DOCTOR OF PHILOSOPHY

Internationalization of small and medium sized UK manufacturing enterprises

technology and knowledge transfer perspective

Oktay Ozdenli

2013

Aston University

INTERNATIONALIZATION OF SMALL AND MEDIUM SIZED UK MANUFACTURING ENTERPRISES: TECHNOLOGY AND KNOWLEDGE TRANSFER PERSPECTIVE

OKTAY OZDENLI

Doctor of Philosophy

ASTON UNVERSITY

May 2013

Aston University

Title:	Internationalisation of Small and Mediums Sized UK Manufacturing Enterprises: Technology and Knowledge Transfer Perspective
Submitted by:	Oktay Ozdenli
Degree:	Doctor of Philosophy
Year of Submission:	2012

Abstract

This dissertation examines internationalisation of small and medium sized enterprises. There has been a journey to achieve this. The research has started as an action research as Teaching Company Scheme Associate. This has been done in two research cycles, which investigated factors for successful internationalisation of a small and medium sized UK manufacturing enterprise. This has revealed that successful internationalisation requires good technology and knowledge transfer to the new operations. The action research is followed by a survey that has been conducted within UK manufacturing companies. The data collected was analysed under three models: entry mode selection, role of factory and level of internationalisation. The first two models explain two major aspects of internationalisation decision. The last is showing what makes successful internationalising small and medium sized companies. These models provided several important results. The small and medium sized enterprise internationalisation is harder to achieve because most of these organisations do not have experience in technology and knowledge transfer. The success of internationalisation depends on the success of the transfer. This is achieved through employee ownership of the new knowledge. There are many factors affecting this result such as the network relationships such as trust, control and commitment and cognitive distance between two organisations. The last is a product of the difference between prior knowledge and the required level of knowledge. The entry mode and role of factory are decided through these factors while the level of internationalisation can only be explained by absorptive capacity of the recipient organisation and the technology transfer ability of the host organisation.

Keywords: SME Internationalisation, Absorptive Capacity, Technology Transfer Ability, Institutionalisation of New Knowledge, Network Relationships

Dedication

I dedicate this thesis to my parents who dedicated their life to provide me a good education. To my wife’s late mother and my wife who helped and supported me in my hardest days when without her support I would never have completed this thesis and all those beloved relatives that are not with us but have shaped generations of people that provide us who we are now.

Acknowledgements

I wish to pay gratitude to those people, without their continual support, invaluable advice and their patience, this thesis will never be brought to a successful completion.

1. My foremost gratefulness is for my supervisors Dr. Breno Nunes and Prof. David Bennett without their expertise, assistance, support and commitment it would be impossible to complete this thesis.
2. The owner and managing director of Sturge Industries Ltd, Paul Cox, and his employees have great patience with me day after day with my never-ending intriguing questions. Their support, encouragement and valuable knowledge helped me to complete this thesis.
3. Prof. Stephen Roper who has given me advises on questionnaire design and execution.
4. The doctoral office in Aston Business School as well as my colleagues and friends who have created an excellent environment for research.
5. My wife, Banu Bozkurt Ozdenli, for her patience with my stress and support in my hardest days within a very long period of time.
6. My parents who have continually put positive pressure on me to complete this thesis.
7. Jinny Hayman whose proof read this thesis for her hard work in a very short period of time.

Table of Contents

Volume 2

Appendices

List of Figures | Page

1 Introduction

1.1 Introduction to the thesis

The chapter will explain the context and background of the research. It will also present the research questions and set the boundaries of the investigation. Through explaining the context, a research aim and its three objectives will be obtained. These will be explained in detail with reference to the relevant assumptions of the research. At the end of this chapter, an introduction to the upcoming chapters will be given.

This thesis investigates the internationalization of small and medium-sized enterprises (SMEs) based in manufacturing in the UK. The managing director is usually the decision maker in such companies, and is expected to make three decisions on setting up a new, international manufacturing facility. The first decision is the location of the new manufacturing facility; the second is the role of the factory within the network of factories currently owned, including what will be manufactured in this new manufacturing location. The motivation for the internationalization decision partly determines what will be manufactured in the location. The third – and most important decision – is the mode of entry for the new facility. There are many forms of entry that the manager can choose from, but the one selected must ensure the least risk for the company. This dissertation tries to explain how a manager should make such a decision in terms of entry mode and the role of the factory. It also investigates what makes successful international SMEs.

1.2 Research background

Globalization has resulted in the decline of manufacturing in developed countries in the last 30 years. This has been highly significant in the UK economy[1]

The decline appears even more severe when the manufacturing output is compared within these developed countries: the US has increased their manufacturing output over the years; however the UK output has stayed at the same level during the same period. This shows that there has been a significant amount of decline against other leading manufacturing countries. The manufacturing sector in most developed countries has to compete against many developing-country rivals within one or more of the generic strategies (Porter, 1980), or the order-winning and qualifying criteria (Berry, Hill and Klompmaker, 1999; Slack, Chambers and Johnston, 2010).

Companies that have traditionally competed on cost and other forms of competitiveness, such as quality, dependability, flexibility and innovation, have found that the rising costs of manufacturing in developed countries are forcing them to choose either to liquidate or change their manufacturing locations. This has been achieved through many different arrangements. Most of the literature on internationalization to date has looked at multinationals or large companies (Dunning, 1988, 1993, 2001; Johanson and Vahlne 1990; Johanson and Mattson, 1988; Buckley and Ghauri, 1993); however, there are similar trends for SMEs. The main reason for the similarities between large companies and SMEs is not that they are alike per se, but that they both operate in – and are therefore affected by – the same environment. This environment contains economic, political, legal and social factors that affect the behaviour of firms (Porter, 1988).

---

[1] Source: http://lincicome.blogspot.co.uk/2011/02/american-manufacturing-decline.html

SMEs make up 99.8% of the UK economy, with small enterprises accounting for 99.2% of this. This 99.8% provides 59.1% of employment and 48.7% of private turnover in the UK[2] (Department of Business Innovation and Skills, 2010), and nearly 30% of these SMEs are from the manufacturing sector (Department of Business Innovation and Skills, 2010). These enterprises mostly compete in international markets.

In the UK, 18% of the GDP is created by the manufacturing sector, and this sector has seen a steady decline in the UK in recent years, according to DBIS (DBIS, 2009). In a DTI publication on the future of manufacturing in the UK, it was envisaged that manufacturing is moving to lower-cost countries (Department of Business Innovation and Skills, 2009), which could explain this downward trend. The DBIS propose that the UK economy is moving to higher-value-added manufacturing, based on research and development (PricewaterhouseCoopers, 2009). The remainder of manufacturing companies, which do not fit into this description, are threatened by two environmental forces; these are trade liberalization and increases in manufacturing from low-cost countries. The total decline has been about 41%, from 1981 to today.

SMEs in the UK are already highly international, as most export, and are indeed export reliant (Department of Business Innovation and Skills, 2010). However, global competition will eventually force UK SMEs to consider equity-based internationalization. This will cause the UK economy to lose the employment power of traditional manufacturing, but the revenue of these companies will continue through equity-based internationalization (PricewaterhouseCoopers, 2009). This has also been the case for other developed countries in Europe, however they have a different advantage compared to the UK – for instance, many German SMEs have moved to other developing countries within the European Union (EU) (European Commission

[2] http://webarchive.nationalarchives.gov.uk/+/http://stats.bis.gov.uk/ed/sme/

Enterprise and Industry, 2011). A report published by the European Commission on Enterprise and Industry suggests that there are 1.6 million SMEs in Germany, which accounts for 99.5% of its companies, 60.1% of its employment and 53.2% of its economic value added. Every year, 1.8% of these SMEs – equating to 30,000 businesses – move from Germany to other developing EU countries, while the average relative figure for Europe is about 2.9%. Another statistic from the European Commission's report shows that the decline in manufacturing sectors in developed EU countries is not based on bankruptcies, since only 12% of the decline can be accounted for by total closure of the business. An increase in the service sector can also be partially explained by the movement of manufacturing from these developed countries to other developing countries within and outside the EU.

The success of developed countries in Europe is partially affected by the success of their companies that manufacture abroad. Although these companies do not pay taxes within the developed country, through their ownership structure they do provide wealth to the nations that their revenues have been generated from. The literature on internationalization and international management aims to explain the success of multinationals, however the same knowledge is lacking for SMEs. Dunning (2001) proposes that the internationalization process of companies can be analysed according to three steps – ownership, location and internalization – while Johanson and Vahlne (1977, 1990) predict that foreign market knowledge determines the speed of internationalization and entry mode. These authors try to explain internationalization primarily with reference to the entry mode, though Dunning (2001) also partially relates it to location advantages.

