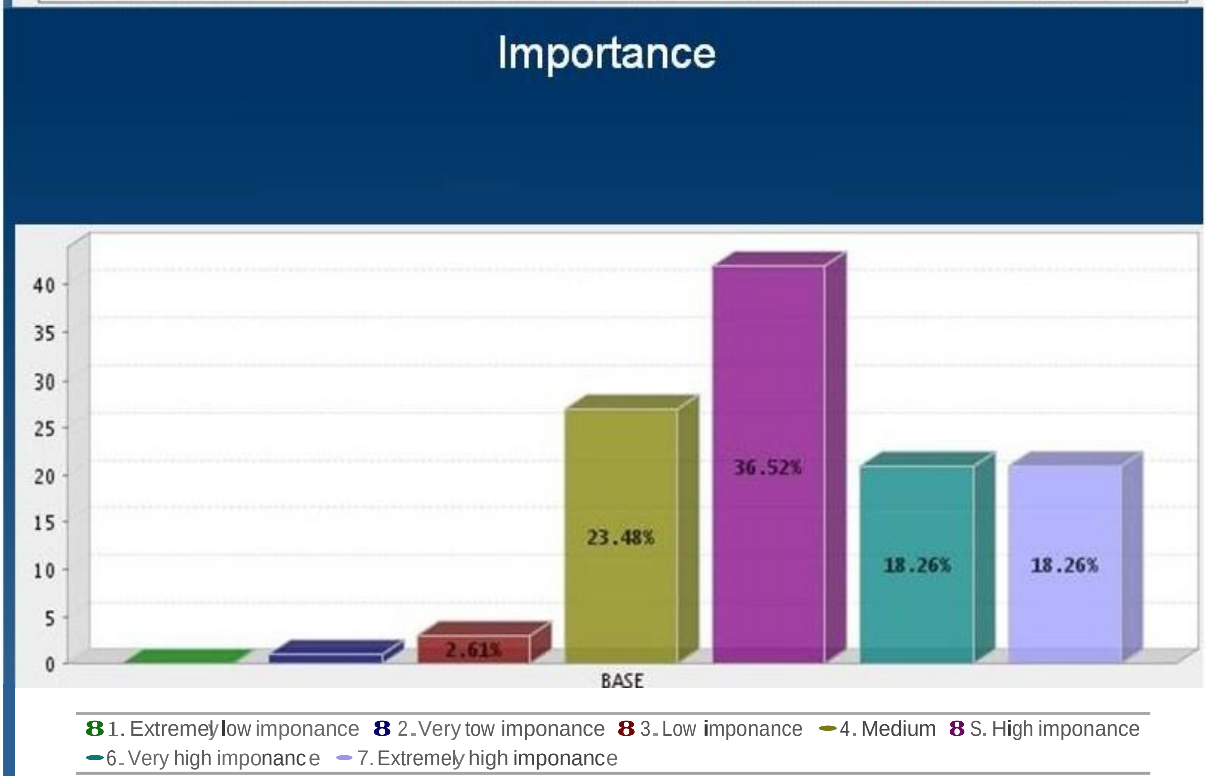
Proposition#lO fu the context of inter-organisational collaboration, product-based organisations predominantly focus on the portfolio and quality of products, and the standardization ofbusiness pnlce:ssc s



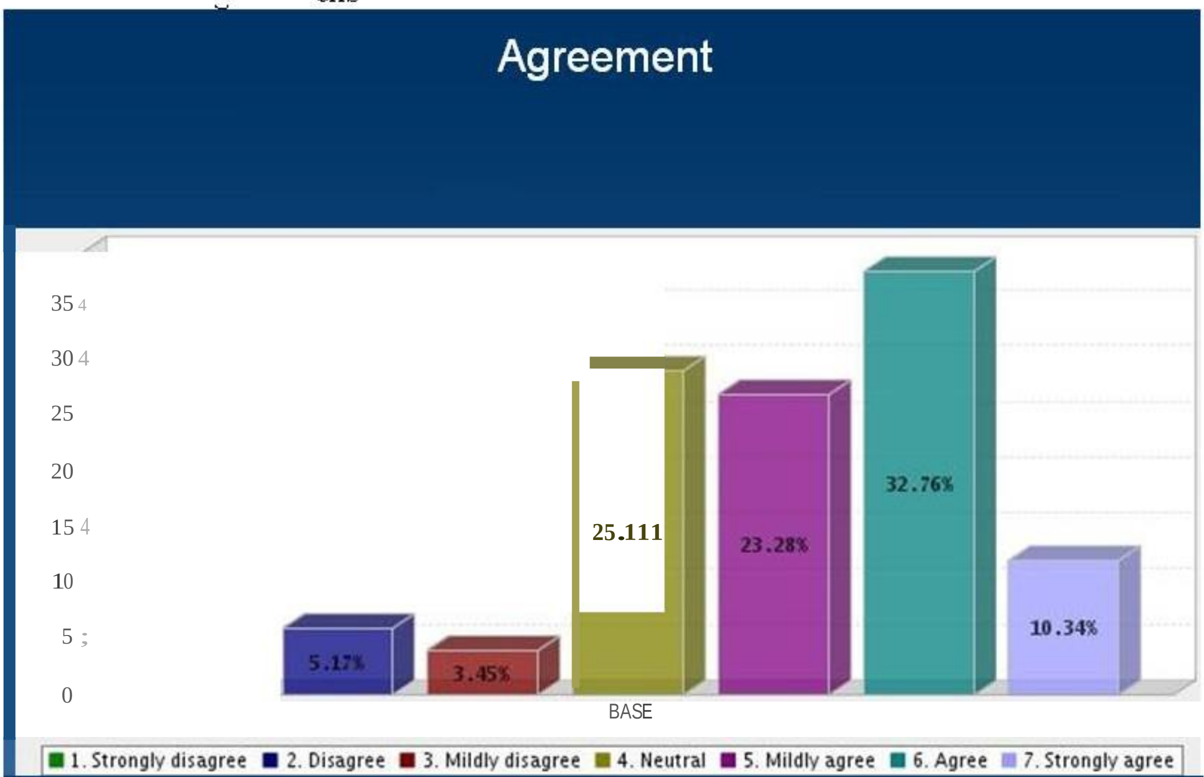


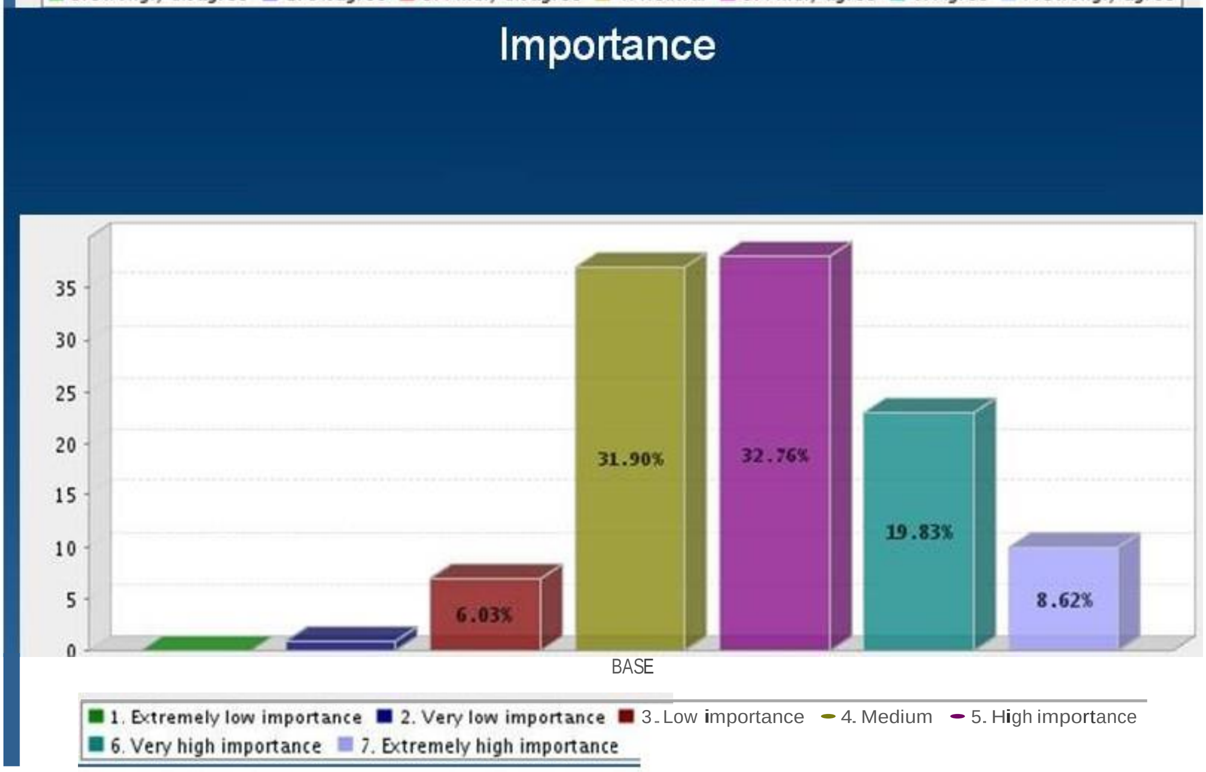
Proposition#ll In the context of inter-organisational collaboration, service-oriented organisations predominantly concentrate on consumers' experiences



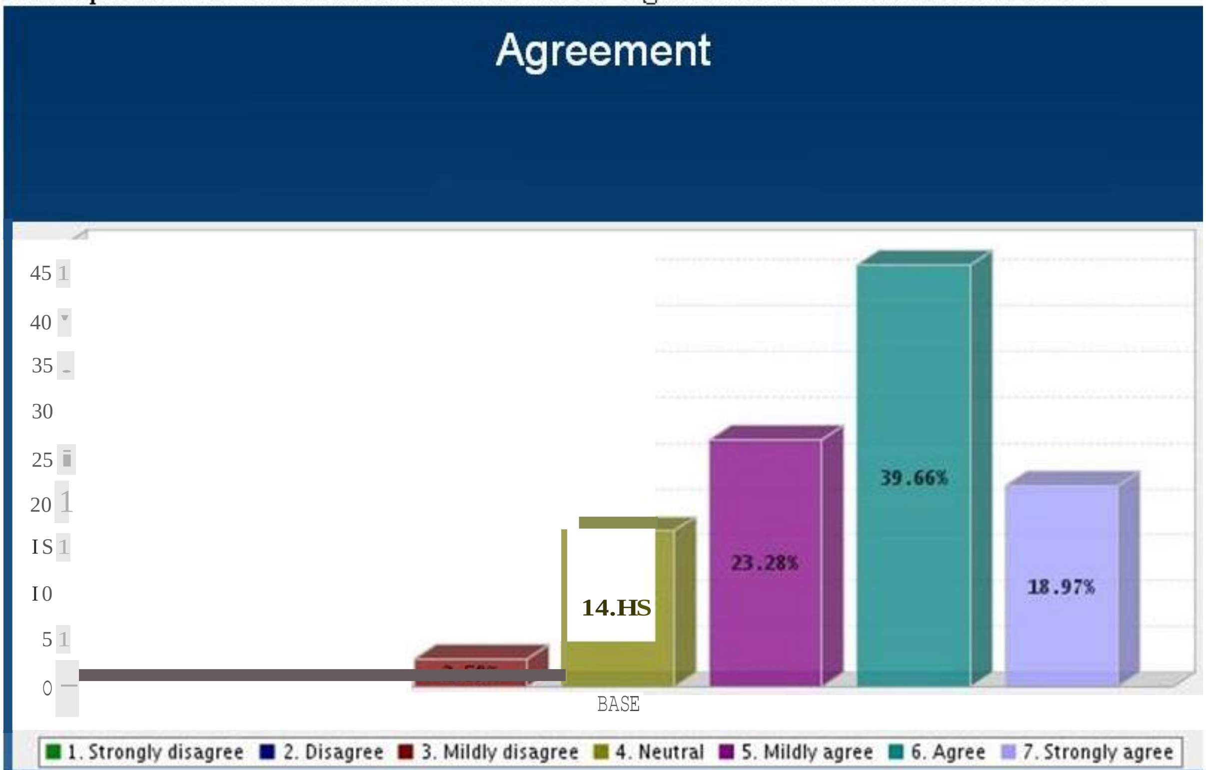


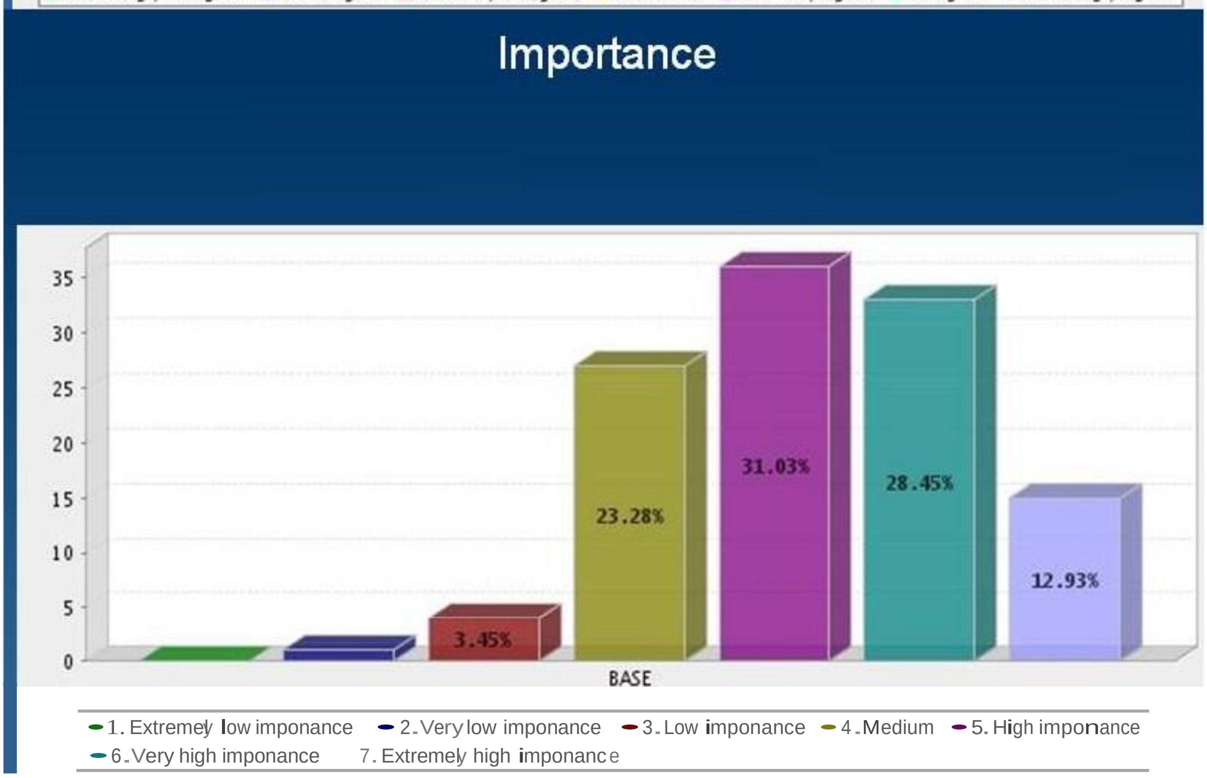
Proposition#12 There is need for a leader or a 'broker' organisation within the supply network who has core competencies and responsibilities to supervise, evaluate and manage cooperation between other · ·ons