SMEs do have some inherent differences compared to large organizations. Thus, We cannot treat them like large organizations, but rather must consider the fact that they have their own structures and development trajectories. The success of SMEs in terms of internationalization would differ compared to that of large organizations. SMEs have to make decisions that will take them from their home countries to foreign ones. The export behaviour of SMEs has been studied in some detail (Calof and Beamish, 1995; Lehtinen and Pentinen, 1999; Li and Cavusgil, 1995; Winch and Bianchi, 2006), however their foreign direct investment, which has led to SMEs having multiple operations (manufacturing facilities) in many countries, still requires a great deal of investigation. The risks for SMEs in internationalization are higher than those facing larger organizations; failure of internationalization may also lead to SMEs having problems within their domestic operations and markets. Thus, this dissertation aims to investigate what makes SMEs successful in terms of foreign direct investment.

Manufacturing SMEs deal with many different problems, including loss of competitiveness to companies in developing countries. Those SMEs who are successful and growing will definitely achieve greater exposure to international markets – for most, this will be through exporting. The export markets for developing SMEs means more competition within international markets. The limited but growing number of SMEs enter into equity-based internationalization modes with the hope that they can regain some of the advantages that are lost or being lost to foreign competitors. The success of these ventures will determine the wellbeing and survival of the organization.

1.3 Research aim and objectives

This thesis aims to understand how SME managers can make successful (equity-based) internationalization decisions. The questions that will be asked relate to what provides success in equity-based internationalization. Success is defined as achieving expected returns from the investment, since it is assumed that SMEs invest in order to achieve a return and rent. This achievement is a matter of managerial perception, but achieving it can be subject to certain common obstacles that have yet to be investigated by prior studies.

The thesis is based on another assumption that runs throughout the research: that internationalization has come about as a result of many different decisions. The SME manager should make decisions about:

1. Location: where they will internationalize to.
2. Entry mode: how they will internationalize.
3. Role of the new operation: what will be the significance of the new operation based on the manager's motivation to internationalize, and the capabilities of the new subsidiary.

This research aims to investigate the last two of these decisions, since the location decision has already been studied extensively, and it is assumed that managers will choose the most economical or suitable location. The next question for the decision maker is what the entry mode should be for this location. Usually, the answer to this is very straightforward; however, it may require significant investment and even risks, since an entry mode that has less commitment than required may mean failure. The decision maker may need to consider several locations and find the least risky entry mode required for the SME. This risk reduction strategy is needed to secure the success of the decision. The role of the decision maker is also an important part of the decision making. It may affect the success of internationalization through a role that is unrealistic, leading to non-realization of the expected returns and, hence, the failure of the internationalization decision. The right role given to the foreign manufacturing operation will lead to a realization of the benefits of internationalization, through the right perceptions about the expected returns.

SME managers have to make decisions that reduce risk. The research objectives set forth to investigate these are:

1. What factors provide the least risk in relation to entry mode decision?
2. What factors provide the least risk in the role of foreign manufacturing internationalization decision?
3. What factors provide high levels of success in international manufacturing decisions?

These research objectives provide the best decision-making procedure for SME managers, which should ensure the reduction of risk relating to internationalization, and hence increase the chances of success.

1.4 Structure of the thesis

This thesis is divided into seven chapters. The first (present) chapter explains the background and context of the research, while outlining the research objectives of the thesis.

The next chapter will consider the existing literature in this field. The first part of Chapter 2 explains the theories on internationalization, which include economic theories, learning theories, network theories, innovation theories and resource-based theories. The internationalization literature in operations management is then explained. A description of global/international manufacturing networks and their importance follows, and the knowledge presented will try to explain internationalization in general. The next section specifically discusses the internationalization of SMEs, and an explanation will then be given of the related technology and knowledge transfer processes, with particular importance given to absorptive capacity. The last section of the chapter concludes with a description of the competitive advantages that can be gained from operations such as quality, flexibility, cost and delivery, since these help to underpin the knowledge required for the accumulation of absorptive capacity.

Chapter 3 explains the methodology used in this thesis. The chapter starts by explaining what mixed methodology is, with reference to the general literature on the subject, followed by an outline of the mixed methodology research design. A justification for using a mixed methodology approach in this thesis is then given. The next section explains one of the research methodologies – action research – used. This is explained with reference to the literature, and is followed by a description of the research design. The second research methodology used within the mixed methodology is surveys. This is explored, and is again followed by a description of the research design used within this thesis. Particular importance has been paid to the validity and reliability of mixed methodology, action research and survey methodologies.

Chapter 4 describes the action research, which is the first method used of the mixed methodology approach. This first method provides insights into the second method, which is surveys. This chapter has two important parts that have very similar structures – i.e. the cycles of the action research. Both of these cycles start and end with similar parts. For each, an explanation is give of the context of the cycle, the action research question, the participants, the researcher’s concerns, the data collection and analysis process, observations, and the researcher’s reflections. The difference between cycles is that the first aims to provide a solution to the problem, while the second tries to solve the problems that occurred during the first cycle. The action research aims to learn from the implementation or solution of a problem. The problems encountered are then listed as reflections later in the research, and are evaluated against the literature studied in Chapter 2.

Chapter 5 is the survey analysis chapter. This chapter starts by explaining the differences, and respective advantages and disadvantages, of variance- and covariance-based structural equation modelling. Indicator coding follows this. The constructs are defined previously in Chapter 3, in the survey research design section. After outlining the indicator coding, three models are evaluated, along with their measurement and path models. These three models are: entry mode selection, role of foreign factory and level of internationalization. The last section of this chapter provides a summary of the findings from the models. The validity and reliability of the findings are discussed within the measurement and path models of each model discussed.

Chapter 6 is the discussion chapter. This chapter starts with a list of findings from the action research. These are then evaluated for validity and reliability. The next section looks at the findings from the survey research, and discusses these with reference to the literature studied in Chapter 2. These findings are then put together to give a managerial decision-making model for internationalization. This is followed by a description of the theoretical and managerial implications, which also explain the contributions of this thesis to the theoretical realm. The last section of this chapter looks at the validity and reliability of the mixed methodology, and the triangulation that has been achieved by mixing different methodologies.

Chapter 7, which is the final chapter of this thesis, explains the conclusions drawn from the findings and discussions detailed in the previous chapters. These conclusions are used to show how the objectives set in the first chapter are met. The last two sections of this thesis outline the study's managerial and theoretical limitations, which form the basis for future research.

1.5 Chapter summary

This chapter has explained the context of the research and outlined the research aim and three objectives. The research aim is to understand how SME managers make successful internationalization decisions. The objectives divide internationalization decisions into three elements, and ask how managers can reduce risk within each of these three elements. The rest of the chapter explained what can be expected from the upcoming chapters.

2 Literature Review

2.1 Introduction

This chapter aims to provide the background knowledge on SME internationalization and justify the research gap, and hence the need for research. The first section will look at SME internationalization and explore the research gap. This will be followed by theories of internationalization, which are presented according to their operational management equivalents and their implications for SME internationalization. The reason why these theories are presented after the SME internationalization section is that there is a need to explore the theories of internationalization literature, as well as to see whether these theories make any contributions to the SME internationalization literature. The next section is the technology and knowledge transfer section, which explains how these internationalizing companies achieve foreign manufacturing in another location. This is important for this thesis because it helps us to understand the implementation of the internationalization decision. The last section of this thesis looks at the performance objectives as a source of manufacturing capability that can be transferred. These capabilities are representations of knowledge within the company, which will eventually be fully or partially transferred to a new location or partner. This thesis takes this knowledge as a source of absorptive capacity and technology transfer ability.

2.2 SME internationalization

The research objective of this thesis is to investigate the internationalization of SMEs. This section explains the literature on SME internationalization and demonstrates the research gap in preparation for this study.

Gjellerup (2000) illustrates that more and more SMEs are setting up activities beyond national borders. This can provide growth opportunities for such SMEs. However, Gjellerup (2000) does not go further, but instead looks at the support services for the internationalization activities. De Maeseneire and Claeys (2011) found that SME internationalization is different from that of large organizations, because of financial constraints. Most SMEs need financing from banks to internationalize, and find it harder to get financed compared to larger organizations, due to the way in which banks evaluate financial projects. Tang (2011) stated that resource scarcity is a major barrier, and listed these as the availability of foreign market information, experiential knowledge, foreign business contacts and localized sales and distribution channels.

Research in international business to date has focused on the incremental nature of SME internationalization. Learning theories of internationalization (Johanson and Vahlne, 1990) have been applied to SMEs; for instance, Johanson and Vahlne's (1977) study consists of SMEs as well as larger companies. Their findings explain the importance of learning market-specific knowledge prior to internationalization. Economic theories of internationalization are all relevant to large corporations. The eclectic paradigm may be useful to explain international production of multinational enterprises, but its lack of focus on behavioural aspects of internationalization fails to account for the importance of risk, knowledge and resources. Ruzzier, Hisrich and Antoncic (2006) compared all the relevant theories that have explained SME internationalization (Table 2.1).