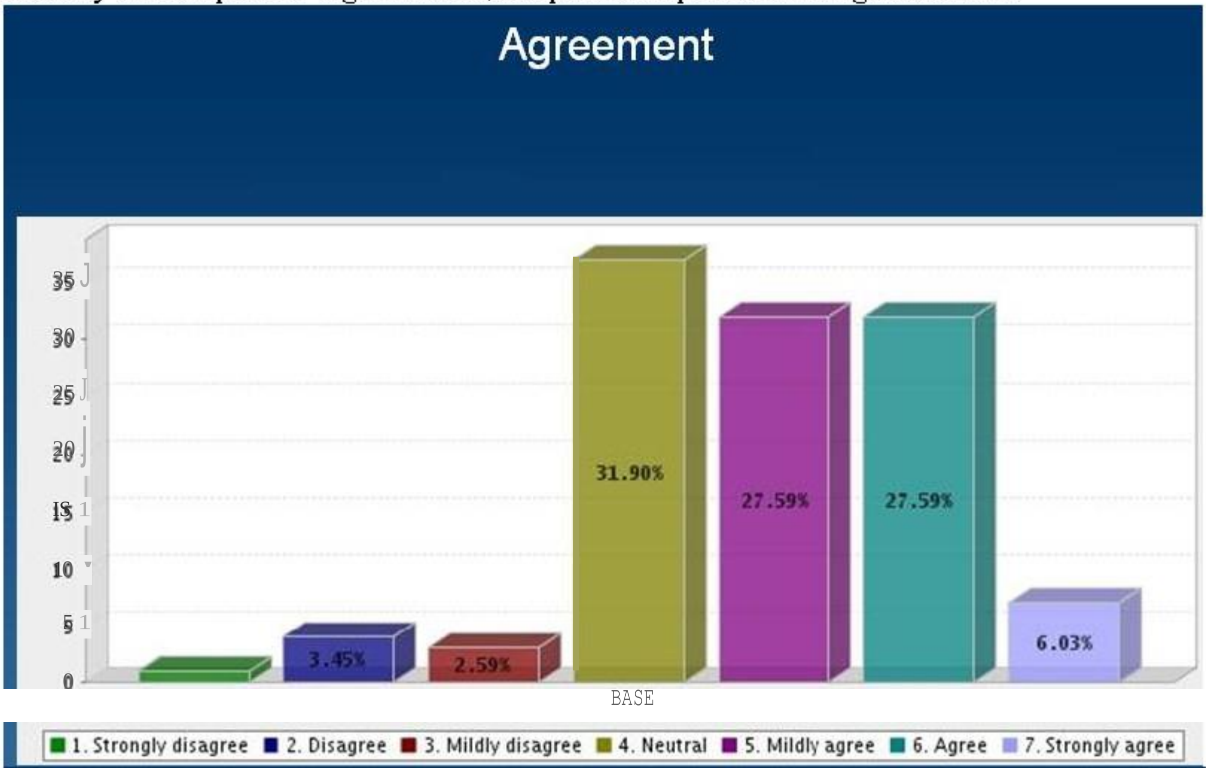


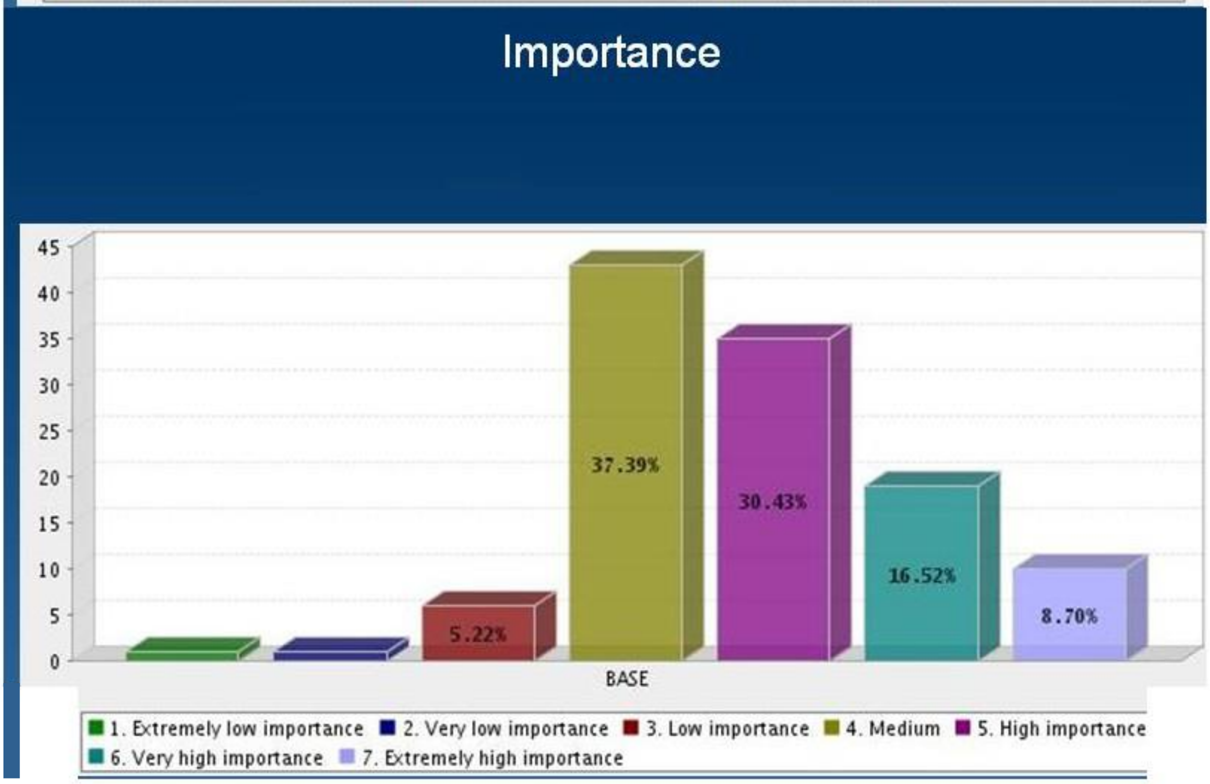
Proposition#13 Organisations are more willing to collaborate with other organisations who have a [illegible] track record of successes in inter-[illegible] business collaborations



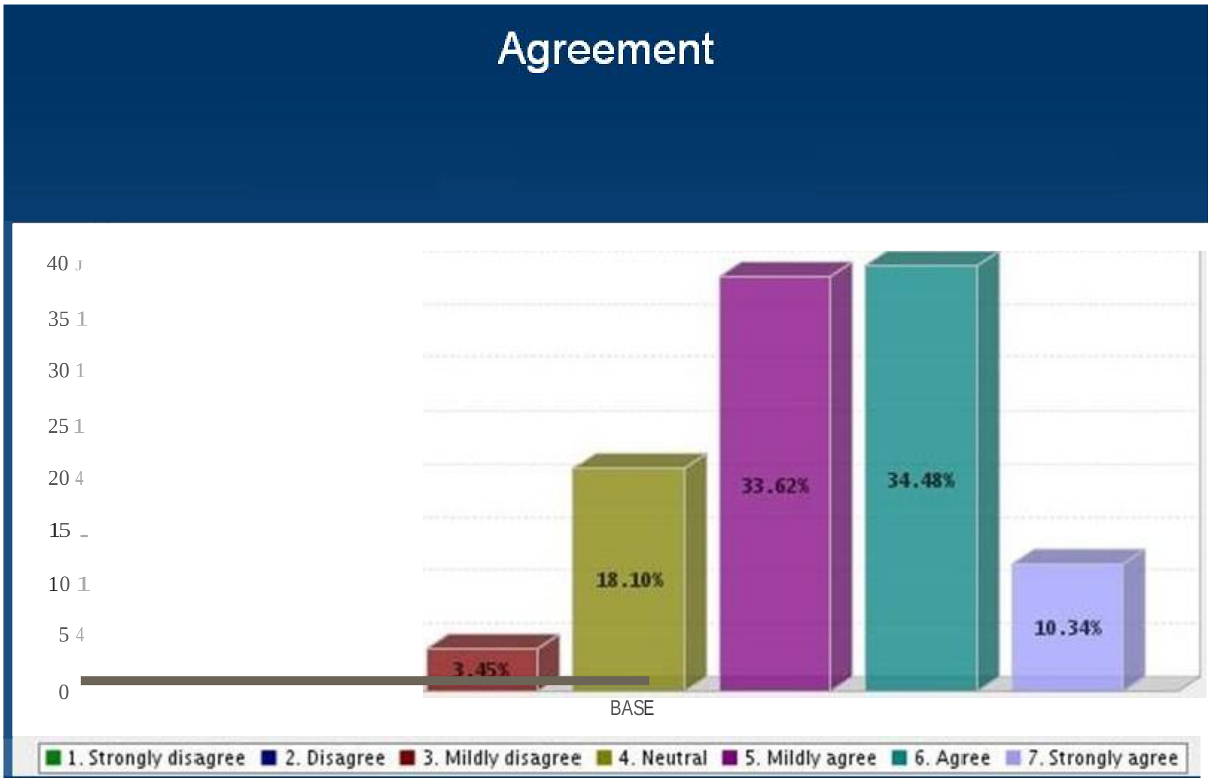


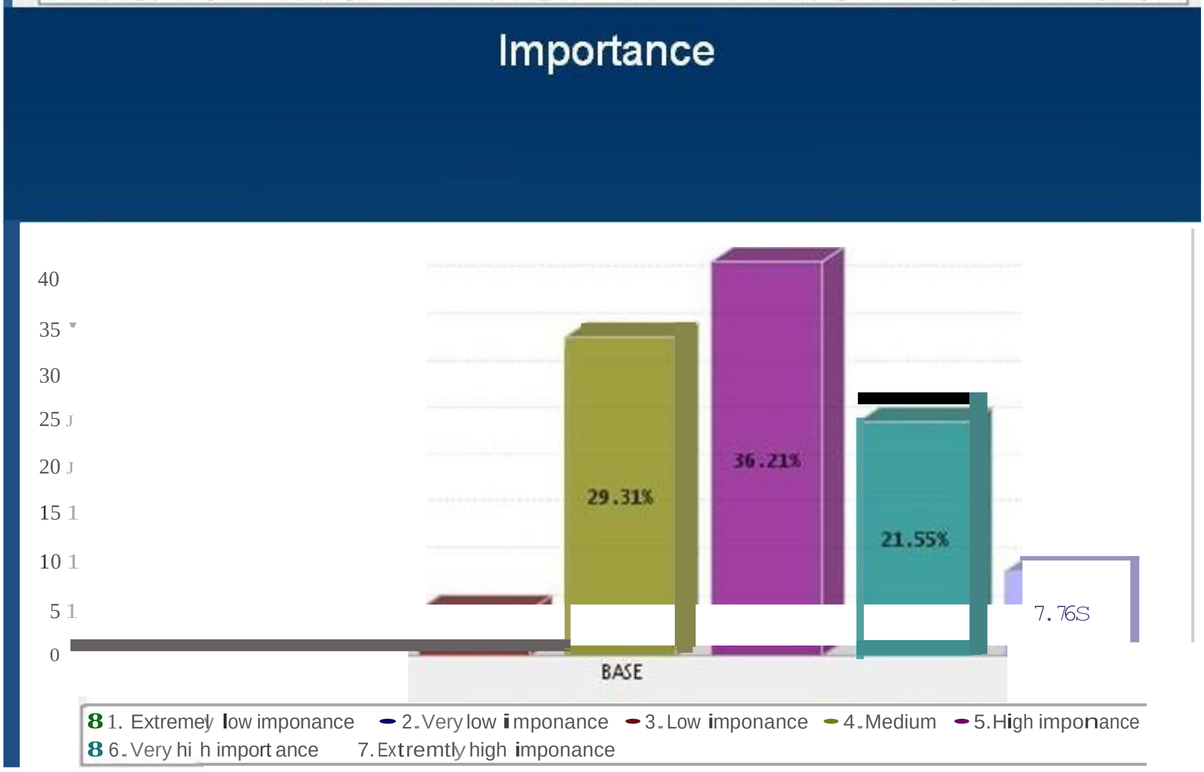
Proposition#14 Once organisations obtain a similar set competences at a similar level of maturity as their partner organisations, the partnerships could change as a result



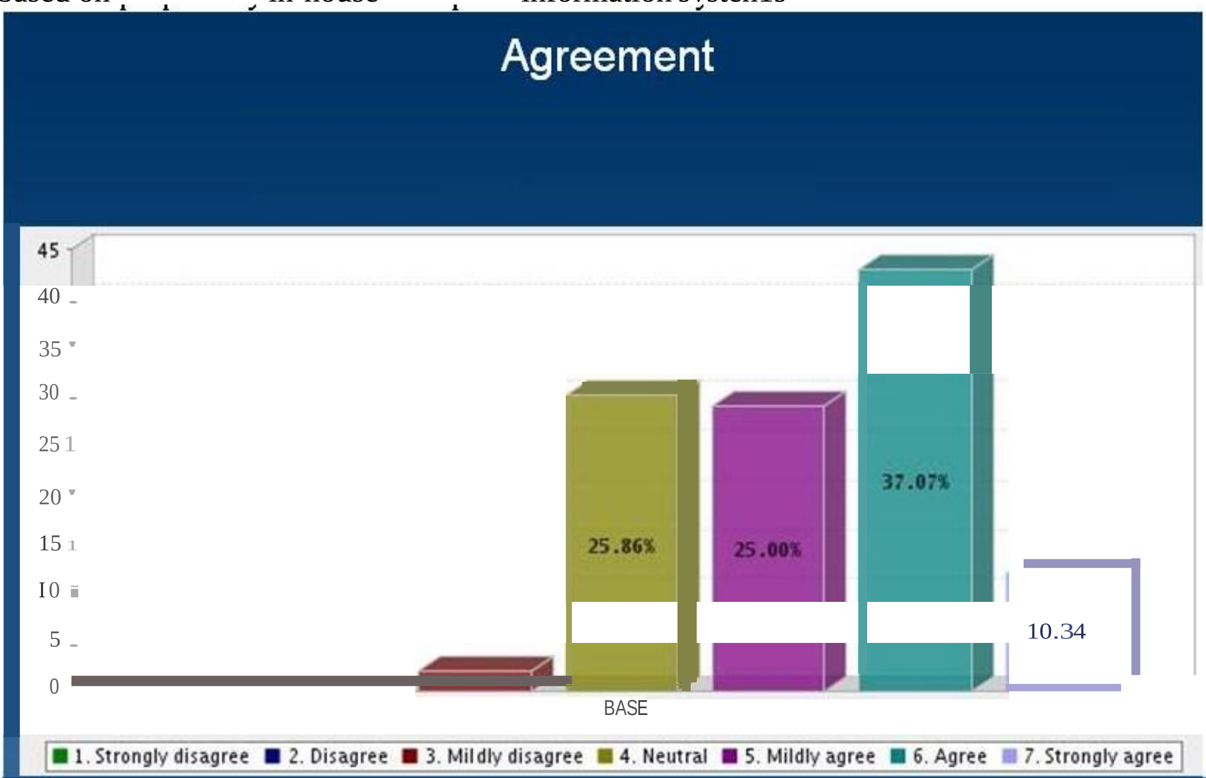


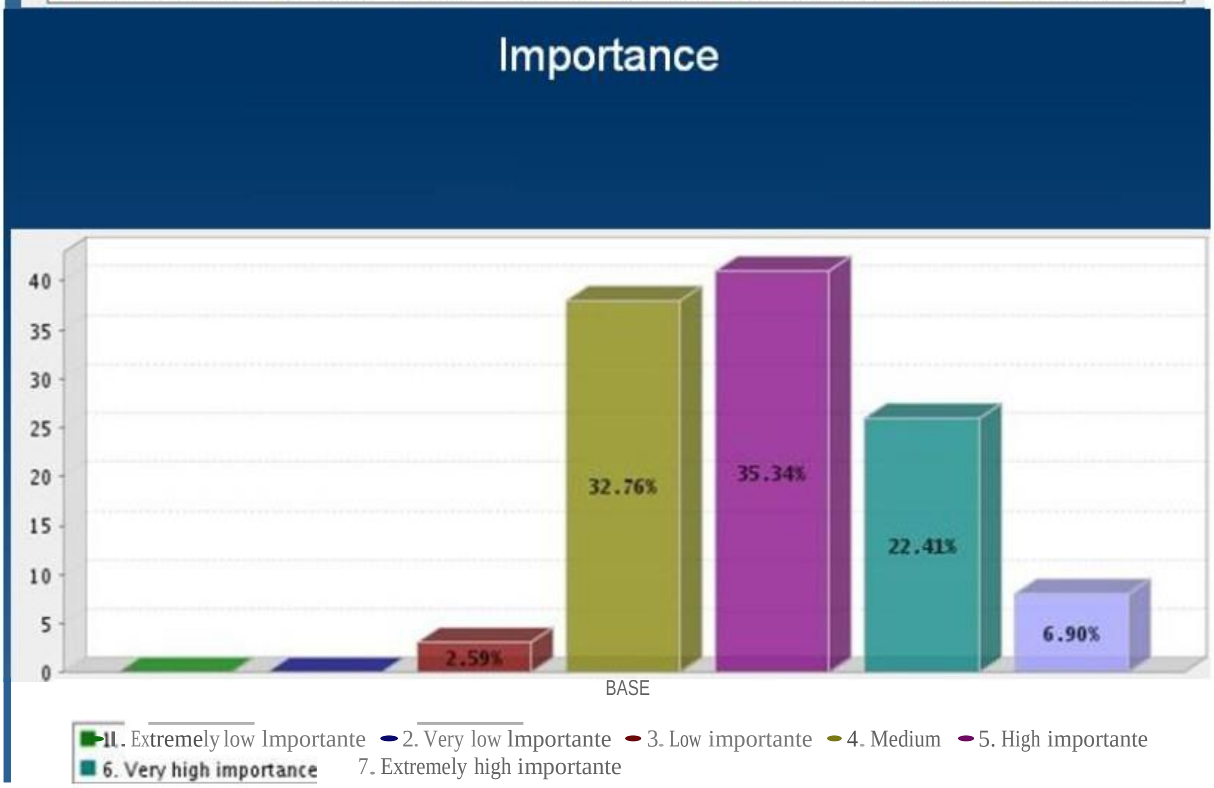
Proposition#15 The role ofERP systems in supporting operational business has evolved from intra-organisational optimisation and integration into multiple inter-organisational coliaborations



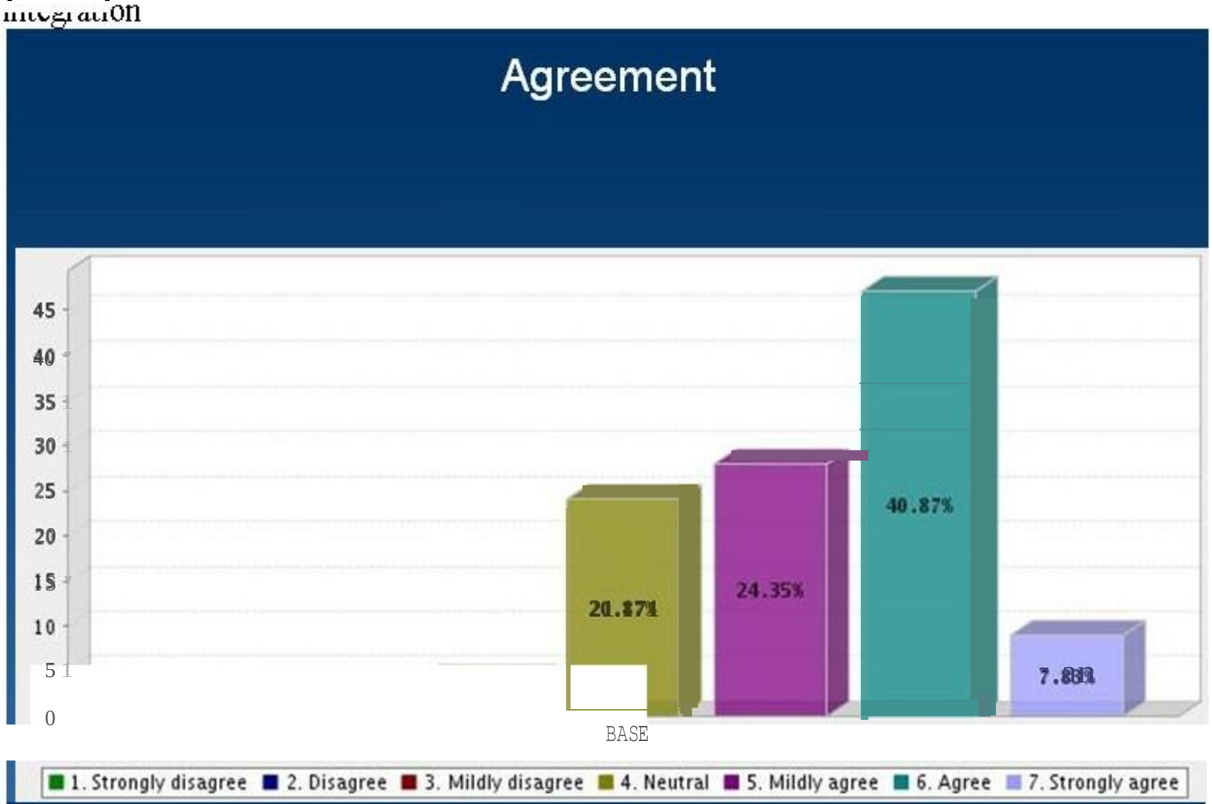


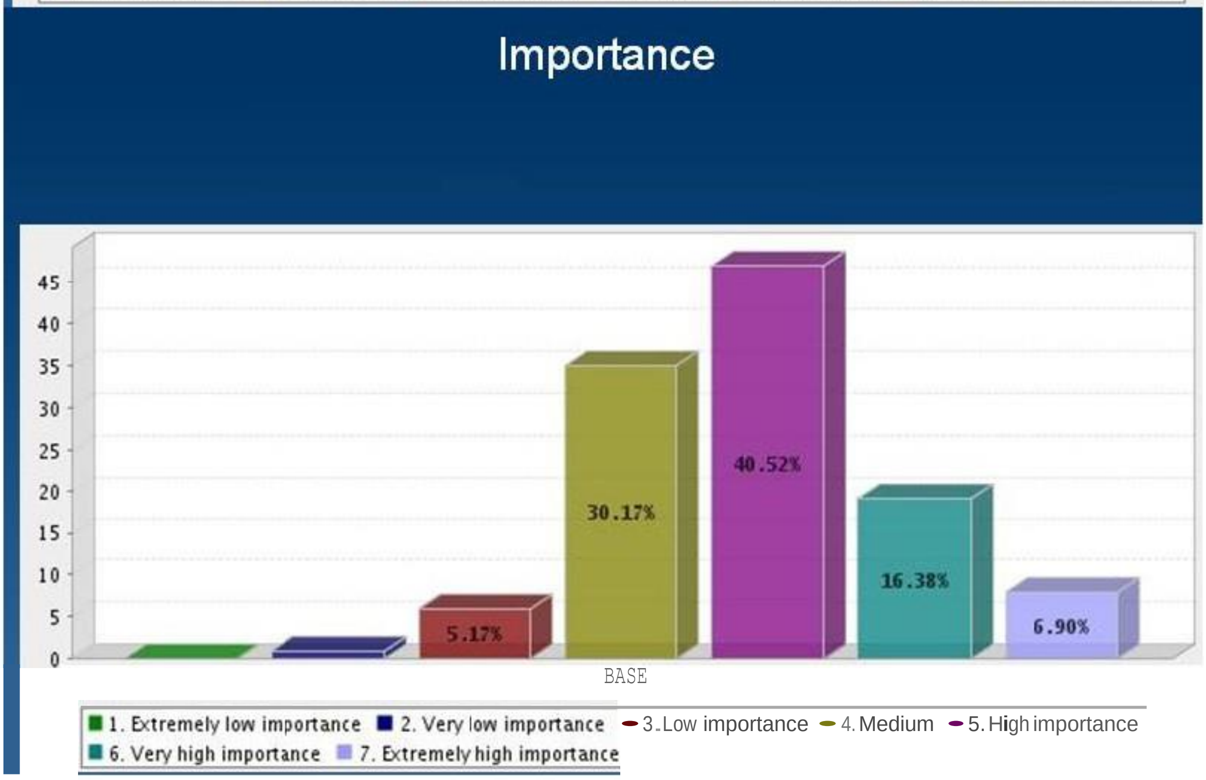
Proposition#16 Future ERP systems should be designed based on web-based technologies by deploying service oriented architectures and cloud computing applications instead of being based on in-house information systen1s



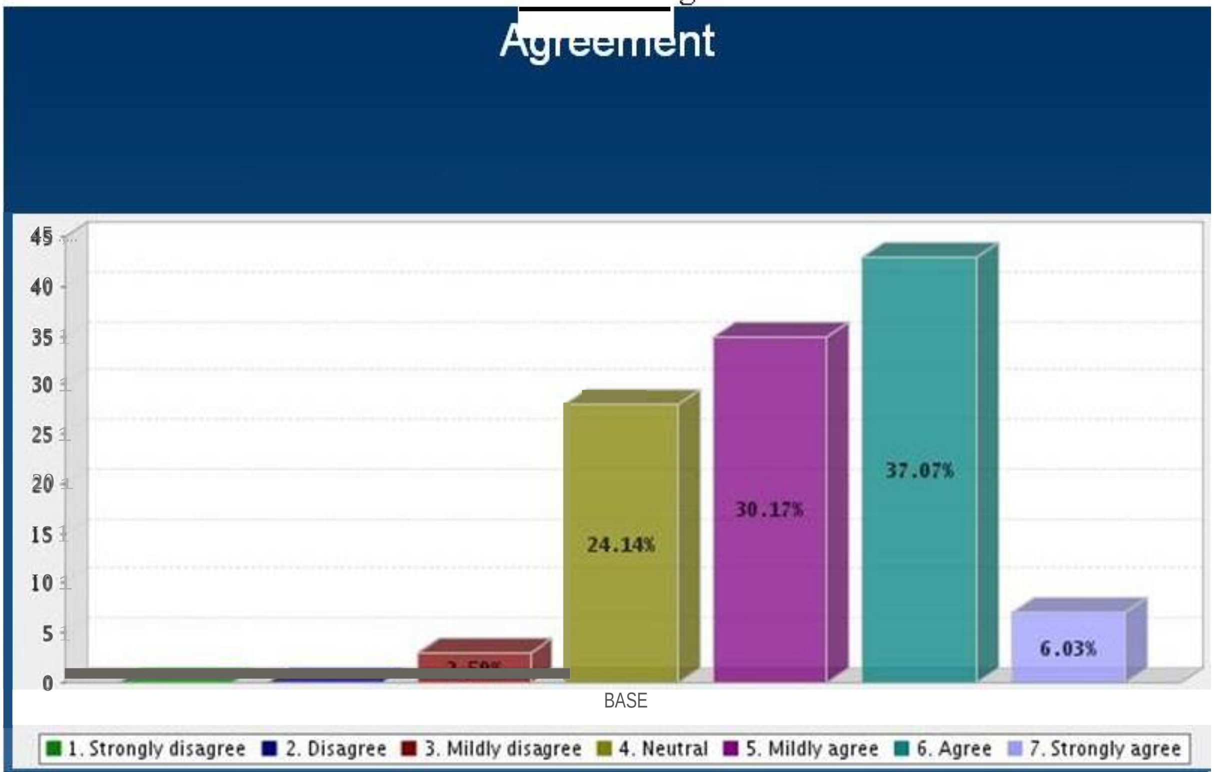


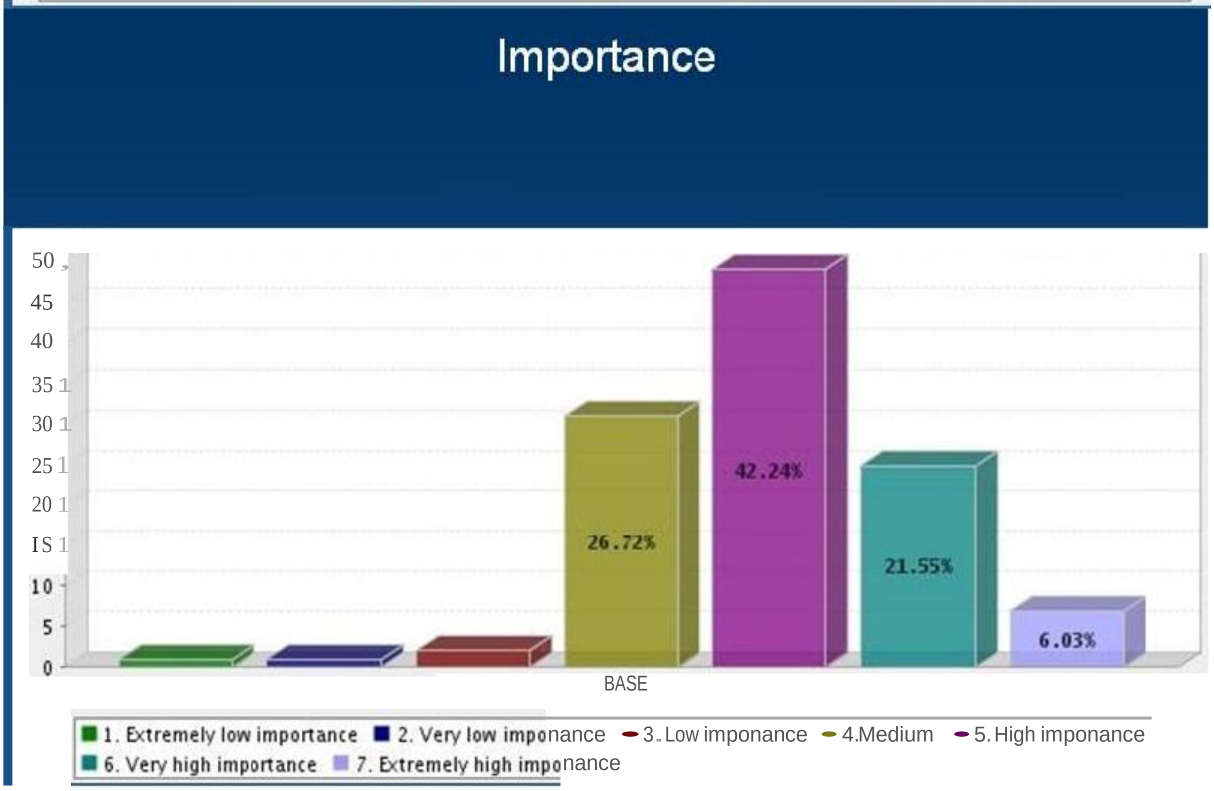
Proposition#17 'On-demand' ERP solutions will benefit and enable organisations to access technologies without significant individual investment cost in inter-organisational systems integration



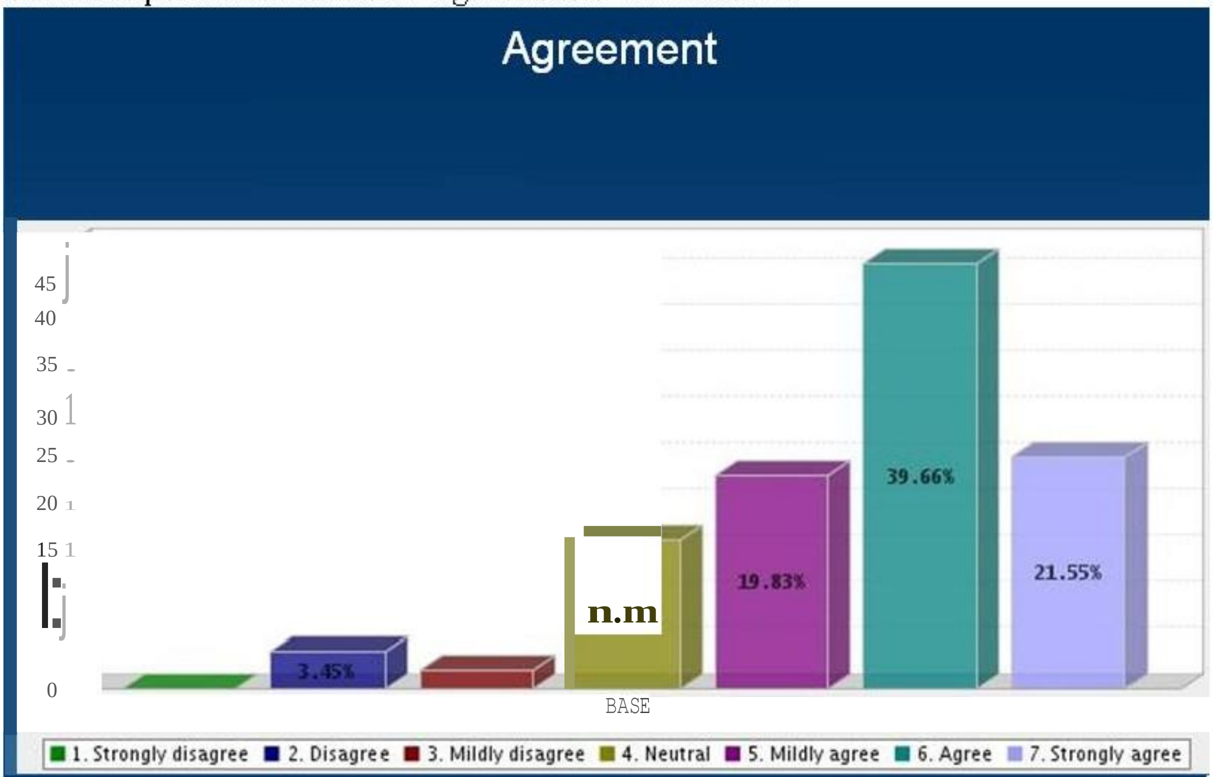


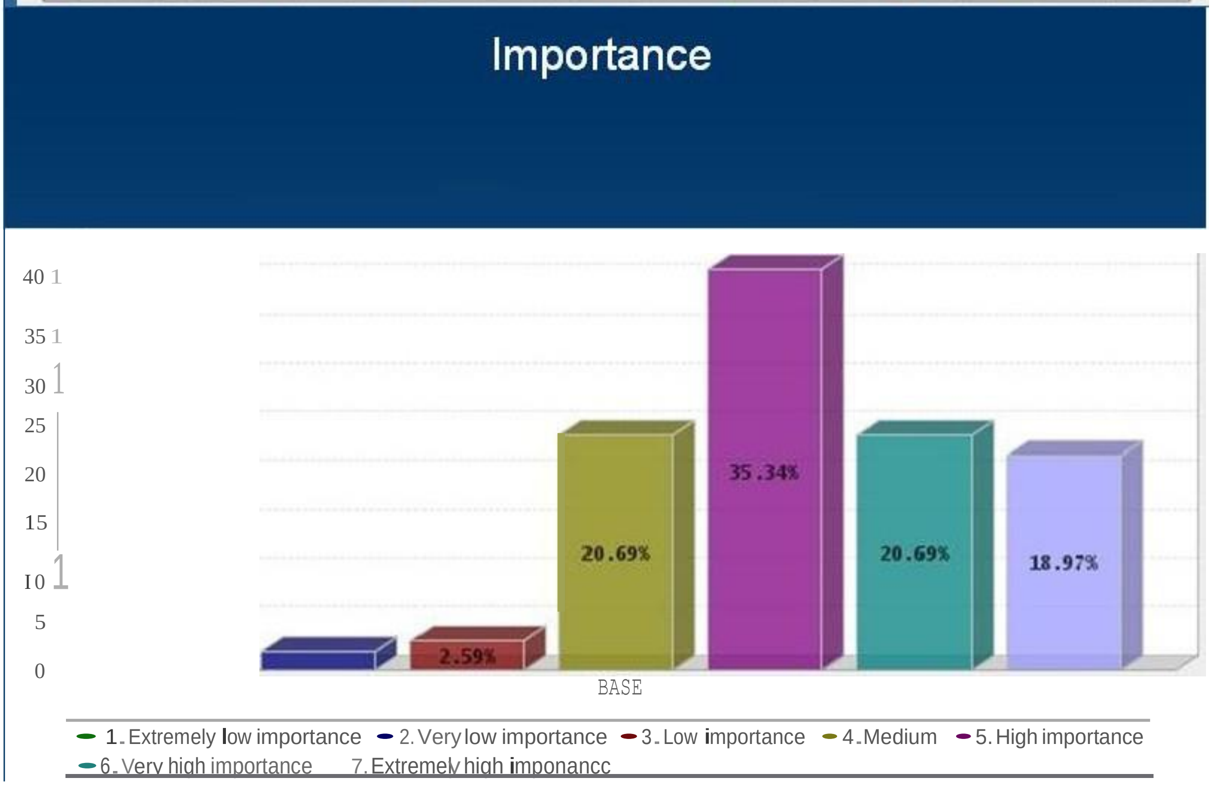
Proposition#18 There is a high degree of compatibility between 'cloud-based ERP' and service oriented architectures and hence the two will grow in unison