All of the studies in Table 2.1 have been explained in learning theories of internationalization. Most are based on what international business scholars call the "Nordic school" of international business. The common characteristics of the learning school (Nordic school of international business) include the incremental nature of internationalization. The reason behind internationalization is the need to obtain experiential knowledge.

Welch and Luostarinen (1993) explored the Uppsala school of internationalization for SMEs. Companies will internationalize to markets that are psychically close to the home country. They build more knowledge about the market with the intention that they can increase their degree of internationalization through committing more to that market. Calof and Beamish (1995) observed that, at some point, companies might reverse their commitment to international markets, due to benefits not materializing. Johanson and Mattsson (1993) viewed the internationalization of SMEs from a network perspective: most studies on network perspective or theory internationalization, including Johanson and Mattsson's (1988, 1993), focus on network structure, but Kenny and Fahy (2011) addressed the importance of network resources as well as network structures. Network resources, which are mostly related to human capital, yield positive results in international performance.

Table 2.1 Internationalization of SMEs classified by their focus and research approach *(adapted from Ruzzier, Hisrich and Antoncic, 2006)*

Author	Definition	Focus
Welch and Loustrainen (1993)	Internationalization is the outward movement of a firm's international operations	Process, firm's operations
Calof and Beamish (1995)	Internationalization is the process of increasing involvement in international operations	Process, firm's operations
Johanson and Mattson (1993)	Internationalization is the process of adapting a firm's operations (strategy, structure, resources, etc.) to international environments	Process, firm's operations
Johanson and Vahlne (1990)	Internationalization is a cumulative process in which relationships are continually established, developed, maintained and dissolved in order to achieve the firm's objectives	Relationships, process
Lehtinen and Penttinen (1999)	Internationalization includes developing networks of business relationships in other countries through extension, penetration and integration	Networks, relationships
Lehtinen and Penttinen (1999)	Internationalization concerns the relationships between the firm and its international environment, derives its origin from the development and utilization process of the personnel's cognitive and attitudinal readiness, and is concretely manifested in the development and utilization process of different international activities, primarily inward, outward and cooperative operations	Relationships; firm's operations; process; international environment
Ahokangas (1998)	Internationalization is the process of mobilizing, accumulating and developing resource stocks for international activity	Resources, process

The international firm should establish, maintain and re-establish relationships so that knowledge will grow. In return, knowledge will lead to increased commitment to international operations. Johanson and Vahlne (1990) developed a similar process wherein companies foster relationships through extension, penetration and integration. Lehtinen and Penttinen (1999) dealt with two important concepts: market orientation and market commitment. Market orientation is closely linked to psychic distance. Kontinen and Ojala (2010) recognized the importance of psychic distance. They conducted multiple case study research to analyse internationalization of Finnish, family-owned SMEs entering the French market. The key determinant for the success of internationalization was psychic distance. The companies used indirect methods of entry first, and lowered their psychic distance by recruiting local, skilled employees, and learning about the local language and culture. Their study therefore focused on the resources needed to internationalize. Ahokangas (1998) defined internationalization as a process of mobilizing, accumulating and developing resources in and for international activities. Nevertheless, all of these contributions are products of learning theories of internationalization. They follow the incremental development of internationalization. This incremental nature starts from indirect exporting, and finally leads to international manufacturing (Johanson and Vahlne, 1990; Johanson and Mattson, 1993; Welch and Loustarainen, 1993). Early development of learning theories that encompass SME internationalization within their spectrum have given very little importance to foreign direct investment for manufacturing; rather, most of the emphasis has been on exporting. The earlier studies have included a limited number of companies that include foreign production (Johanson and Vahlne, 1977). The market knowledge that is required for higher levels of internationalization is most suitable for export, rather than foreign, manufacturing.

Havnes (1998) disagreed with the incremental internationalization posited in the above learning theories. According to his study, a number of small firms internationalize without following the incremental steps. Bell and

Young (1998) and Madsen and Servais (1997) criticize learning theories of internationalization and advocate a more holistic study with reference to SMEs. Li, Li and Dalgic (2004) studied experiential learning, systematic planning models and the contingency perspective in combination to create a hybrid model of internationalization processes of SMEs. They used antecedents, planning and execution to explain internationalization. Motivation and corporate competence are the antecedents, where motivation is the antecedent reason as to why companies internationalize, and corporate competence is based on technology, innovation capabilities, internal experience and entrepreneurship. Planning is done through market research, market entry mode and market selection. Execution deals with the level of involvement and risk. This model is mainly focused on the early internationalization of SMEs. Hence, it has not been sufficiently developed and tested for SMEs' foreign direct investment.

Brouthers and Nakos (2004) examined SME entry mode choice from the transaction cost theory perspective. This is one of the few studies that has been done within economic theories of internationalization, and also one of the few that looks at equity-based internationalization, as well as non-equity-based internationalization. They consider three factors to explain how to choose between equity-based and non-equity-based internationalization. These are asset specificity, behavioural uncertainty and environmental uncertainty. Asset specificity refers to resources that add value to a company in one context (environment) but may cause it to lose its value in another. In international business, context relates to the investment required to form a new foreign operation. Unique technology and know-how should be protected from competitors. If asset specificity is low, protecting know-how will be easy and less costly, and transaction cost will also be low. The dissemination of knowledge will be easy as it will be codified and can be acquired from many sources. Switching costs will also be lower if the investing company decides to change from one agent to another, or from one mode of entry to another. If asset specificity is high, equity modes of entry are favoured. High asset-specific resources are better protected than low asset-specific resources. This may lead to internationalizing foreign operations. Control is the main advantage and motive for internationalizing. The investing firm will not choose foreign agents because a loss of relationship will cause problems with respect to protecting these resources, which are hard to transfer. However, Brouthers and Nakos' (2004) paper did not explain the internationalization, but rather looked at the issue up to the point that the decision, related to equity-based internationalization, is made. However, asset specificity will make resources harder to transfer.

Behavioural uncertainty is the inability of the investing firm to predict the behaviour of people in a foreign country. This may hinder the protection of high asset-specific resources. The investing firm designs a control mechanism so that the risk of behavioural uncertainty can be reduced. Internal control is achieved through equity-based internationalization, and experiential knowledge helps companies to develop control mechanisms. In return, this leads to increases in the degree of internationalization from the investing firm. Firms with no experiential knowledge will prefer non-equity-based internationalization. This is more important in SMEs, as they have limited resources and their internationalization depends on the perceptions and characteristics of their managers. Behavioural uncertainty results in selecting an incremental strategy in internationalization. Through this incremental internationalization, they can develop control mechanisms. The highest degree of internationalization depends on the asset specificity. If it is high, then companies will internationalize to an equity level of investment. If it is low, then they will internationalize to a non-equity level.

Environmental uncertainty relates to the risk associated with enforcing contracts, and control of political and legal risks. The investing firm may want to have internal control of high-asset-specific resources, and doing so would increase their exposure to external environmental risk. If the environmental risk is high, companies will select non-equity-based internationalization modes. If the environmental risk is low, they will select equity-based internationalization modes depending on behavioural uncertainty and asset specificity.

Brouthers and Nakos' (2004) study is the only one to look at equity-based internationalization from a transaction-cost economics perspective for SMEs. The rest of the literature below mainly considers export-based internationalization for SMEs.

Risk is a common theme in the internationalization of SMEs and general SME literature. Winch and Bianchi (2006) examined the drivers and dynamic processes of SMEs when going global, and discovered that there are four types of risks in their internationalization. First, the new and unfamiliar markets will require a great deal of resources. This will put pressure on the business functions, which is followed by with new investments there are two risks with regards to customer satisfaction: worse customer satisfaction in the home market because of investment abroad, or worse customer satisfaction in general because of operations in the foreign market. There is a risk relating to investing in two different markets. As the resources are scarce, sharing resources in two markets is risky as success can be jeopardized in one for success in the other. Until the new market can sustain itself, it will be subsidized by the existing market. The last risk listed by Winch and Bianchi (2006) is the pressure placed on R&D in small firms, who are vulnerable because large firms have greater resources to achieve innovations in superior effectiveness and efficiency. They usually focus on smaller, niche innovations where they can build on their future market potential.