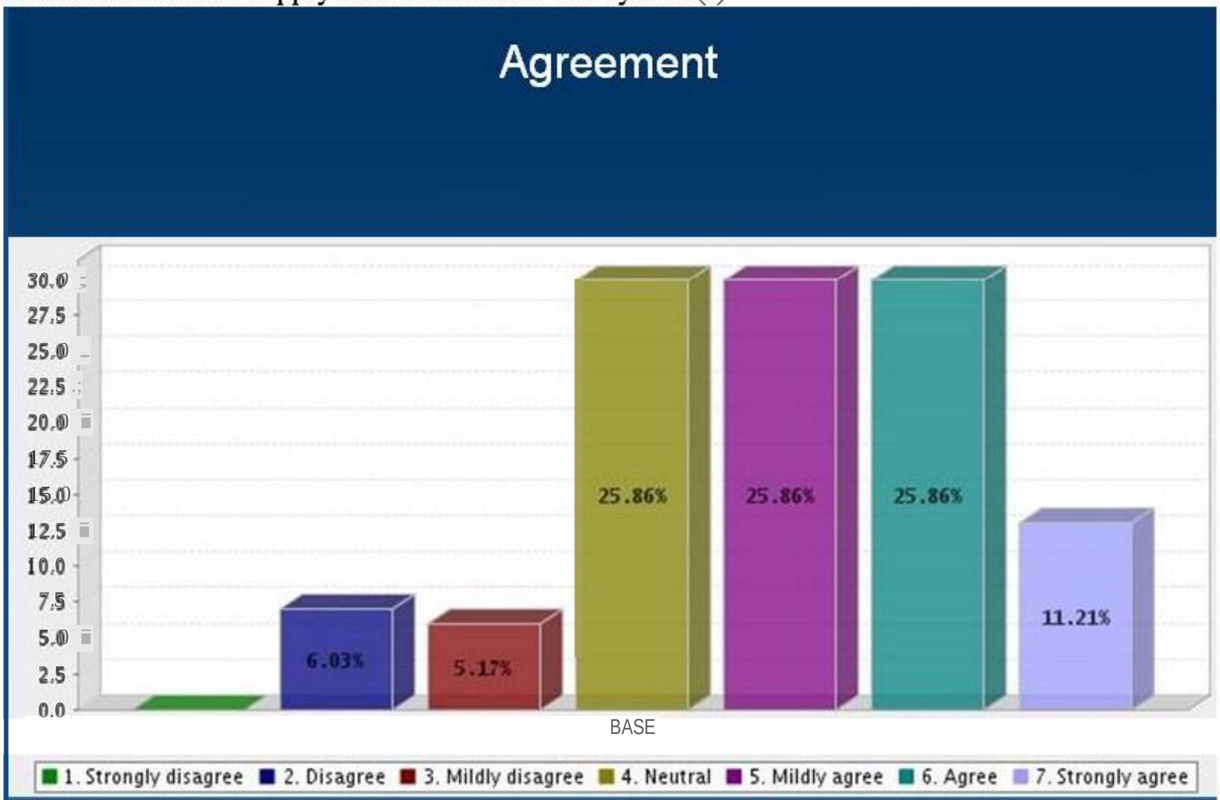


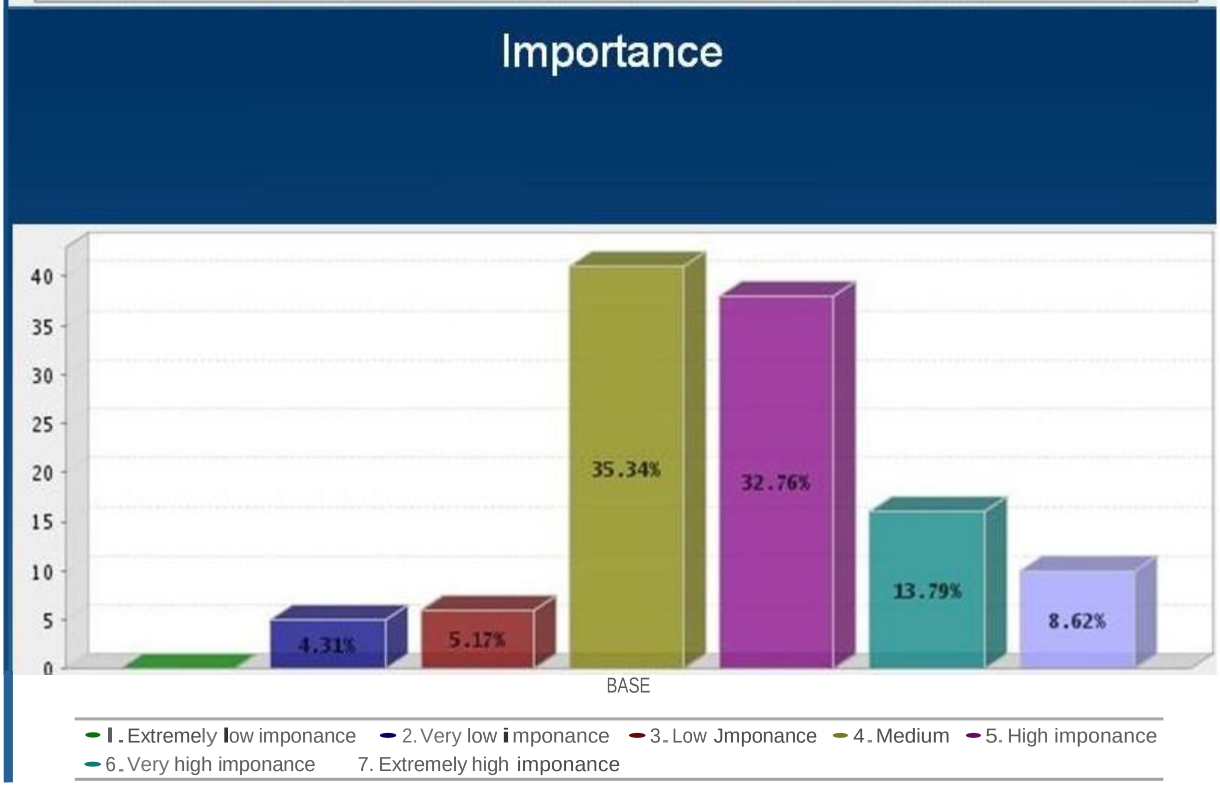
Proposition#19 Information security and flexibility of ERP systems will be key determinants in their ...... and use in inter ...... collaborations



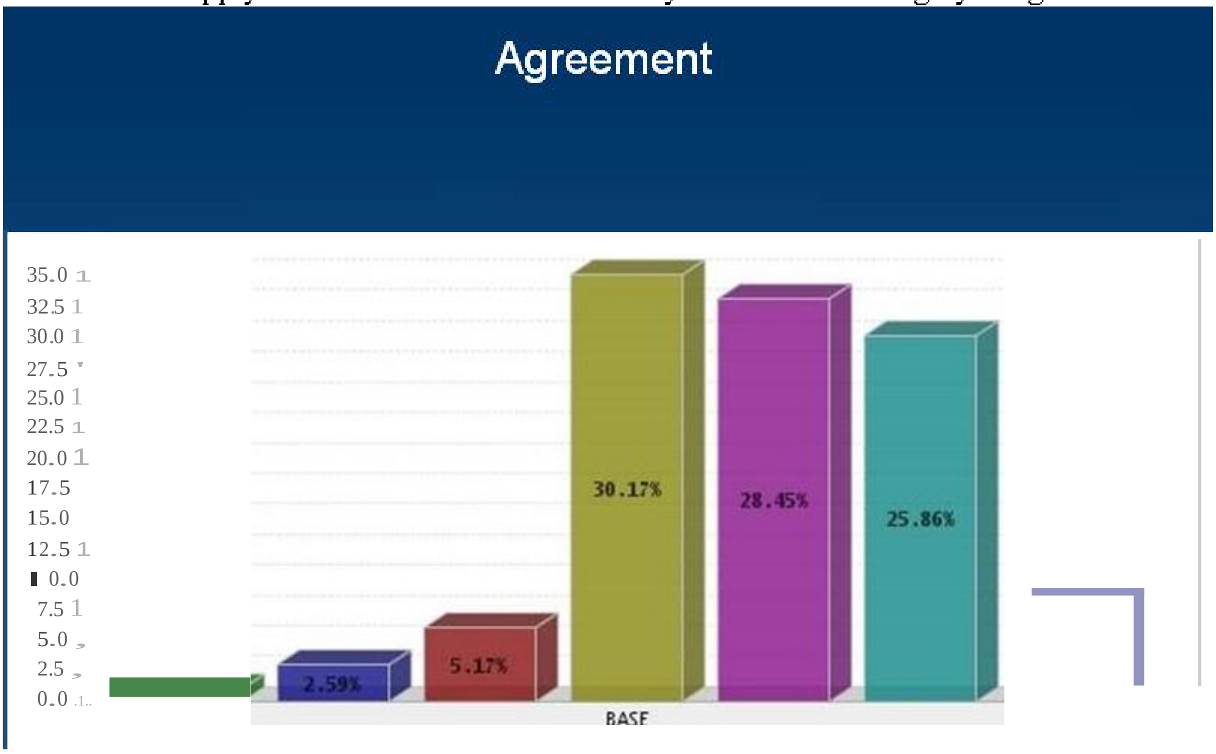


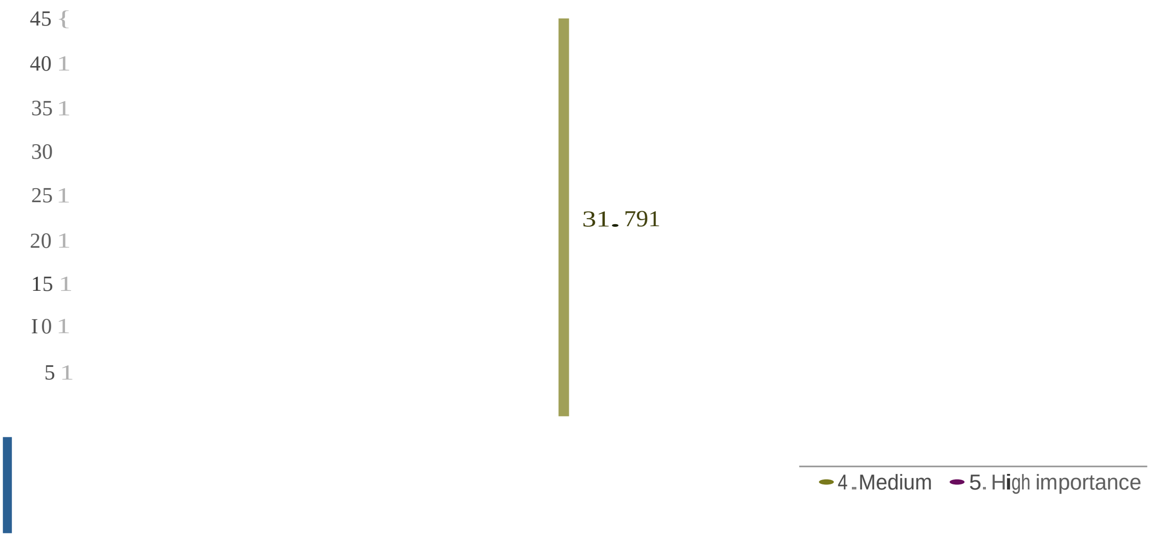
Proposition#20 Inter-organisational integration requires different organisations within the same collaborative supply network to use ERP systems)



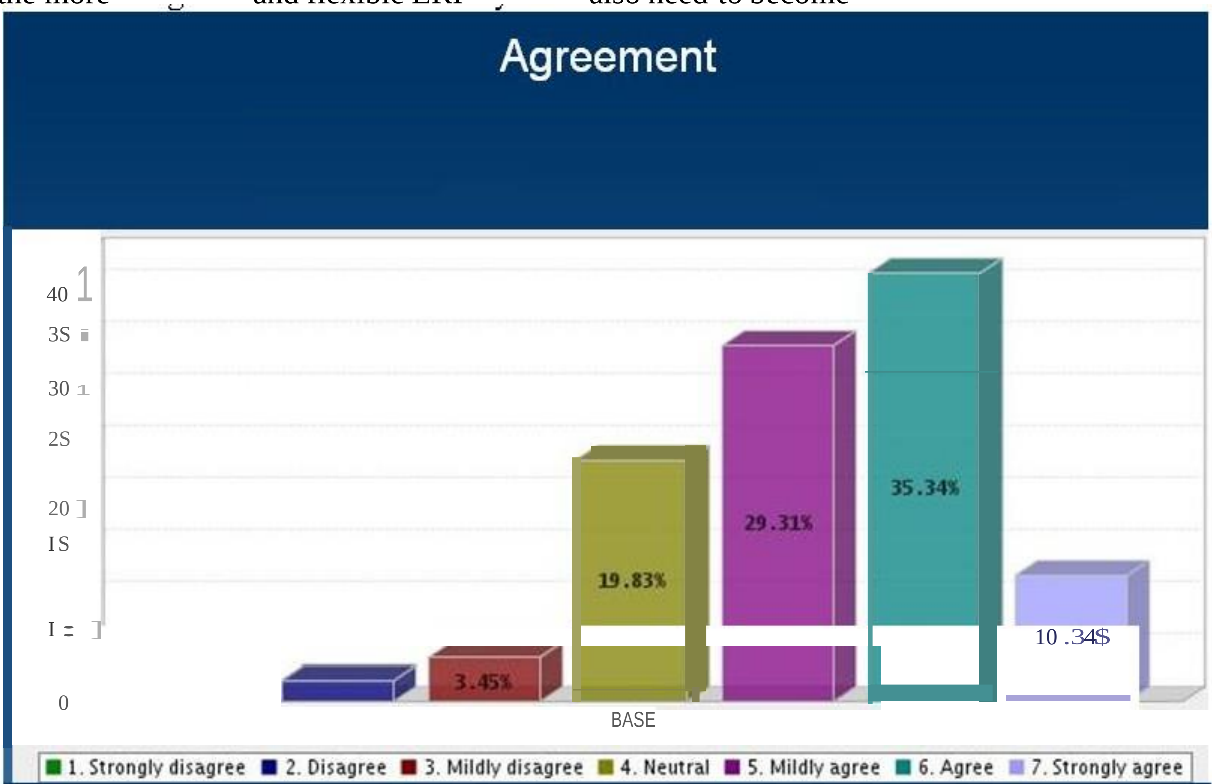


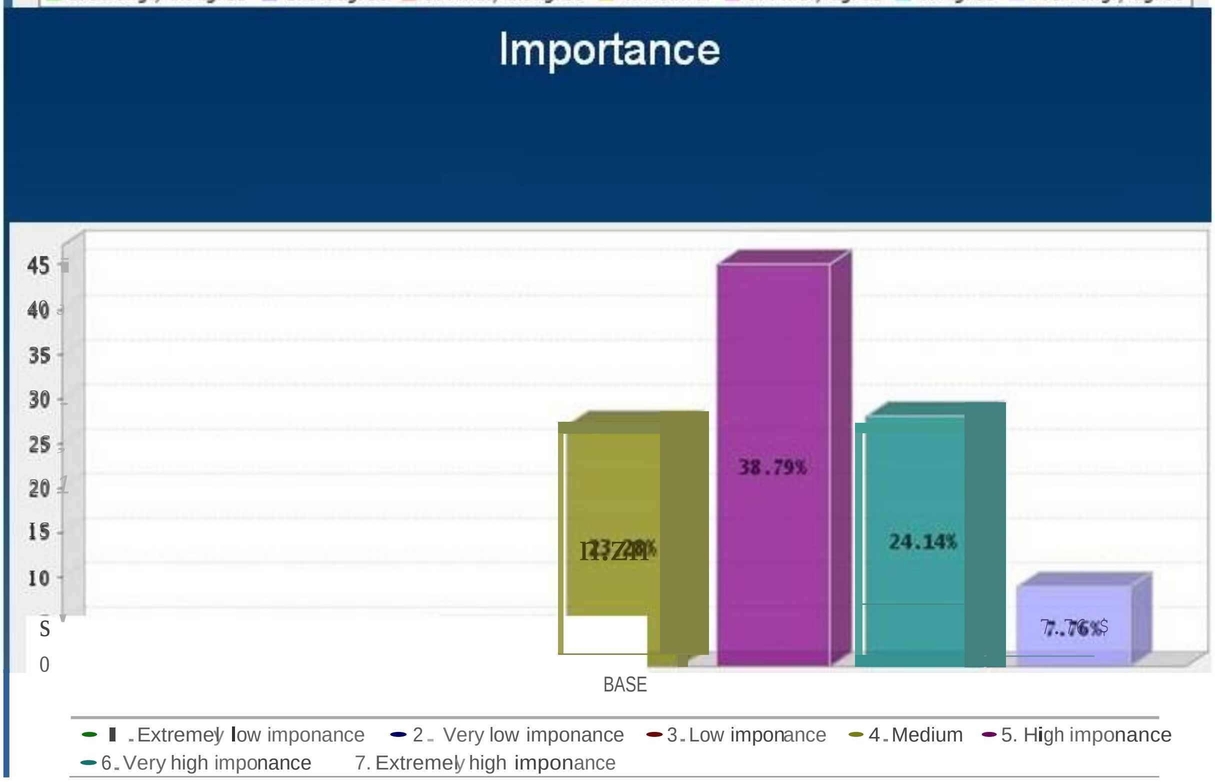
Proposition#21 Inter-organisational integration requires ERP systems within the same collaborative supply network to use the same ERP system to become highly integrated



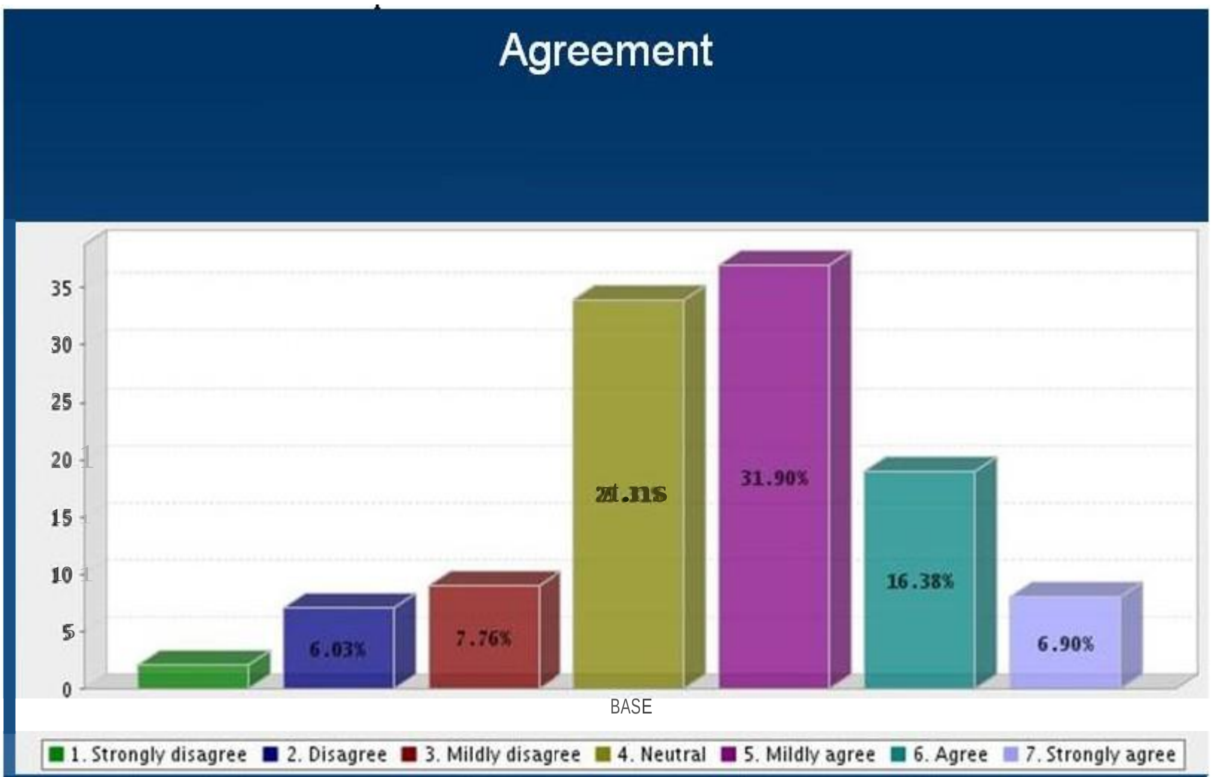


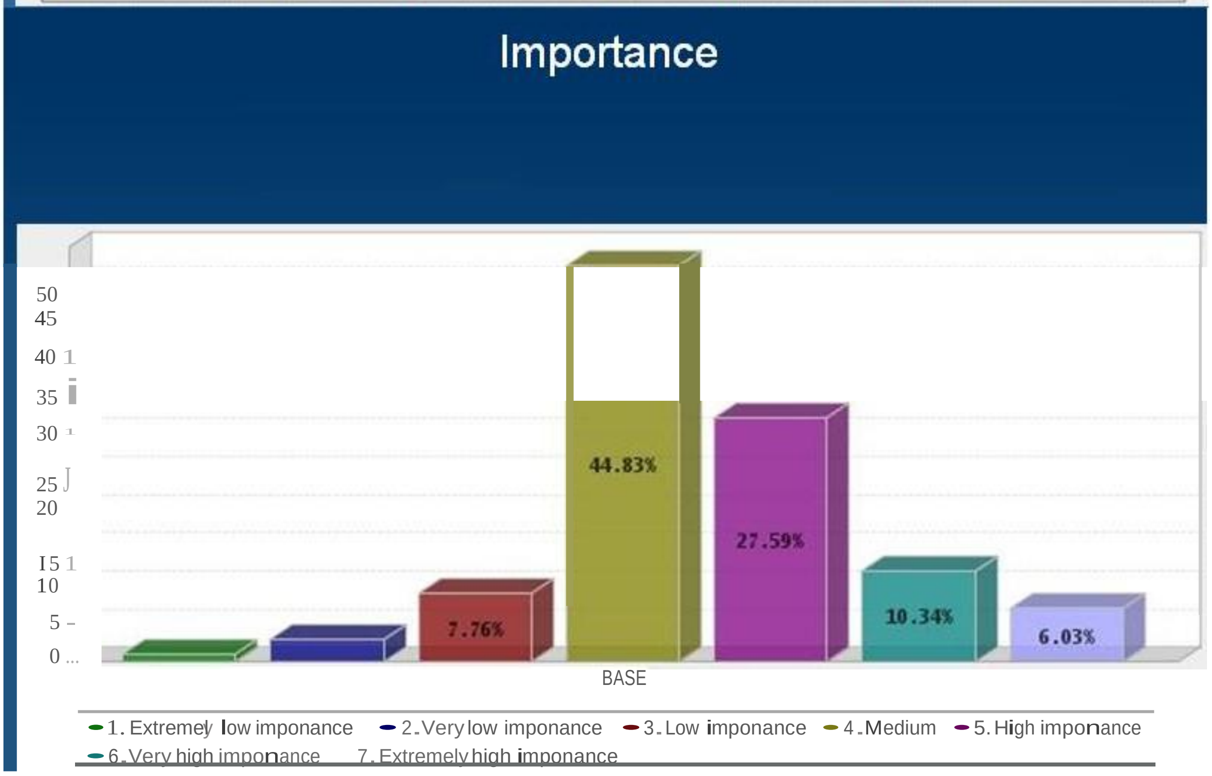
Proposition#22 The tighter inter-organisational collaborative structures and strategies become; the more and flexible ERP also need to become



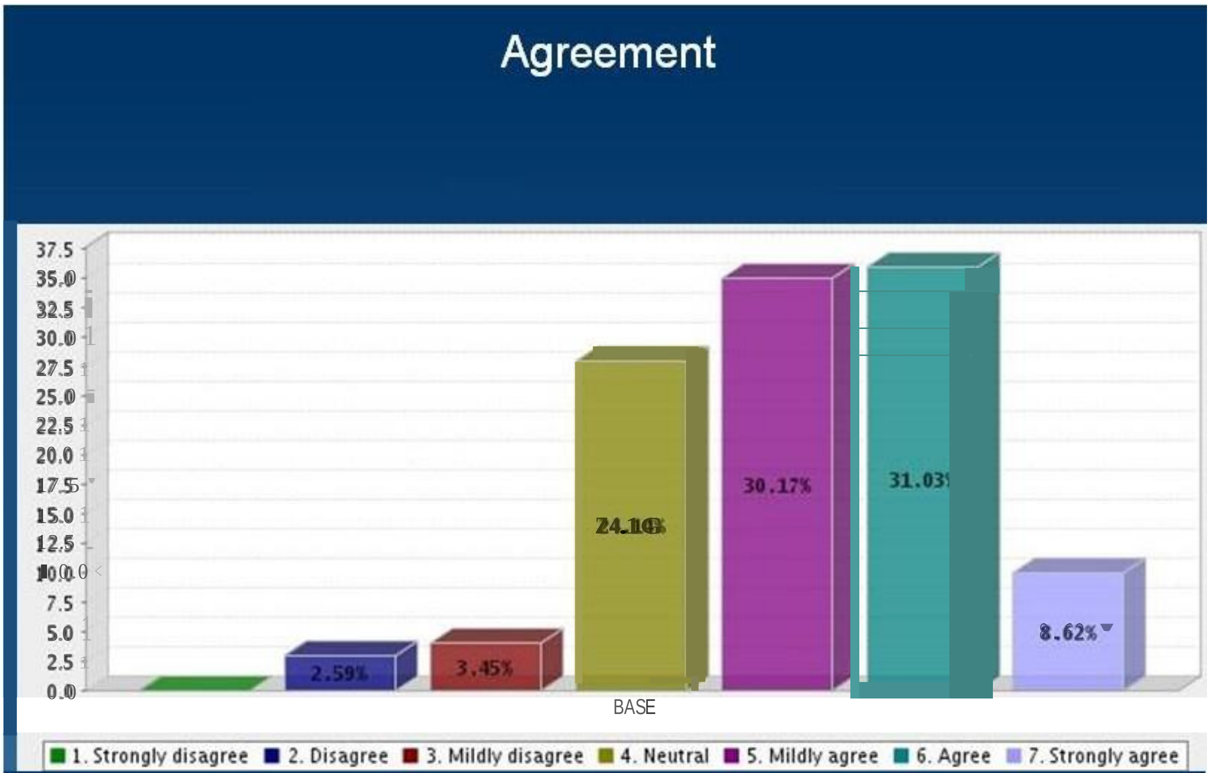


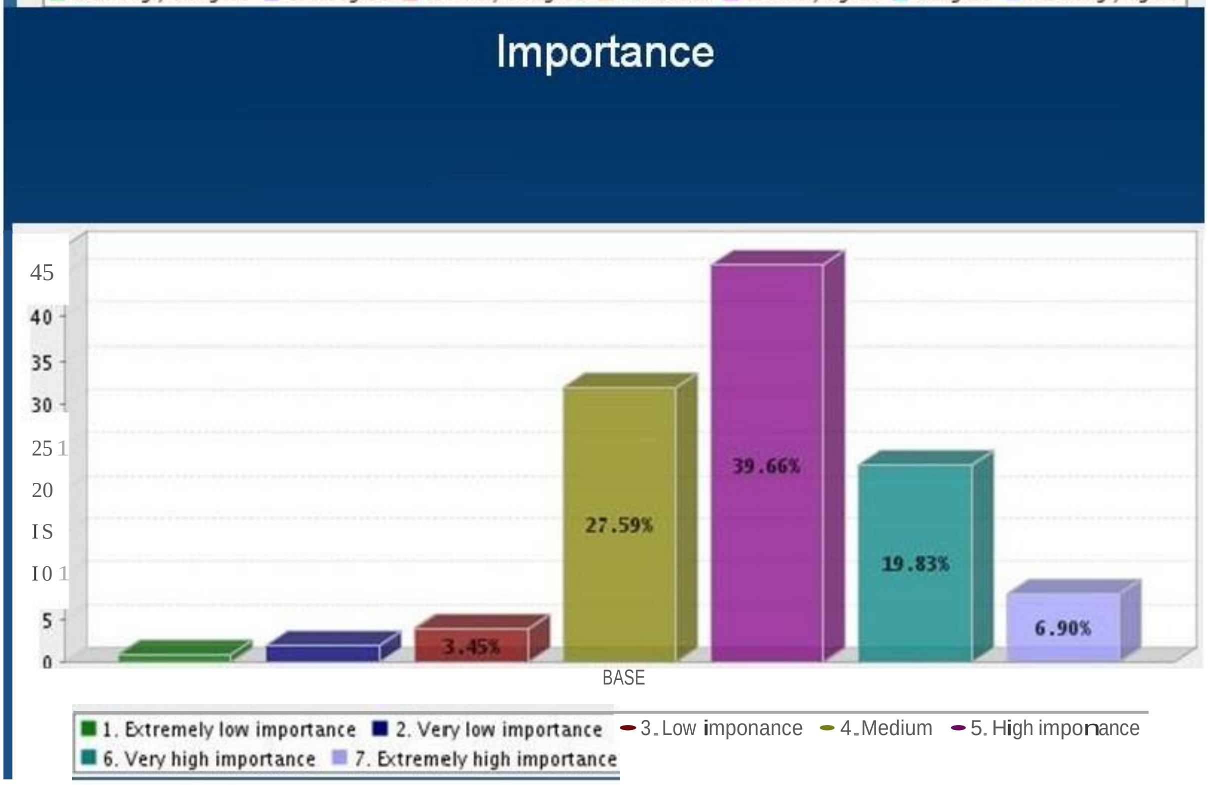
Proposition#23 Third-party consulting organisations are becoming increasingly responsible for handling web-based ERP system implementations, which could make non-web-based ERP vendors lose their influential · over end-users



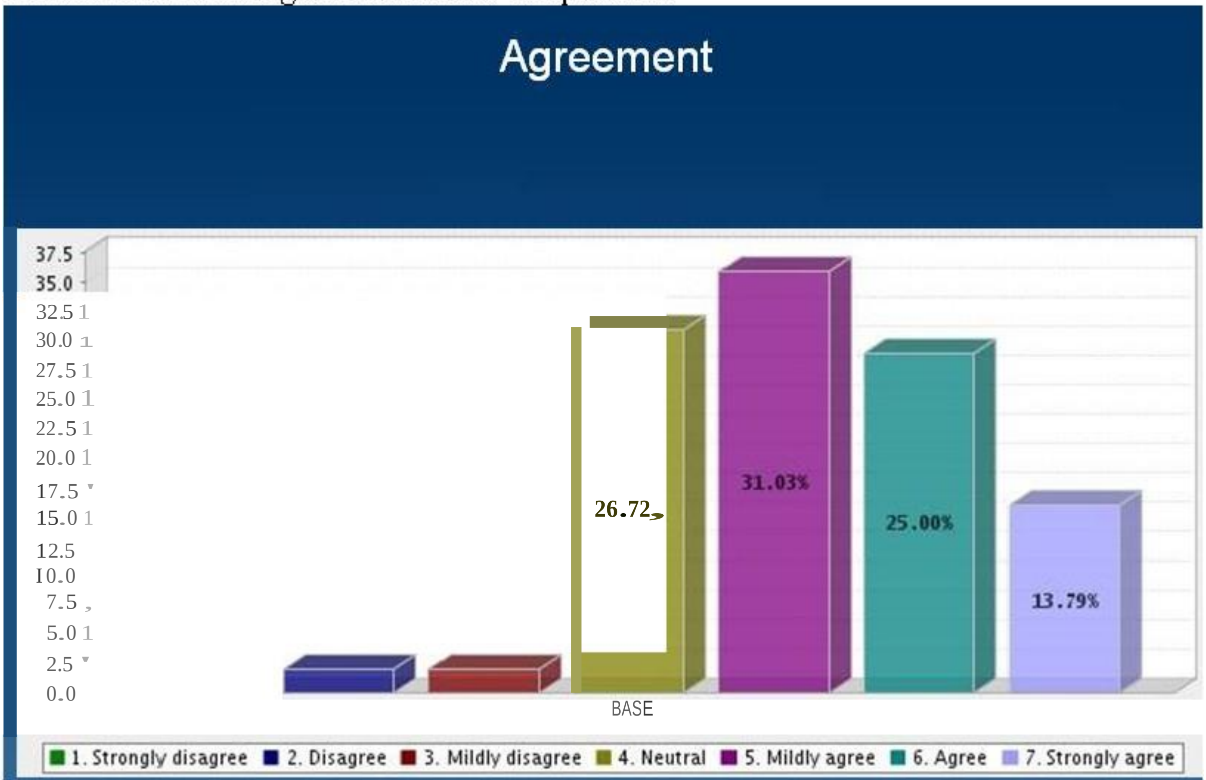


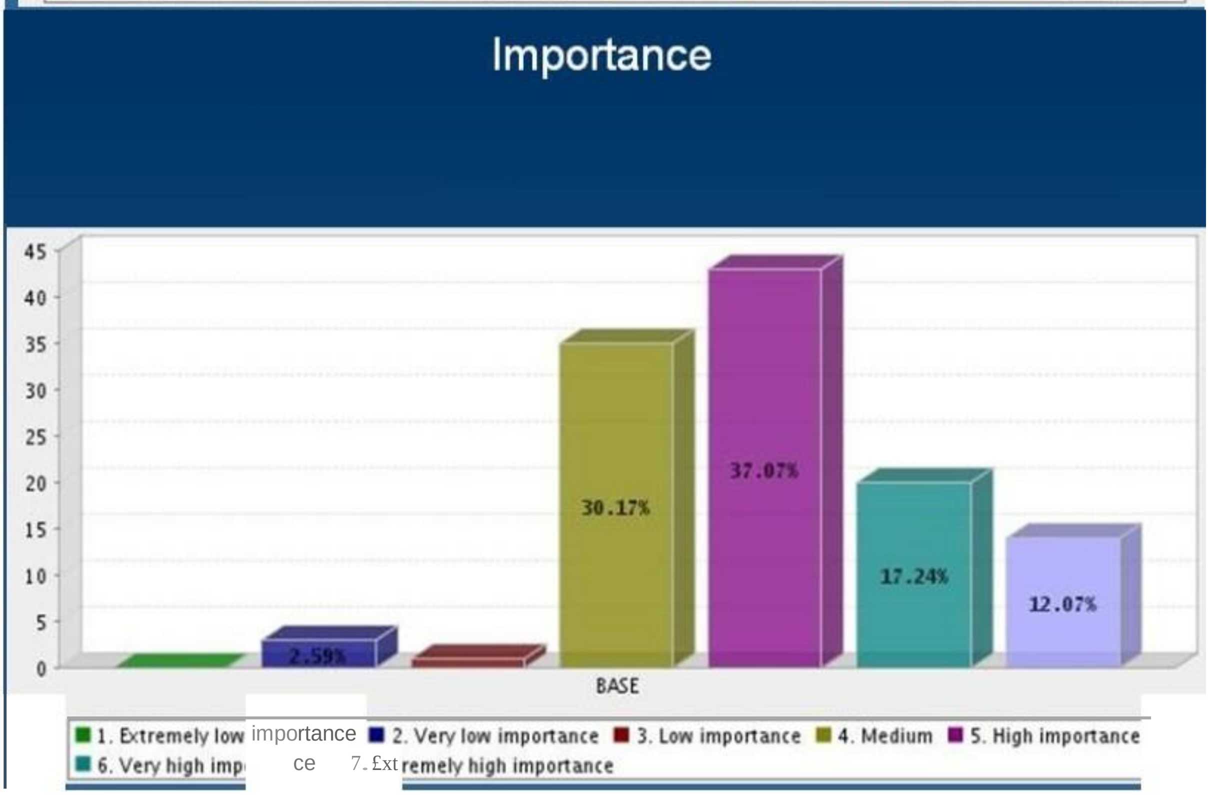
Proposition#24 Inter-organisational collaboration can be facilitated best by integrating 'best of breed' functional modules from different ERP solutions, rather than customising a single 'one-size-fit all' solution