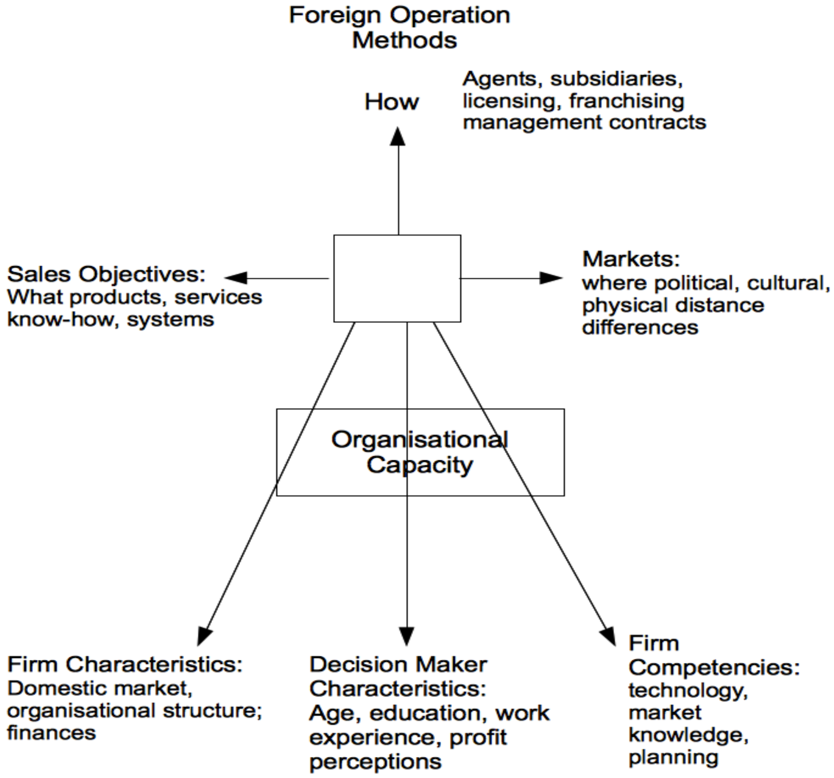
Bell, Crick and Young (2004) examined the importance of business strategy in SME internationalization. Many of the early studies on SME internationalization are based on the unplanned, reactive and opportunistic behaviour of companies. Nearly all of the early studies of SME internationalization pay attention to the resource needs of SMEs. The general consensus on SME internationalization is based on the limited resources and knowledge, and the high risks associated with these. Bell, Crick and Young (2004) moved away from such resource and knowledge constraints, and believe that companies actually do behave according to their designed business strategies, rather than in an ad hoc, reactive, unplanned manner. Equity-based internationalization of SMEs will definitely be strategically planned, rather than reactive and unplanned. Raymond and St-Pierre (2010) identified the link between strategic capabilities and their configuration and internationalization of SMEs. SMEs may enter export markets in a reactive manner, however the investment required for international manufacturing involves planning and strategic decision-making. Welch and Welch (1996) were the first to attempt to converge international business and strategy. They emphasized the importance of knowledge, skills, experience and networks, with considerable attention given to external environment. Hermel and Khayat (2011) recognized the importance of network relationships with external parties and listed industry networks, professional forums, former colleagues and friends as good sources of market knowledge. Bell, Crick and Young (2004) discovered that a firm's initial business strategy, growth objectives and international orientation are significant in their internationalization decisions and success. All of the above are directly or indirectly related to the ownership of the company. New product development can also trigger internationalization in SMEs, and the product range is critical in business expansion through internationalization. Bell, Crick and Young (2004) cited a clear distinction between knowledge-intensive SMEs and traditional SMEs. Knowledge-intensive SMEs have niche products. Such companies have international business strategies, and their products are developed in international markets. Traditional firms have a domestic focus, and internationalize because of problems in the domestic market, global competition or reactions to unsolicited orders. The role of the decision maker has been found to be important for SME internationalization, and this role within SMEs in equity-based internationalization is equally important. There is a gap in terms of understanding the role of the decision maker, however. Bell, Crick and Young (2004) believe that international experience and knowledge about foreign markets and industries are more important for knowledge-intensive SMEs than traditional ones. Market selection entry strategies for knowledge-intensive SMEs are free from geographic or psychically close markets, and are related to network relations. Tang (2011) found similar evidence on network relations. He believes that SMEs form network relationships which determine their international development. Traditional firms give less importance to network relations, but place more importance on psychically close markets. This has to be tested for equity-based internationalization with investment from SMEs. Hence, knowledge-intensive SMEs internationalize faster than traditional SMEs. It should be noted here that this study looks at the whole spectrum of international operations, and most of the findings to date are related to internationalization based on exporting. There is thus a gap regarding equity-based internationalization in Bell, Crick and Young's (2004) study.

Crick and Spence (2005) investigated the internationalization of UK high-tech SMEs, who need to react to fast-changing environments through allocating resources to different markets. Crick and Spence (2005) discussed the influence of owner-manager characteristics, and recognized higher education, international openness, foreign origins and past experience as important factors. Their study looked particularly at the speed of internationalization for SMEs with an export concentration.

Lloyd-Reason and Mughan (2002) discovered that the success of SME internationalization is determined by what they call “cultural orientation”. They define cultural orientation as the “degree of openness of the owner manager to foreign cultures, [and] the willingness of the owner-manager to understand and adapt to the foreign cultures” (p. 121). They uncovered that the key determinants of cultural orientation include willingness to develop language skills, values and cultural differences. Several other studies have also examined owner-manager characteristics and their effects on the internationalization process. Cavusgil and Nevin (1981) identified two determinants of management characteristics for successful internationalization: management expectations of growth from internationalization, and high degree of commitment to internationalization. Calof and Beamish (1995) recognized the importance of how decision makers perceive the benefits, costs and risks of internationalizing. Bolbrook, Cohen, Hounshell and Klepper (2000) and Welch and Luostarinen (1988) recognize decision makers’ past internationalization experience as an important characteristic. Jaffe and Pasternak (1989) observed managerial beliefs about firms’ competitive advantage, readiness to export, the risks associated with internationalization, and perceived internal and external barriers towards internationalization. Simpson and Kujawa (1974) studied managers’ levels of education, while Langston and Teas (1976) looked at their foreign market experience and ability to speak foreign languages. Simmonds and Smith (1968) identified whether the manager was born abroad, and how that affects internationalization of SMEs, and Chetty (1999) specifically studied manufacturing SME internationalization. In Figure 2.1 the dimensions of internationalization identified by Welch and Loustarinen (1988) are used to explain SME internationalization.

The studies outlined above on managerial characteristics have been discussed for SMEs that have internationalized through exporting within certain periods of time after their establishment. Some of the managerial characteristics may be similar for equity- and non-equity-based internationalization, however many of them may differ.

Figure 2.1 Dimensions of SME internationalization *(adapted from Chetty, 1999 and Welch and Loustarinen, 1988)*



Chetty's (1999) dimensions of SME internationalization can be explained through four dimensions, which are operation method explaining the how question of internationalization, sales objects explaining the what of internationalization, target markets explaining the where of internationalization and the last is the organizational capacity as firm and decision maker characteristics such as domestic market situation, organizational structure and finance, technology, market knowledge and planning and age, education, work experience and profit perception of the decision maker.

Chetty (1999) lists the requirements of non-equity-based internationalization. SMEs internationalize through increasing commitments of resources and a variety of international operations modes. Internationalization is matched with product diversification, or new products. Increasing commitments mean that firms gradually internationalize to larger numbers of markets. Firm characteristics within domestic markets (size of market, competitive forces, industry conditions and government policies) influence the internationalization of SMEs, and internationalization impacts the organizational structure and finances in return. All of these are actually determined by the decision maker, who is usually the SME owner-manager, however age, education, work experience and profit perceptions are the only owner characteristics considered by Chetty (1999). Internationalization in new markets will require the SME to develop new competencies through investment in resources. Kjellman and Ramstroem (2004) identified 10 characteristics of management (managing director, owner-manager, etc.) as high interest of managing director in international orientation, commitment to international business and internationalization, understanding international customer needs and commitment to these, satisfying international customer needs, responding to international customer needs and after-sales activities, the personnel are allowed to improve products, services and relations, focus on value creation for the customers and the company, existence of foreign demand acting as a motivating factor, selling is a key success factor and better in executing more than other firms.