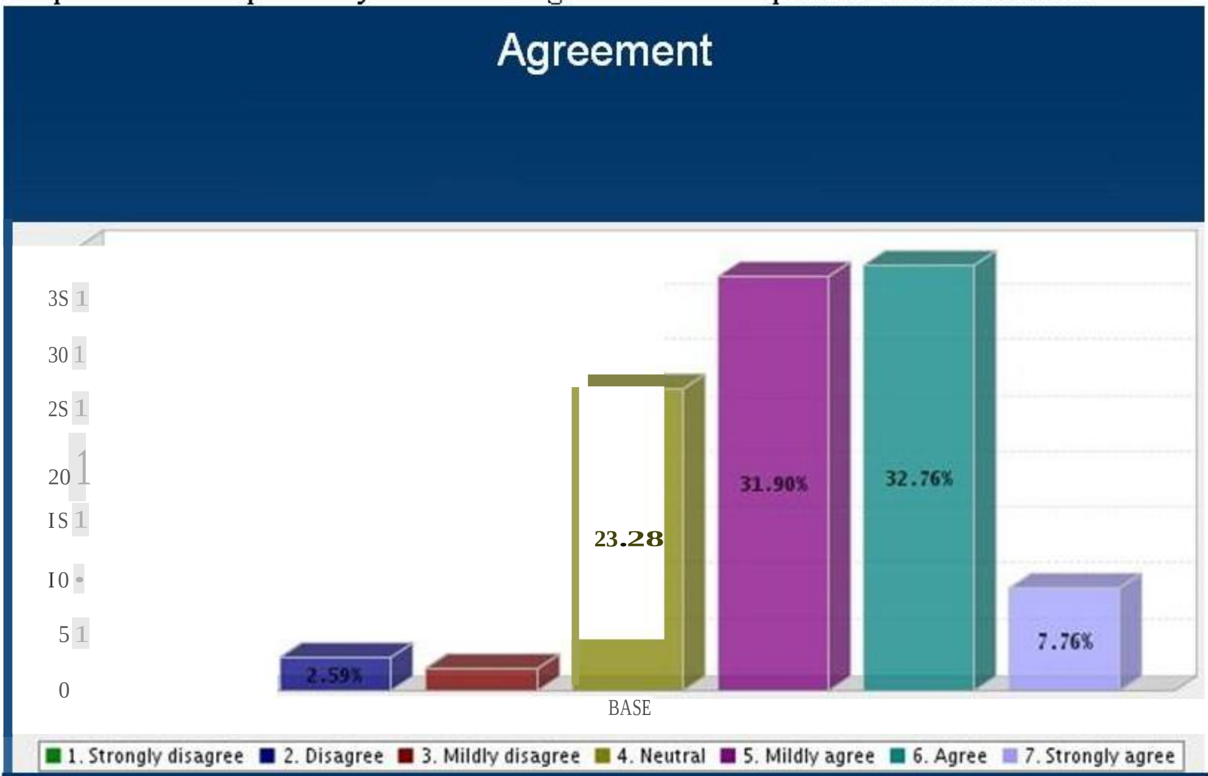


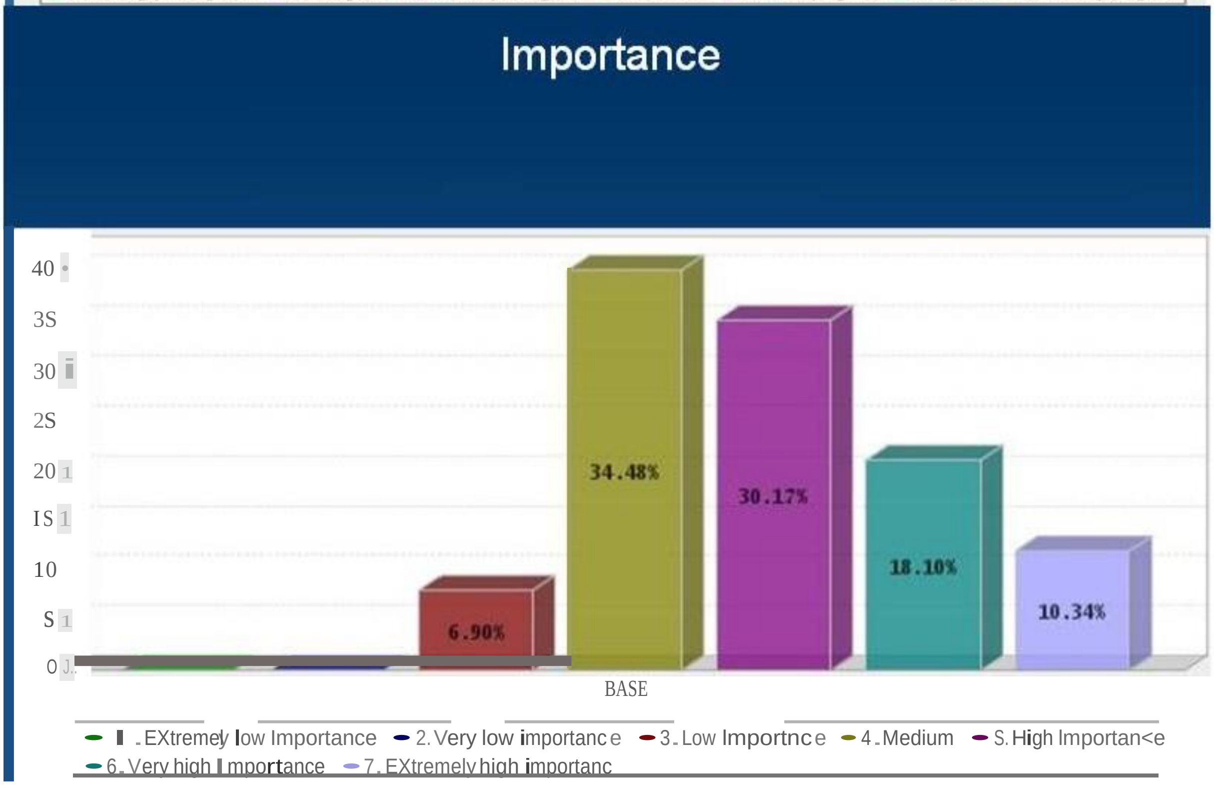
Proposition#25 Initial motives for inter-organisational collaboration are based upon the attractiveness of an organisation's core competences



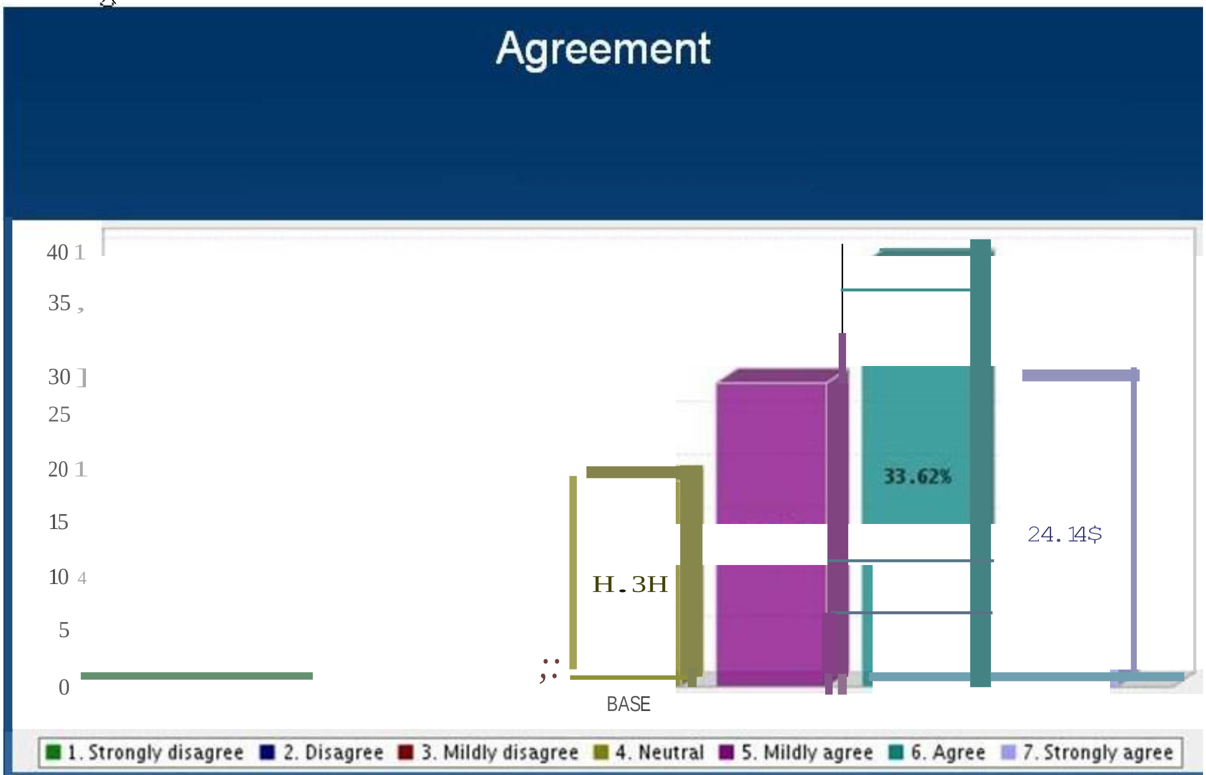


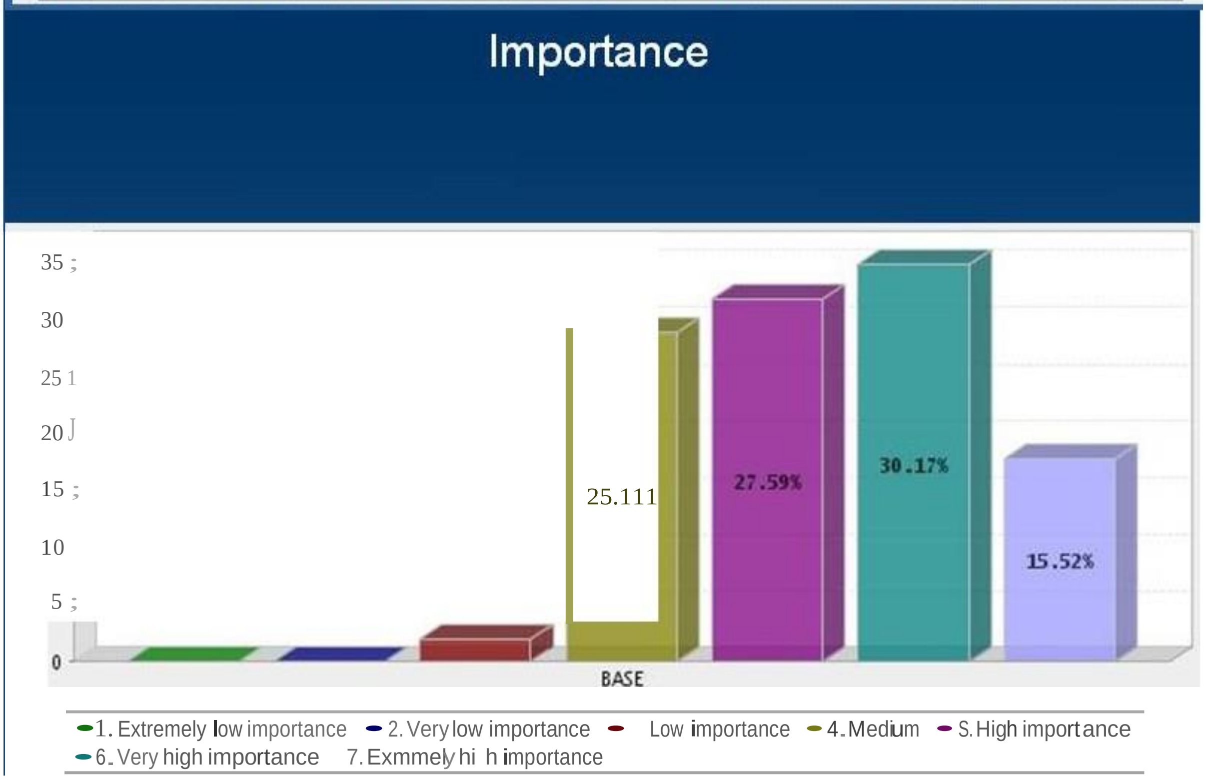
Proposition#26 Collaboration between different organisations can create new meta core COIDPI tetlCIC S and in 'end-to-end' product-service solutions



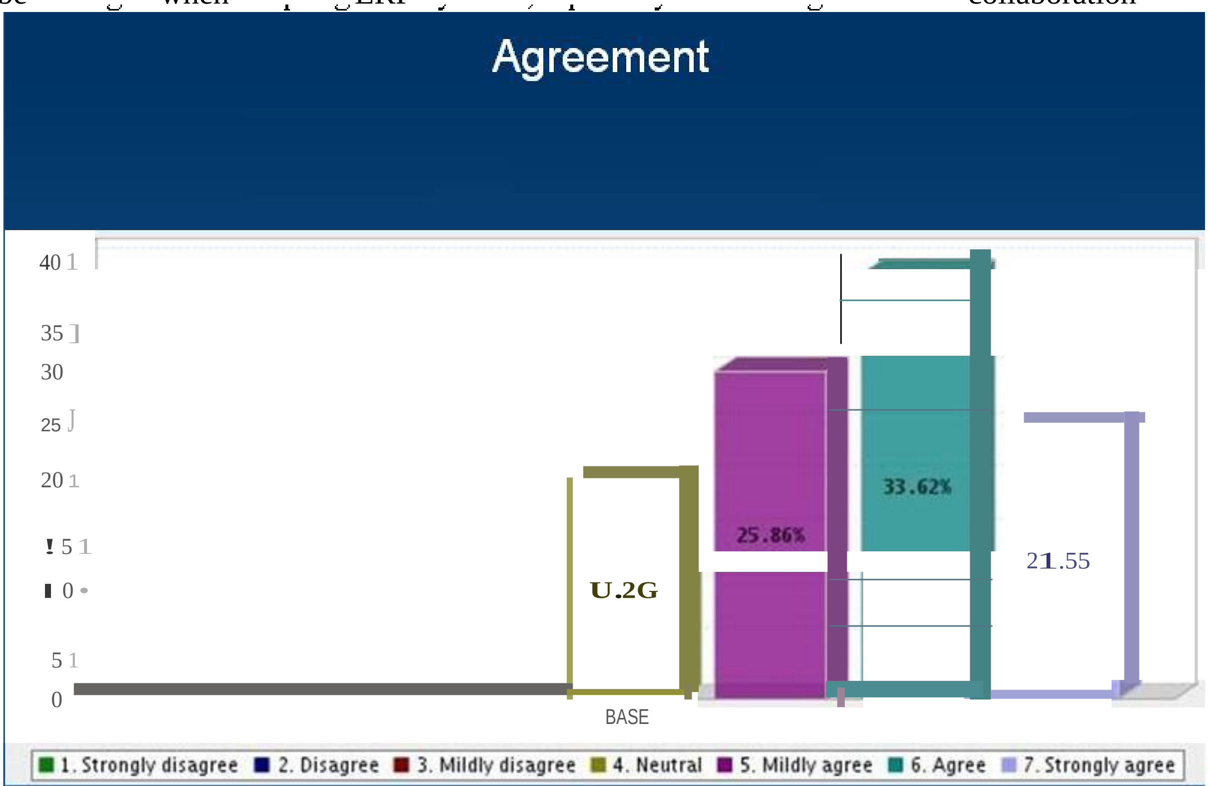


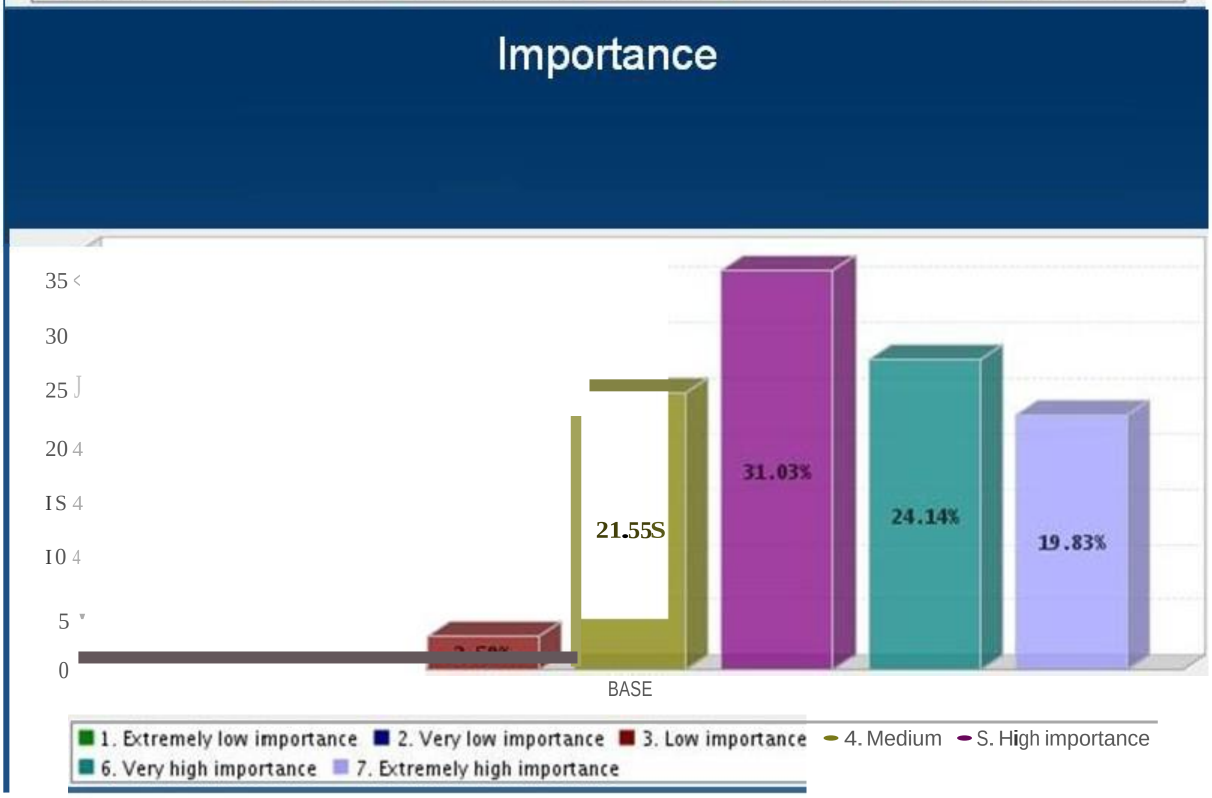
Proposition#27 Building inter-organisational collaboration is an effective way to reduce cost and lead time, increase the efficiency, improve flexibility and reactivity to demand; and en<:ourm;(e innovation



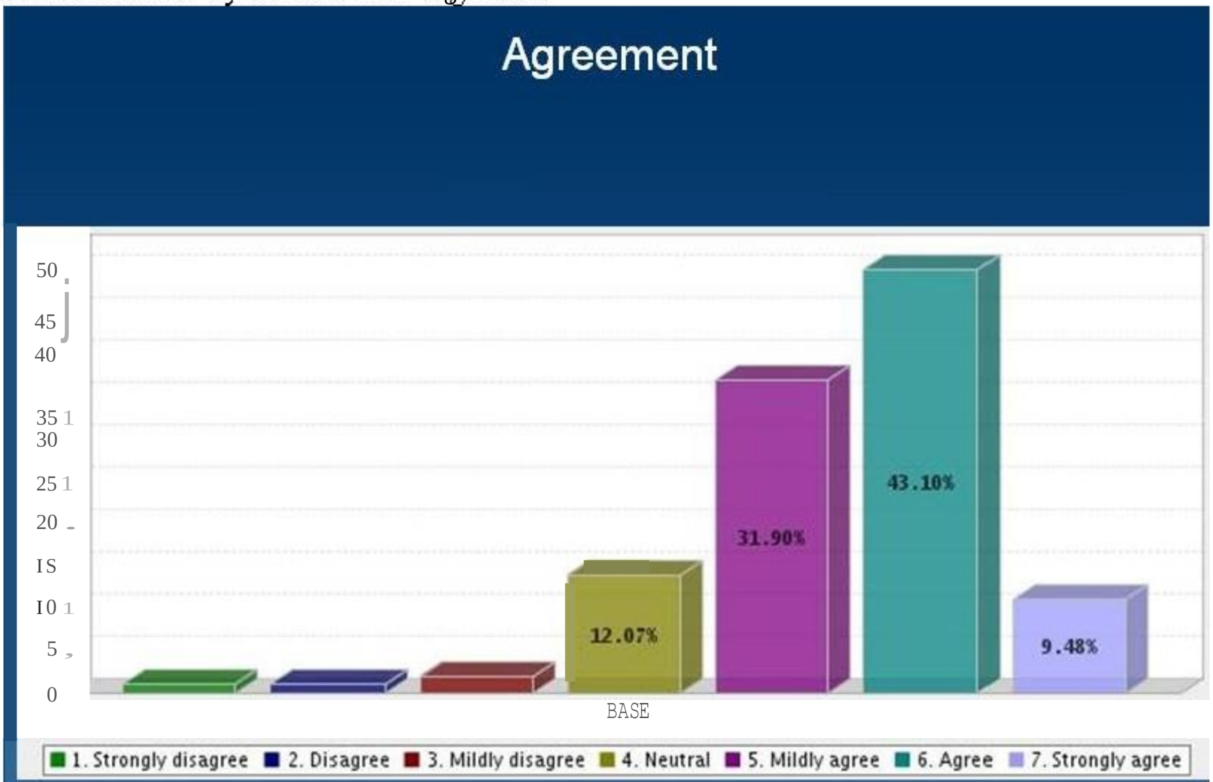


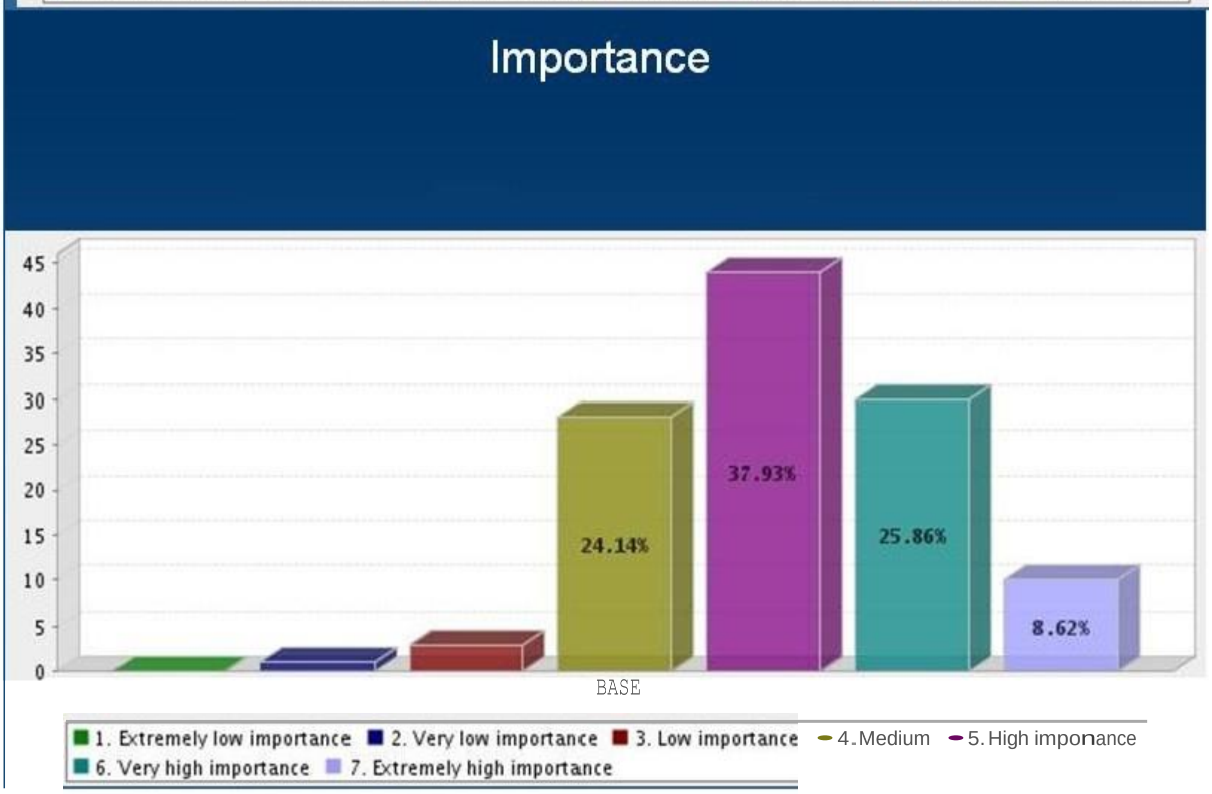
Proposition#28 Organisational cultural diversity, trust issues and resistance to change have to be when ERP collaboration





Proposition#29 Organisational behavior is a key challenge when adopting and managing web-based ERP systems in inter-organisational collaborations



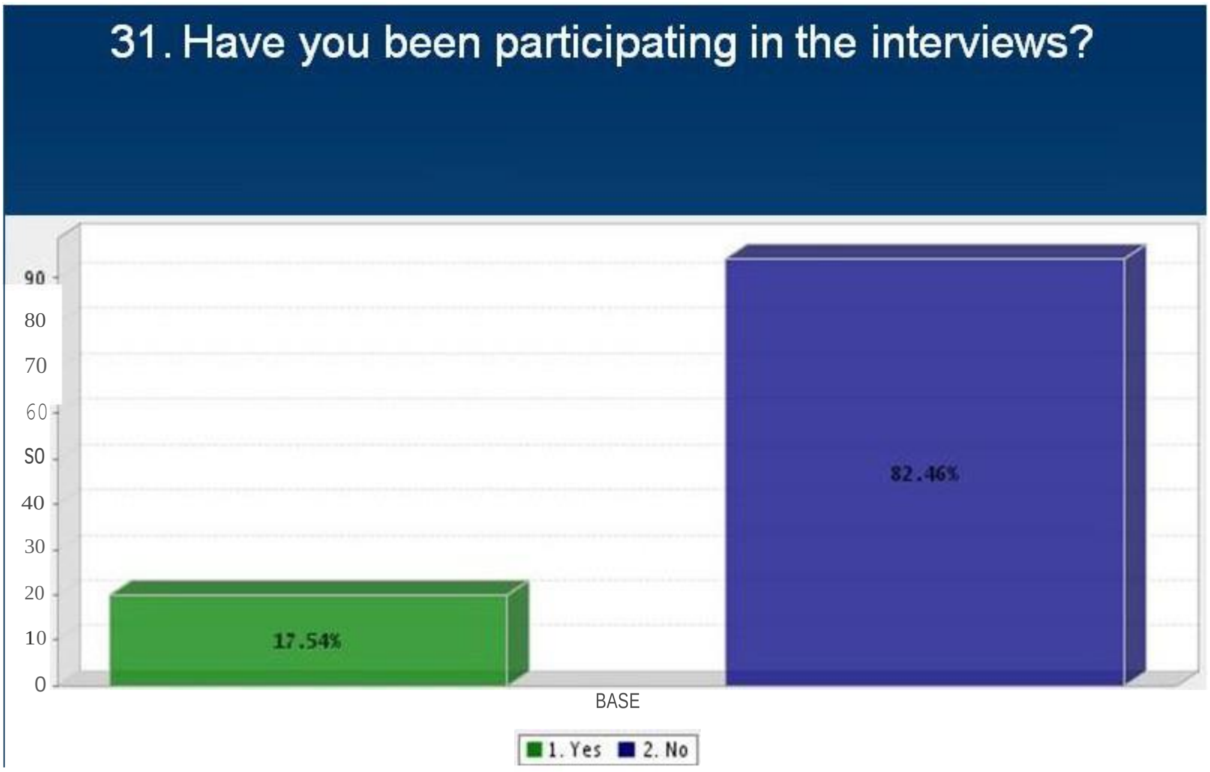


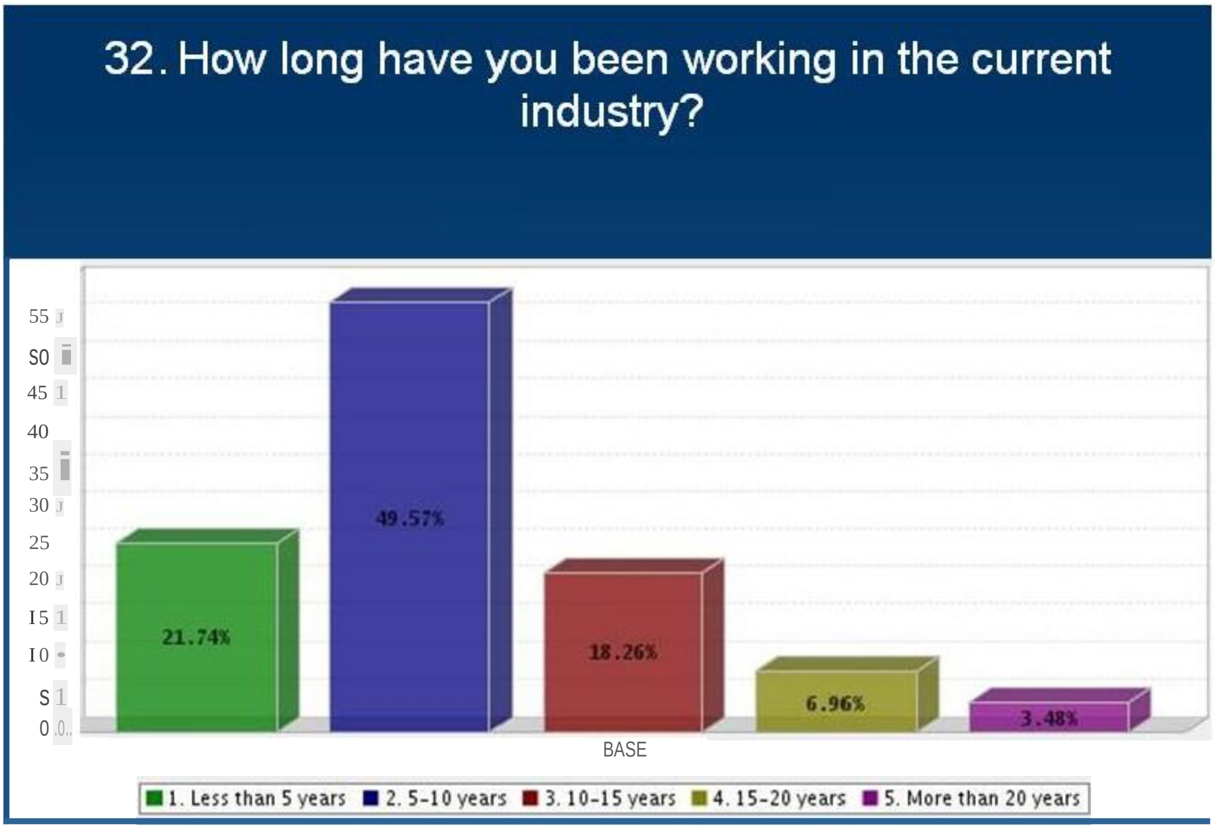
A summary of validated propositions relating to ERP systems and inter-organisational (enterprise) collaborations (N = 116)