Hessels and Terjesen (2010) looked at the exporting of SMEs and identified the following characteristics that help them to succeed, including operating with domestic customers, competitors and suppliers. There is another body of literature that looks at the relationship between entrepreneurship and internationalization. This is based on the resource-based view of internationalization, which is also known as the theory of "born globals". Bloodgood, Sapienza and Almeida (1996) explored the effects of tangible and intangible resource accumulation on internationalization performance. Resources that are valuable, inimitable and not substitutable are needed to achieve higher performance in foreign markets, compared to competitors. McDougal, Shane and Oviatt (1994) suggested that international entrepreneurs follow practices to coordinate different resources from different locations, compared to domestic companies which follow the path dependency of established ventures. Studies by authors such as Crick and Spence (2005) and Bell, Crick and Yound (2004) recognized the distinction between high-tech or knowledge-intensive SMEs and traditional SMEs. Bell, Crick and Young (2004) identified that knowledge-intensive SMEs internationalize faster and according to a business strategy. Oviatt and McDougall (1994) define born globals as SMEs that gain considerable competitive advantage from the use of resources and sales of products in multiple countries from their inception. Boter and Holmquist (1996) uncovered that the international expansion of knowledge-intensive innovative SMEs is determined by entrepreneurial culture, opportunistic strategies and short-term goals. The speed of internationalization is explained by various factors: market awareness, channel control, market penetration (McDougall, 1989), absence of strong industry structure, and quick learning (McDougal, Shane and Oviatt, 1994). Bell, McNaughton, Young and Crick (2003) attributed sudden changes from gradual internationalization to rapid internationalization to changes in ownership characteristics, an abundance of financial resources from financial institutions such as venture capitalists, and increases in domestic competition. Internationalization can happen because the company needs to repay a debt. Bell, McNaughton and Young (2003) also defined a group of companies that can be considered as "traditional", and uncovered the relationship between the owner-manager and the SME's internationalization. Firms with traditional backgrounds will behave like born globals after they experience an ownership or managerial change. The only exception is the need for repayment of debt to financial institutions, before or without any management change. Managerial change will force the new managers to increase sales through exporting. This will lead to a born-global-like behaviour. Bell, McNaughton and Young (2003) called these types of companies "born again globals". Born globals internationalize quickly through newly acquired network resources. Business networks can be sources of knowledge for the entrepreneur (Lindqvist, 1997). The network relations should be based on commitment and trust so that born globals can internationalize to more geographically and psychically distant markets. Merrilees, Miller and

Tiessen (1998) describe SME international market selection through four steps, which are networking, referrals and meeting other entrepreneurs to see possible opportunities, identifying opportunities, responding to opportunities by allocating resources, adapting resources for the necessary market to gain advantages.

Crick and Spence (2005) identified three triggers to pursue a born global strategy, including availability and existence of network contacts, ability to develop and use resources such as financial and managerial and unexpected, unsolicited orders.

Westhead, Wright and Ucbasaran (2001) studied human, business and external environment explanatory variables. An entrepreneur’s human capital affects internationalization through gender, immigration and higher education. In terms of managerial know-how, entrepreneurs whose parents have owned a business are more likely to internationalize. Older owner-managers who have held managerial or supervisory positions in their last place of employment are more likely to internationalize quickly. The following distinction has been made between one-shot investors and habitual entrepreneurs (serial or portfolio entrepreneurs): it is more likely that habitual entrepreneurs will internationalize quicker than one-shot investors. Ventures with more than one owner-manager will internationalize quicker than single-entrepreneur-based companies. External professional advisors will also increase the pace of internationalization. Industry-specific know-how such as, if entrepreneurs last employer is from the same industry, ventures that were exporting previously in low or high quantities will be exporting more and internationalize to newer markets faster than other companies. Companies who have received support from financial institutions will be more likely to internationalize faster than companies who have not. Mohr and Shoobridge (2011) identified that a multi-ethnic workforce is helpful to access market-specific knowledge and create contacts within foreign countries. Westhead, Binks, Ucbasaran and Wright (2002) found that SMEs who are located in urban areas will seek customers in domestic markets because they will be lacking resources with which to internationalize. Companies that are not in urban areas with network connections are also more likely to internationalize. Fletcher and Prashantham (2011) identified that knowledge sharing is very important for born globals. They investigated Scottish SMEs through case studies, and found that SMEs adopt formal processes to access knowledge through planned events and codification of tacit knowledge to become explicit. This learning can be transferred for future learning within the host company.

Weikl and Grotz (1999) studied German SME manufacturers who have internationalized through different international operation modes. On of third of international SME manufacturers they studied use capital-intensive internationalization modes. The remainder make heavy use of licensing, subcontracting and managerial contracts.

Most of the studies above have dealt with early internationalization of SMEs, and have focused mainly on their export behaviour. It is evident from Weikl and Grotz' (1999) study that there is a considerable number of

SMEs with capital-intensive international modes or modes with a need for transfer of knowledge and technology. The motives for SME internationalization, according to Weikl and Grotz (1999), are: use of labour-cost advantage, improved market access, improved market penetration, internationalization of the competitor, use of material cost advantage, company's bottleneck of production capacities, demands of main customers, strategic split of product portfolio, lower environmental standards, usage of tax advantages, exchange-rate advantage, and avoidance of import restrictions. Weikl and Grotz (1999) identified two clusters of motives. These are cost-oriented motives and market-oriented motives. Their study showed that market-oriented motives dominate the motives of German manufacturing SMEs.

Weikl and Grotz (1999) observed that the majority of technology transfer happens regarding knowledge about products and production processes. Research and development (R&D) intensity does not play an important role in internationalization decisions. Enterprises with high amounts of international technology transfer for market penetration know-how have a significantly higher export proportion. The technology transfer for products and marketing knowledge happens more in capital-intensive forms of internationalization. Most of these companies only joint development projects and product development initiatives, and also transfer general-interest and less important issues as forms of technology transfer. SMEs with international technology transfers are considerably market- and technology-oriented organizations. This paper does not specifically define the scope of Weikl and Grotz' (1999) study. The focus on technology and knowledge transfer definitely makes it clear that it should be looking at the equity-based internationalization.

Lu and Beamish (2001) conducted one of the earliest studies, which has a significant amount of international operations. Most of the studies prior to theirs was focused on the early internationalization of the companies. They compared exporting, foreign direct investment and international alliances to SME performances, and found that exporting can have an initial good performance effect, but over time, with changes to economic and financial parameters such as exchange rate differences, the performance drops. There is a linear relationship between exporting and SME performance. Foreign direct investment has another type of performance relationship – the number of foreign direct investments greatly affects SME performance. The number of foreign direct investments should reach five before SMEs achieve higher performance. From one to five foreign direct investments the performance drops slowly, and after five it increases rapidly. The reason for this decrease of performance until five internationalizations is not clear; there is thus a need to test this finding and explain it further. This non-linear relationship provides a flattened u-shape graph. This is totally different to larger organizations, which have an inverted u-shaped relationship to performance. Larger organizations will gain performance achievements from foreign direct investment early on, but later, increased numbers of foreign direct investments will become a liability and the performance will drop significantly (Beamish and da Costa, 1984; Hitt, Hoskisson and Kim, 1997). The initial decline of performance by foreign direct investment was attributed to foreignness liability (Hymer, 1976) by Lu and Beamish (2001). This is similar for both large enterprises and SMEs. There may be managerial deficiencies in dealing with foreignness liability or limited resources, and there is still a need to investigate this anomaly. Firms' exporting behaviour will have an effect on the performance of SMEs. Higher levels of exporting with foreign direct investment is the least performing according to this study. The highest performing relationship is the least exporting with foreign direct investment. The importance of alliances is explained through gaining local knowledge from local partners, and this reduces the risks involved in foreign direct investment. Lu and Beamish (2001) go on to explain that alliances can help to overcome the foreignness liability, which relates to the international entrepreneurship literature. In early foreign direct investment, companies actually behave like start-ups. They need to build new business relationships with different stakeholders, recruit and train new employees, and adapt knowledge and capabilities from their original markets to new ones. Finally, as an implication SMEs should not be discouraged by early problems in the internationalization process, and should develop their own knowledge and resources. This will gradually lead to higher levels of international modes. There should be a learning effect that helps them to choose higher forms of internationalization, and this should be investigated so that what has to be learned can be explained. From Lu and Beamish's (2001) study, it is clear that companies in the early stages of internationalization may no longer follow Uppsala model of internationalization's gradual commitment to foreign markets. Similarly, psychic distance and foreignness liability may no longer play a crucial role in early internationalization. However, in higher levels of internationalization with a possibility of knowledge/technology transfer, companies will confront higher levels of risk. The international entrepreneurship theory and the characteristics of entrepreneurs may be important and sufficient to reduce the risk of exporting to foreign markets. The risk associated with higher levels of internationalization cannot be fully solved by entrepreneur characteristics. There is an evidence that more and more SMEs are operating with higher levels of internationalization and their decision making, along with how, why and where they internationalize, has not been considered. Some companies skip lower levels of international mode and go straight into the higher end; in such cases, most of the literature to date can only partially explain their behaviour. Furthermore, the cumulative knowledge of SME internationalization can only partially, and possibly incorrectly, lead decision and policy makers. Davenport (2005) observed the importance of proximity for SME knowledge acquisition. This is important because the biggest problem with SME internationalization is experiential knowledge. Knowledge-intensive firms gain the most advantages from locating closer to each other, so that the transfer of knowledge can be done as quickly as possible. There is also a need for proximity (in terms of location) to achieve transfer of tacit information. Davenport (2005) specifically investigated proximity for innovation and the effects of clusters for SMEs. The findings have a general importance to internationalization. Before and after entering or locating in a new market, it is important to recognize that knowledge acquisition from that context will determine the success of that SME's internationalization. This knowledge can be obtained from business relations or by acquiring key personnel or companies in that market. The benefits result in resource scarcity and risks associated with allocating these scarce resources to multiple markets. Davenport's (2005) study looks at the exporting behaviour of SMEs. The need for experiential knowledge may be equally important for the equity-based SME internationalization, however there are no studies that explain the type of experiential knowledge needed. Liesch and Knight (1999) studied information internalization and its effect on SME internationalization. The disadvantages faced by SMEs have been mentioned above; nevertheless, SMEs also have advantages in internalizing information because they do not have bureaucracy, hierarchical thinking or expensive existing information systems. SMEs are often more innovative and customer focused, and have quicker response times to implement new technologies and respond to customer requirements. These internal traits also are opportunities for the company to learn from its environment. The hierarchical industry structures are replaced by network structures in which SMEs take part. These relationships offer other opportunities to internalize information about foreign markets. Compared to Davenport (2005), some of these activities are not constrained by proximity. Liesch and Knight (1999) provide an explanation for the relationship between psychic distance and information internalization: the more psychically distant a market is, the greater the uncertainty for the investing SME. Psychic distance is a function of uncertainty, however, and can only be reduced by information internalization. More psychically distant markets will result in higher costs of acquiring knowledge and internalizing for the SME. Liesch and Knight (1999) believe that there is a need for a trigger for the SME to start acquiring and internalizing information, which may lead to internationalization. This trigger is usually a form of opportunity. They introduced a hurdle rate explanation to SME internationalization, wherein the two axes of their hurdle rate represent cost of information acquisition, and knowledge creation and psychic distance. These have a linear relationship. The concept of psychic distance was first developed by Johanson and Vahlne (1977), and was tested for small and large organizations with respect to learning theories. Their emphasis was mostly on exporting, and foreign direct investment has been given very little attention. The relationships defined by Liesch and Knight (1999) must therefore by tested for equity-based internationalization. The knowledge needed to overcome psychic distance has certainly been defined for exporting, however the knowledge required for equity-based internationalization may differ. Through exporting in previous stages the knowledge required may have reduced for psychic distance towards another country however changed in the type of knowledge required. These need to be investigated further for SME internationalization.

The internationalization of SMEs has created another stream of literature for support services. SMEs' export behaviour can enhance a country's economic performance through contributions to the trade balance. There is a need for the following services: administration, finance, credit on advantageous terms, management and credit solvency as standardized services; market analysis, identification and selection of customers, promotion, packaging innovation and countertrade as customized services; and finally logistics, distribution and sales intermediation as services whose effect is not always uniformly definable (De Chiara and Minguzzi, 2002).

The research for SME internationalization has been focused on exporting, and there are only three studies that have explained equity-based internationalization as well as non-equity-based internationalization. There is a definite focus on the learning, but this or the type of learning may differ for equity-based internationalization. Brouthers and Nakos (2004) defined conditions for equity-based internationalization, while Weikl and Grotz (1999) looked at the technology and knowledge transfer, but failed to explain details on the importance and difficulties, instead reporting on the differences between knowledge-intensive and traditional SMEs. Lu and Beamish (2001) explained an anomaly for SME equity-based internationalization, that SMEs need to have at least five investments before they start to get any benefits from foreign direct investment. They reported that a possible reason for this may be liabilities associated with foreigness. However, there is a need to examine this anomaly. Foreignness liability is equally important for large organizations, and the time required to overcome this problem will depend on learning about the foreign market. Knowledge is needed to understand what has to be learned if there is a need for it. The anomaly may be also be explained by other reasons, and again this has to be tested. There is a definite research gap in SME equity-based internationalization. The literature presented above mainly focuses on exporting and managerial characteristics. The three studies that use equity-based internationalization only explain from exporting or managerial characteristics perspective, or use certain assumptions. Thus, there is a need for a study to understand how SMEs make successful equity-based internationalization decisions. This will help us to understand the important features of equity-based internationalization for SMEs. These attributes may related to the knowledge needed for them to learn, the difficulties they face, or how can they overcome the anomaly defined by Lu and Beamish (2001). This thesis aims to investigate the successful equity-based internationalization of SMEs, through which it will explain what is required for SMEs.

2.3 Theories of internationalization

There are three groups of internationalization theories within international business literature. Economic theories have been accepted as a norm by scholars with an economic background, however decision-making for internationalization has also been studied by operations management literature. Economic theories and internationalization decision-making in operations management complement each other through looking at the attractiveness of a location from different points of view. The behavioural school of management also outlines learning theories of internationalization. These consider the difficulties companies face when they internationalize. Finally, network theories have been developed from learning theories. They therefore have similar roots, but network theories have developed enough that they can now be classified as separate theories. Operations management scholars have developed international (global) manufacturing networks as an explanation of network theories from an operations perspective.

There have been other developments within internationalization theories, such as innovation, resource-based and strategic models. However, all of these can be classified under one of the three major theories of internationalization. These will not be discussed in here.

2.3.1 Economic theories of internationalization

Internationalization research began by looking at the international activities of multinational enterprises. There are several economic theories of internationalization, including internationalization theory, transaction cost approach, eclectic paradigm and monopolistic advantage theory. The most important contribution to internationalization relates to the eclectic paradigm (Dunning 1988, 1993), which is widely used by economics scholars.

Internationalization theory (Buckley and Casson, 1993) defines internationalization as an attempt to lower the cost of transactions with increasing commitment to international markets. The commitment to international markets will be viable until the margins for lowering transaction cost do not materialize.

The transaction cost approach to internationalization (Gilroy, 1993) is very similar to internationalization theory. The difference between these two theories is the foci of the analysis. In internationalization theories, the foci of analysis are the firm and the international markets, whereas in transaction cost approach this foci changes to the transactions themselves.

Brouthers and Nakos (2004) used transaction cost economics and provided information on the selection of equity- and non-equity-based internationalization. This study is the only notable study to use economic theories with reference to SME internationalization.

The last economic theory of internationalization is monopolistic advantage theory. This theory has been used widely within the economic theories literature, and is the starting point for eclectic paradigms. The reason for multinationals to internationalize is to use their monopolistic advantage such as superior manufacturing ability, brand value, differentiated products and so on in other markets (Hymer, 1976).

There are many different eclectic paradigms. The most well-known was developed by Dunning (1988, 1993). There is a discussion on what and how the work of Dunning should be named. Initially, Dunning (1988) called his work a theory, which was then changed to a model (Dunning, 1993). The latest versions of his work name his eclectic paradigm as a framework (Dunning, 2001). Nevertheless, his works are considered as very valuable by economics based international business academics.

Dunning studied production in multinational enterprises in more than one location, and identified three advantages: ownership, locations and internalization advantages. He labelled his model the “eclectic paradigm”, or OLI for international production. According to this model, firms establish production capacities in other countries through making decisions on ownership, location and internalization parameters. He answers different questions for each factor. Ownership advantages look at the whys of internationalization; they are based on the resources owned by the company and how to generate income. The importance of ownership is stressed with reference to the role of the factory in those countries. The origins of ownership specify that there are some advantages of being in one location, or the reason why customers buy the company's products. This advantage can be transferred from one location to another. This is no different from the monopolistic advantage theory set forth by Hymer (1976). The location advantages are a product of each specific location, which will have several different advantages to choose from. Hymer (1976) did not go into detail about how to choose these factors and compare different locations, which has been studied extensively within the operations management literature, and will be explained in detail below. Internationalization is related to company choices regarding the exploitation of ownership advantages within other locations. They also have the option to sell or transfer those ownership advantages to another company (Dunning, 2001). Internationalization will increase ownership advantages because of the location advantages. The combination of these will result in higher ownership advantages. However, Dunning (1988, 1993, 2001) did not mention the requirement of transfer of knowledge and technology from one location to another, which is a necessity in order for companies to internalize the superior ability. However, internationalization for Dunning (1988, 1993, 2001) was always defined with reference to selection of entry mode between export, licensing and foreign direct investment, which require transfers of technology and related knowledge. A monopolistic advantage can arise from the manufacturing process ability. This should be transferred to another location and internalized. Internalization is closely related to Stephen Hymer's (1976) work on multinational enterprises. The problem within economic theories of internationalization is that they advocate the instantaneous implementation of the decision without any problems or delays. However, monopolistic advantages cannot be fully realized if internationalization is not fully implemented. The advantages will probably be realized in a normal distribution, in which variability can be explained with reference to implementation and other factors. Internalization results in the removal of conflicts between firms in international markets, the exploitation of monopolistic advantages, and the diversification of risk (Pitelis, 2007). Hymer (1976) identified ownership and internalization variables and implicitly mentioned several location factors. OLI encapsulated all of these variables and integrated them. Dunning (1988, 2001) sees his eclectic paradigm as a tool that can explain a methodology (a generic set of variables – OLI), which in turn can help to derive a satisfactory explanation regarding any specific foreign production activity. Ownership and location try to explain where to internationalize, and internalization explains the choice of entry mode. Cantwell and Narula (2001) recognize two different levels of ownership advantages from the works of Dunning (1988, 2001). First, ownership of firm-specific assets can be used to gain advantage over competitors. Second, ownership of complementary assets, such as an ability to create new technologies and to coordinate international activities, can enhance the competitive position of the firm. Dunning (1988) specifically talks about the first set of ownership advantages in his early works. However, later he recognized the importance of the second set of advantages proposed by Cantwell and Narula (2001).