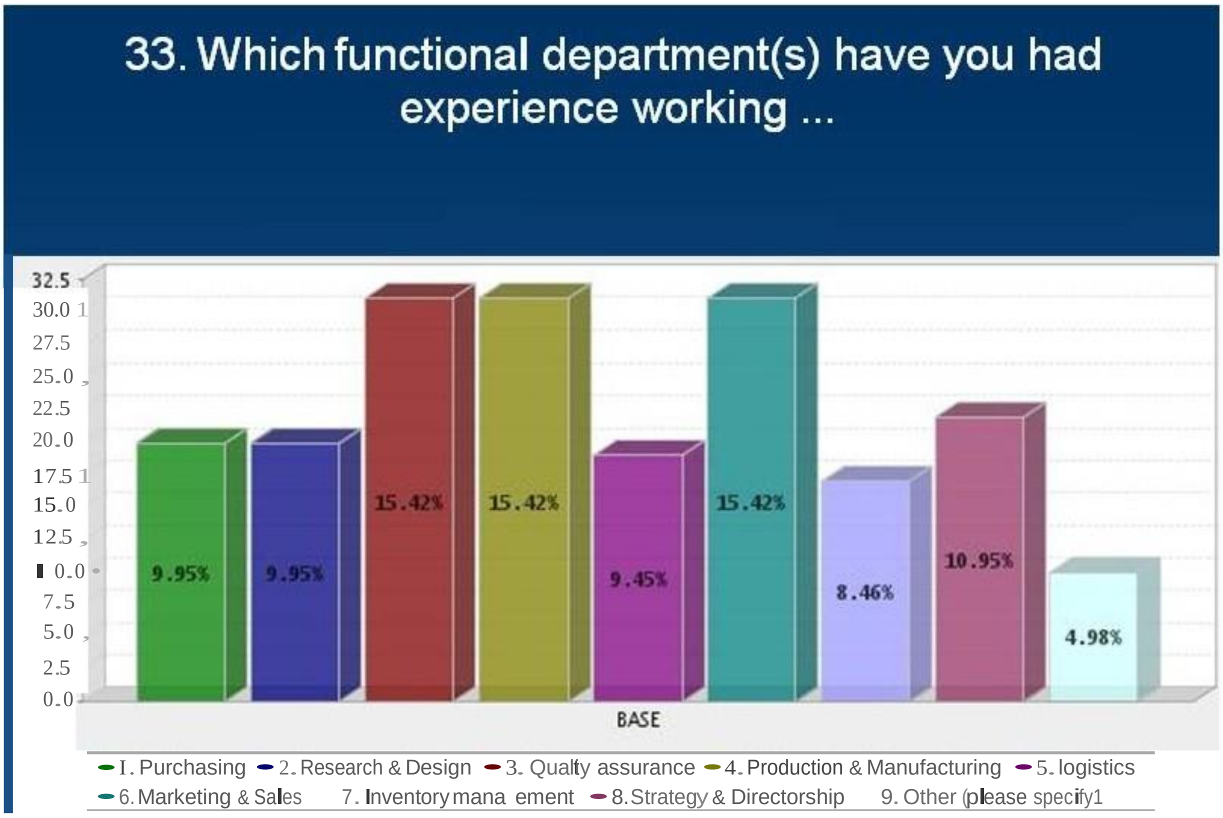
Core category	No.	Propositions relating to ERP systems and inter-organisational collaborations	Mean Agreement	Mean Importance
Inter-firm relationship status quo (Industrial impact)	#1	Change in the manufacturing and service-driven industries is driven by a combination of dynamic globalization, internal organisational issues and general industrial forces	1.76	5.40
	#2	Increasing business complexity, cost-effectiveness and shorter turnaround time requires organisations to move towards more collaborative strategies	1.83	5.45
Inter-firm relationship structure design (Enterprise structure and strategy design)	#3	Inter-organisational relationships change over time, which is dependent upon individual core competencies	1.04	4.89
	#4	Inter-organisational relationships change over time, which is dependent upon the end product or service being delivered	1.39	4.99
	#5	Types of inter-organisational relationships and collaborative practices are determined by an industry-specific context	1.34	4.93
	#6	Service based inter-organisational collaborations have greater propensity to become virtual than product based inter-organisational collaborations	0.60	4.30
	#7	Organisations could use different approaches to inter-organisational collaboration, structure and strategy within different supply networks simultaneously	1.51	5.03
Inter-firm relationship structure management (Enterprise structure and strategy governance)	#8	Responsibilities and functional roles of each different organisation needs to be clearly defined within the supply network	1.99	5.54
	#9	Collaboration with new external organisations requires internal business processes to be reengineered to accommodate new changes	1.38	5.20
	#10	In the context of inter-organisational collaboration, product-based organisations predominantly focus on the portfolio and quality of products, and the standardization of business processes	1.35	4.95
	#11	In the context of inter-organisational collaboration, service-oriented organisations predominantly concentrate on consumers' experiences	1.64	5.32
	#12	There is need for a leader or a 'broker' organisation within the supply network who has core competencies and responsibilities to supervise, evaluate and manage cooperation between other organisations	0.91	4.89
	#13	Organisations are more willing to collaborate with other organisations who have a proven track record of successes in inter-organisational business collaborations	1.79	5.23
	#14	Once organisations obtain a similar set competences at a similar level of maturity as their partner organisations, the partnerships could change as a result	0.98	4.68

Information systems design (Enterprise resource planning systems design)	#15	The role of ERP systems in supporting operational business has evolved from intra-organisational optimisation and integration into multiple inter-organisational collaborations	1.58	4.93
	#16	Future ERP systems should be designed based on web-based technologies by deploying service oriented architectures and cloud computing applications instead of being based on proprietary in-house enterprise information systems	1.47	4.90
	#17	'On-demand' ERP solutions will benefit and enable organisations to access technologies without significant individual investment cost in inter-organisational systems integration	1.24	4.87
	#18	There is a high degree of compatibility between 'cloud-based ERP' and service oriented architectures and hence the two will grow in unison	1.09	4.82
Information systems management (Enterprise resource planning systems management)	#19	Information security and flexibility of ERP systems will be key determinants in their adoption and use in inter-organisational collaborations	1.94	5.62
	#20	Inter-organisational integration requires different organisations within the same collaborative supply network to use ERP system(s)	1.02	4.71
	#21	Inter-organisational integration requires ERP systems within the same collaborative supply network to use the same ERP system to become highly integrated	0.61	4.42
	#22	The tighter inter-organisational collaborative structures and strategies become; the more integrated and flexible ERP systems also need to become	1.33	5.04
	#23	Third-party consulting organisations are becoming increasingly responsible for handling web-based ERP system implementations, which could make non-web-based ERP vendors lose their influential positions over end-users	0.41	4.24
	#24	Inter-organisational collaboration can be facilitated best by integrating 'best of breed' functional modules from different ERP solutions, rather than customising a single 'one-size-fit all' solution	0.66	4.44
Inter-firm relationship contingency (Competence and competitiveness as main contingency factors)	#25	Initial motives for inter-organisational collaboration are based upon the attractiveness of an organisation's core competences	1.37	4.97
	#26	Collaboration between different organisations can create new meta core competencies and specific systems resulting in 'end-to-end' product-service solutions	1.50	4.98
	#27	Building inter-organisational collaboration is an effective way to reduce cost and lead time, increase the efficiency, improve flexibility and reactivity to demand; and encourage innovation	1.77	5.31
Organisational and people issues	#28	Organisational cultural diversity, trust issues and resistance to change have to be managed when adopting	2.00	5.63

(Organisation and people management)		ERP systems, especially in inter-organisational collaboration		
	#29	Organisational behavior is a key challenge when adopting and managing web-based ERP systems in inter-organisational collaborations	1.64	5.26


31. Have you been participating in the interviews?
17.54%
82.46%
BASE
1. Yes
2. No

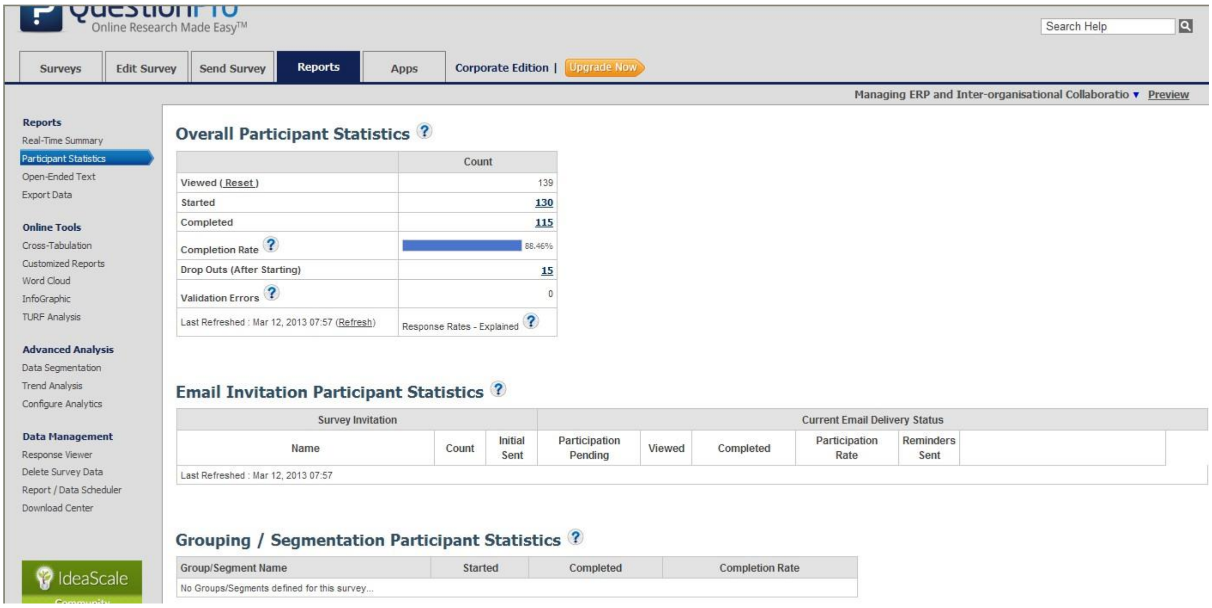

32. How long have you been working in the current industry?
21.74%
49.57%
18.26%
6.96%
3.48%
BASE
1. Less than 5 years
2. 5-10 years
3. 10-15 years
4. 15-20 years
5. More than 20 years


33. Which functional department(s) have you had experience working ...
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
9.95%
9.95%
15.42%
15.42%
9.45%
15.42%
8.46%
10.95%
4.98%
BASE
1. Purchasing
2. Research & Design
3. Quality assurance
4. Production & Manufacturing
5. logistics
6. Marketing & Sales
7. Inventory management
8. Strategy & Directorship
9. Other (please specify)

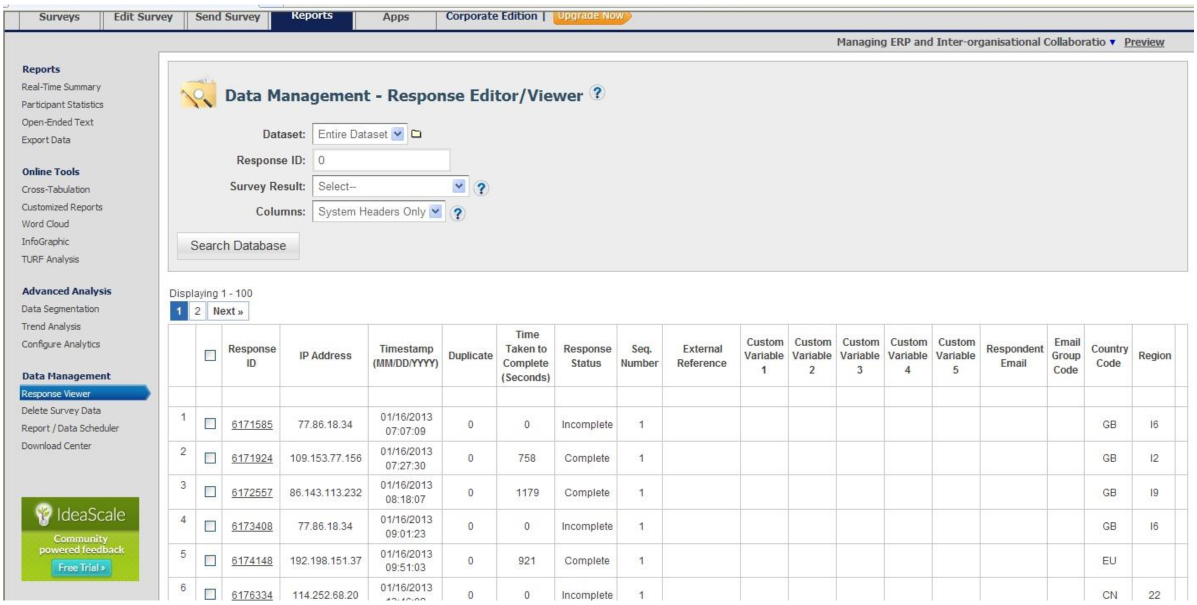

34. What organisational responsibility level do you currently occup...
45
40
35
30
25
20
15
10
5
0
13.91%
22.61%
39.13%
14.71
5.22%
4.35%
BASE
1. Clerk level
2. Junior management level
3. Middle management level
4. Senior management level
5. Top management level & Executive level
6. Other (please specify)

Screenshots of the Survey Statistics Report (an excerpt of additional information)

Real-Time Summary Report



Overall Participant Statistics



Data Management and Response View

S3

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Response ID	IP Address	Timestamp (MM/DD/Y	Duplicate	Time Taken to (	Response Statu	Seq. Number	External Refere	Custom Variabl	Custom Variabl	Custom Variabl	Custom Variabl	Custom Variabl	Respondent En	Email Group Co	Country Code	Region	We present a n	1. Change
6171585	77.86.18.34	01/16/2013 07:07:09	FALSE	0	Incomplete	1									GB	I6		
6171924	109.153.77.156	01/16/2013 07:27:30	FALSE	758	Complete	1									GB	I2		Agree
6172557	86.143.113.232	01/16/2013 08:18:07	FALSE	1179	Complete	1									GB	I9		Agree
6173408	77.86.18.34	01/16/2013 09:01:23	FALSE	0	Incomplete	1									GB	I6		
6174148	192.198.151.37	01/16/2013 09:51:03	FALSE	921	Complete	1									EU			Agree
6176334	114.252.68.20	01/16/2013 13:46:02	FALSE	0	Incomplete	1									CN	22		
6181877	77.86.18.34	01/17/2013 01:41:04	FALSE	329	Complete	1									GB	I6		Agree
6183410	80.169.48.182	01/17/2013 05:06:43	FALSE	267	Complete	1									GB	H9		Agree

Survey Report (a) (spreadsheet screenshots)

A1 Q1

	A	B	C	D	E	F	G	H
1	**Q1**						**Grouping /**	
2	1. Change in the manufacturing and service-driven industries is driven by a combination of dynamic globalization, internal organisational issues and general industrial forces							
3	Agreement							
4	Strongly disagree	0	0.00%					
5	Disagree	1	0.86%					
6	Mildly disagree	6	5.17%					
7	Neutral	16	13.79%					
8	Mildly agree	28	24.14%					
9	Agree	**45**	**38.79%**					
10	Strongly agree	20	17.24%					
11	**Total**	**116**						
12								
13	Mean	5.47						
14	Standard Dev.	1.14						
15	Variance	1.29						
16								
17								
18								
19	**Q2**						**Grouping /**	
20								
21	Importance							
22	Extremely low importance	0	0.00%					
23	Very low importance	0	0.00%					
24	Low importance	9	7.76%					
25	Medium	19	16.38%					
26	High importance	**43**	**37.07%**					
27	Very high importance	34	29.31%					
28	Extremely high importance	11	9.48%					
29	**Total**	**116**						
30								
31	Mean	5.16						
32	Standard Dev.	1.06						
33	Variance	1.13						
34								
35								

Introduction / Overall Statistics / Raw Data / Q1 - Q59 / Q60 / Q61 - Q64

Survey Report (b) (spreadsheet screenshots)

A1 | Open Ended Text Data

	A	B	C
1	**Open Ended Text Data**		
2	**Q64**		
3			
4	30. Any other comments on these propositions:		
5			
6	**No.**	**Response II**	**Data**
7			**30. Any other comments on these propositions:**
8	1	6171924	
9	2	6172557	
10	3	6174148	If you expect modular ERP solutions from different suppliers to work, there needs first to be clear industry standards. Who would drive these and why would ERP companies follow? Rosettanet was not a big success...
11	4	6181877	
12	5	6183410	

Survey Report (c) (spreadsheet screenshots)

A1 | Q59

	A	B	C	D	E	F	G
1	**Q59**						**Grouping /**
2							
3	31. Have you been participating in the interviews?						
4	Yes	20	17.54%				
5	No	**94**	**82.46%**				
6	**Total**	**114**					
7							
8	Mean	1.82					
9	Standard Dev.	0.38					
10	Variance	0.15					
11							
12							
13							
14	**Q60**						**Grouping /**
15							
16	32. How long have you been working in the current industry?						
17	Less than 5 years	25	21.74%				
18	5-10 years	**57**	**49.57%**				
19	10-15 years	21	18.26%				
20	15-20 years	8	6.96%				
21	More than 20 years	4	3.48%				
22	**Total**	**115**					
23							
24	Mean	2.21					
25	Standard Dev.	0.98					
26	Variance	0.96					
27							
28							
29							
30	**Q61**						**Grouping /**
31							
32	33. Which functional department(s) have you had experience working in? (Please tick as many boxes as appropriate)						
33	Purchasing	20	9.95%				
34	Research & Design	20	9.95%				
35	Quality assurance	**31**	**15.42%**				

Introduction / Overall Statistics / Raw Data / Q1 - Q59 / Q60 / Q61 - Q64

Survey Report (d) (spreadsheet screenshots)