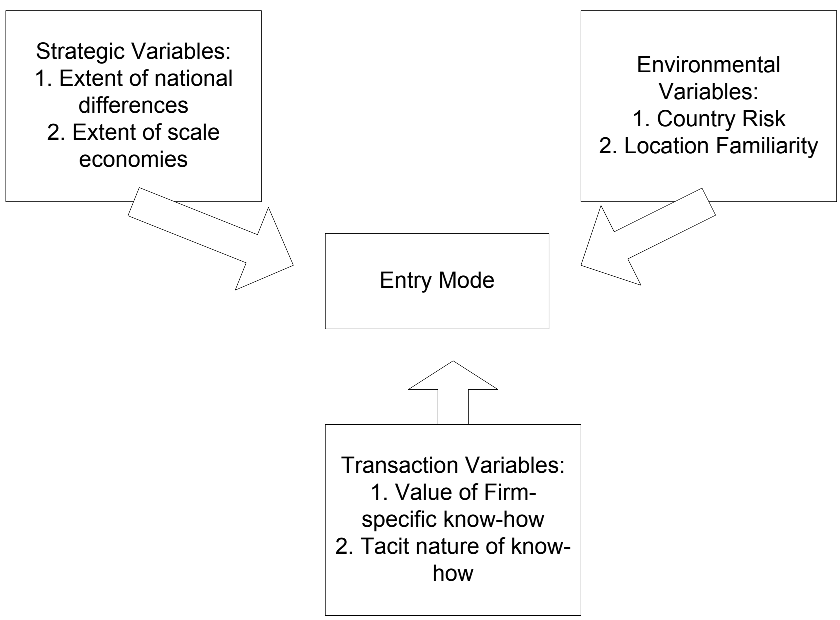
There are three main criticisms of the eclectic paradigm (Dunning, 2001). First, the location choice can be made from a large selection of variables. These are used extensively in operations management location decision literature. Second, the variables that make up the eclectic paradigm (ownership, location and internalization) are not independent of one another, despite Dunning's (2001) belief that they are. An explanation of these relationships makes it easier to explain the advantages of the eclectic paradigm. Finally, the eclectic paradigm is a static approach and does not relate to strategy. Dunning (2001) tried to address these criticisms as a defence of his model, without tackling any of them with concrete additions or changes to the eclectic paradigm.

Ozawa and Castello (2001) studied endogenous growth factors (generation and transfer of knowledge) using the OLI framework. Ownership and location advantages are used to gain location-specific advantage through learning. Their study does not include the effects of internalization. The importance of this study is the bridging effect created between the eclectic paradigm and learning theories of internationalization. Internalization has mainly been explained from learning perspectives, and knowledge transfer is the reason for learning.

Hill, Hwang and Kim (1990) also developed an eclectic model of the choice of international entry mode (Figure 2.2), which explains firms' need to control some of their international activities. The degree of control can determine the type of entry they will make into a foreign country. Each entry type will also need resource commitments that will affect the entry mode for the company. This study solves the problem of independence within OLI from Dunning's (1988, 1993, 2001) work by explaining how these three advantages are related to each other.

Most of the eclectic paradigms, including Dunning's (2001), try to explain internalization through entry mode selection. The only study that recognizes the importance of implementation in entry mode selection is that of Ozawa and Castello (2001). The ownership advantages and location advantages seem to play a more important role in explaining the entry mode selection. This is one of the areas in which economic theories are lacking.

Figure 2.2 Eclectic Decision Framework *(adapted from Hill, Hwang and Kim, 1990)*



2.3.1.1 Internationalization in operations management

There have been two strands of research in operations management on internationalization. The first relates to decision-making, within which two variables have been discussed in greater detail. These are: factors that affect decision making and the method used for decision making. The second strand of research looks at the international manufacturing network. It explains the internationalization of a company as a move by which to gain better position through changing certain aspects.

The first strand is more influenced by the economic and learning theories of internationalization, which provide a way to predict internationalization through the use of factors, but only looking at the configuration. Through configuration, a new location for internationalization is decided.

The second strand is more affected by network-, innovation- and resource-based theories of internationalization. The importance of networks and the creation of capabilities through accessing internal and external resources are parts of these theories. This strand of research not only looks at the configuration, but also the coordination after the internationalization decision. Below, both of these strands of literature will be explained in detail.

2.3.1.1.1 Factor and decision-making research

The research about configuration can be divided into two sections. The first tries to explain the factors that companies use to decide on new locations. The second relates to how that decision is made by using some of these factors, which are ranging from business climate to labour unionization and to availability of schools. These variables can be categorized under economic factors (GDP, inflation rate, economic stability), availability and infrastructure factors (availability of skilled labour, availability of land, availability of ports and transportation systems, availability of communication systems, banking services), cost factors (cost of land, cost of construction, cost of utilities, cost of skilled labour), market conditions (access to distribution channels, population density, general demographics), supply information (proximity to suppliers and resources) and finally legal and taxation issues (intellectual property rights, union law, environmental regulations). The full list of factors used can be found from appendix 1.

Another group of research about the factors used in configuration explains the strategic impact of factors and how they are used (Bartmess, 1994; Schmenner, 1976; MacCormack *et al.*, 1994; Simango, 1993; Young, 1987). The factors of configuration can be analysed by clustering them into groups and assigning them general names (Atthirawong and MacCarthy, 2000; 2001; Akritis, 1993). These factors can be used in two different ways with respect to decision making for internationalization. Qualitative decision-making models use these factors and rank them (Atthirawong and MacCarthy, 2002). For this research, three categories are selected. The first focuses on the economic factors, and whether the new operation will continually create economic rents for a certain time. The second relates to the operational level – i.e. whether the new operation can continually develop, taking into account country differences in the application of work practices. The last refers to innovation capability

– i.e. whether the new operation has the necessary competencies to innovate. For a company who is trying to internationalize and assign a role to a lead factory, the factors considered will focus on the innovation capacity of the country and company.

A total of 176 factors were identified through national investment agencies[1] (international investment promotion agencies), and were divided into these categories accordingly. The categories were then developed further to explain what companies are really looking for, and how they can measure it.

Quantitative decision-making uses some of these factors above, and tries to find an optimized solution to the international location problem. Appendix 2 summarizes some of the literature about quantitative decision-making, and provides explanations on the method used.

2.3.1.2 Implications of economic theories on SME internationalization, and a discussion of the research gap

Ruzzier, Hisrich and Antoncic (2006) reviewed economic theories and could not find any that use SMEs. However, Ruzzier, Hisrich and Antoncic (2006) selected the OLI paradigm and tried to find any study that uses it (Dunning, 1988, 1993, 2001). According to their results, there is only one study that uses SMEs and explains entry mode selection from the transaction cost economics perspective (Brouthers and Nakos, 2004).

[1] National investment agencies are responsible for promoting their countries to foreign investors. Their advertisements contain 176 different factors.

Nevertheless, some implications can be drawn from the study in relation to SME internationalization. Ozawa and Castello (2001) addressed the importance of learning and this was because of knowledge transfer. This is an area that needs to be researched further. Internalization has been defined as instantaneous and without problems in most studies. However, this is not true in most cases, as it may in fact affect the distribution of monopolistic advantages in terms of realization. The operations management literature on internationalization takes a factor-driven approach, where the best location is selected from many. The selection methods are discussed in detail, however implementation has been given very little importance.

The economic theories also fail to explain SME internationalization. Instead, research on eclectic approaches to internationalization, particularly Dunning's (1988, 1993, 2001), dominate the area. There are many authors that work within this decision framework, however none of the studies explain SMEs. The only economic theory that tries to explain SME internationalization is based on transaction cost economics, rather than dominant monopolistic advantage theory.

2.3.2 Learning theories of internationalization

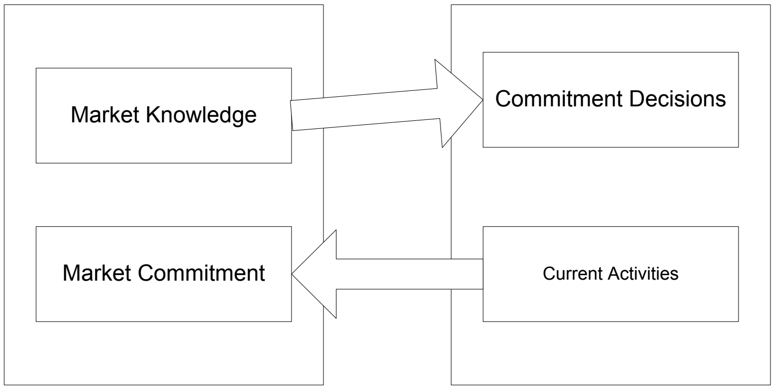
Learning theories of internationalization , compared to economic theories, are based on the behavioural school of management and tries to explain actions of companies through their behaviour and constraints. The first ever studies in this field (Johanson and Widersheim-Paul, 1975; Johanson and Vahlne, 1977, 1990) included SMEs as well as multinationals. The incremental nature of learning theories of internationalization suited SMEs and their behaviour better than economic theories. These theories have been influenced by the behavioural theory of the firm and the theory of knowledge and change in organizations (Ruzzier, Hisrich and Antoncic 2006).

Below, a rationalization of psychic distance is given. This is part of the Uppsala model of internationalization, and will be used later on as a variable, while the construct has been developed through the extensive literature presented.

2.3.2.1 Uppsala model of internationalization

The Uppsala model of internationalization was developed by Johanson and Wiedersheim-Paul (1975) and Johanson and Vahlne (1977, 1990). While the eclectic paradigm is based on transaction cost economics and monopolistic advantage theory, the Uppsala model of internationalization depends on the behavioural theory of the firm (Ruzzier, Hisrich and Antoncic 2006). The Uppsala model proposes five successive stages, which companies move through during their internationalization effort. Companies increase their international commitments as they learn more and more about international markets. Johanson and Vahlne (1977) predict this move from one stage to another by changing from state aspects to change aspects of internationalization. The state aspect of internationalization is about foreign market commitments and knowledge about foreign markets and activities. General and experiential knowledge increases, which forces the company to take action through changing their commitment in international markets. The change aspect of internationalization involves deciding to commit resources and engage in foreign activities. The new commitment decision becomes the state aspect – this is called the market commitment. The state aspects of internationalization affect the company's change aspects of internationalization. The knowledge about a market and market commitment will determine a company's decision to enter a new market (Figure 2.3).

Figure 2.3 Uppsala model of internationalization *(adapted from Johanson and Vahlne, 1977)*



The amount of resources committed and the degree of commitment define market commitment. The degree of commitment is relative to the integration of resources with other resources in the firm. Another factor that affects the degree of commitment is the transferability of resources. However, the Uppsala model does not recognize the importance of resource transferability. If resources are hard to transfer from one market to another, a higher level of commitment is demonstrated to that market. Specialization of the resource to a certain market also increases the degree of commitment. The model recognizes the importance of market knowledge as the key to increasing commitments from one market to another; however, committing to another market means increasing the entry mode, and hence transferring knowledge. This has not been given details about. The commitment seems to be done in an instance with any problems or difficulties.

Market knowledge is the foundation of any market commitment. When evaluating a new market, companies will collect data/ information about that market, and a decision will be made based on the market environment and possible performance measures of the market. Importance is given to experiential knowledge (tacit), which can only be learned from personal experience. Objective knowledge (explicit) can be researched, and learned by anyone. Experiential knowledge becomes more important as activities get less structured and knowledge about activities is not known. Johanson and Vahlne (1977) describe the differences between general knowledge and market-specific knowledge, as follows: general knowledge relates to marketing methods and common characteristics of certain types of customers, while market-specific knowledge involves the characteristics of the national market in terms of: business climate, cultural patterns, structure of the market system and characteristics of the individual customer firms and their personnel. This is called psychic distance by Vahlne and Wiedersheim-Paul (1973), and will be explained in detail at the end of this section.

Market knowledge and commitment are called the state aspects of internationalization in Uppsala model, and are linked. Knowledge, according to this model, is considered a resource, which determines the location and degree of internationalization, and knowledge is based on that market. Higher entry modes require higher amounts of market knowledge, which can be obtained by committing to a new market. The degree of commitment is related to the extent of the available resource, which is experiential knowledge in this case.

Current business activities must include continuous effort and commitment in the market. Repetition will increase the knowledge and commitment to that market. Knowledge can also be gained by hiring experienced people from within that market. A combination of internal and external sources of experiential knowledge works best.

Commitment decisions are a product of choice of location and mode of entry. Companies have two reasons to commit further in international markets. Market problems and opportunities will define how companies react or proact in different conditions. Companies who depend on their experiential knowledge will attempt to solve market problems or gain advantages from market opportunities. There are two forms of commitment. The first involves increasing the commitment in a market in which the firm previously had resources, which relates to increasing levels of market-related experiential knowledge. However, there is another form of commitment, which involves a lot more uncertainty about the market. The company may decide to invest in a foreign market, with limited experiential knowledge but a dependence on the objective knowledge (explicit knowledge). Every commitment will reduce the market uncertainty and result in greater resources. An incremental decision-making process helps the firm to overcome uncertainty and risks associated with international operations.

Johanson and Vahlne (1990) state that market commitments will increase in small steps. The firm will start with regular export activity, and then export through independent agents. Following this, more commitment will be placed through establishing an export subsidiary. At the end of the chain is manufacturing in that country.

Even though many other authors have criticized this approach, there is certainly a great deal of dependence on exporting, compared to international production. The eclectic paradigm claims to explain international production, while the emphasis in the Uppsala model of internationalization is on exporting. The first three out of four stages of internationalization are export related. Market knowledge will definitely help companies in their export expansions, however the it will be of limited use in deciding on a location and entry mode for foreign production. There is a need for research on the learning requirements for international production for large and small organizations alike. Nevertheless, there is still a lot to learn from the Uppsala model. Even though it focuses on exporting activity, the same principles apply when a company internationalizes, in terms of selecting a new manufacturing location. The stages of internationalization will result in international production, but this will take time and considerable learning, according to this theory. The learning in each stage may change form and direction, while the market knowledge on customer preferences and how to make payments in another country will be less useful in foreign production than issues such as how to manage a skilled and unskilled workforce, the labour laws, and so on.

Johanson and Vahlne (1990) continue to explain three exceptions where companies may make larger investments into unknown markets. First, if the resources are large enough, the consequences of investment and commitment will be small. However, though this may be true for large organizations, it is not the reality for SMEs. The issue of risk with regards to investment into new markets, especially in terms of establishing some sort of manufacturing facility, is greater for SMEs. Second, if the market conditions are stable and uniform then market knowledge can be gained through methods other than experiential knowledge. In the following section, psychic distance will be explained in greater detail. There is evidence that even markets that are very close, such as the USA and Canada, have very different market and business conditions. It is very hard to find a market that is uniform and stable, as well as one in which the psychic distance is very low. However, the born globals literature on SME internationalization regarding decision-maker characteristics (Kjellman and Ramstroem, 2004; Chetty, 1999; McDougal, Shane and Oviatt, 194; Bell, McNaughton, Young and Crick, 2003) explains that decision-maker characteristics can be influential in terms of overcoming some of the psychic distance and needs for experiential knowledge. The internationalizing SME may acquire a manager with the right background and characteristics that would help them to internationalize faster. However, the born global literature (Kjellman and Ramstroem, 2004;

Chetty, 1999; McDougal, Shane and Oviatt, 194; Bell, McNaughton, Young and Crick, 2003) considers exporting, rather than foreign direct investment. Nevertheless, there is a need for further research in this area that will explain the equity-based internationalization of the large and small organizations alike. Last, companies can use experiential knowledge from one market, and generalize it for use in other markets. This can be achieved as a capability to internationalize. One criticism of this is there will be a need for market-specific information, despite the generalized knowledge from the other market.

Other studies have provided empirical evidence to support the Uppsala model of internationalization. For instance, the Wisconsin school provided evidence through studying the export behaviour of firms (Bilkey, 1978, Cavusgil 1980, 1984). Most of the other empirical evidence comes from export-related activities.

Reid (1981, 1983) criticized the deterministic characteristics of the Uppsala model, which is also called "stages theory" because it does not give the opportunity for flexibility in explaining different internationalization patterns. Forsgren (2002) also posits a number of criticisms. The first is the over-dependence of experiential knowledge, and there are other forms of knowledge, which can be gained through acquiring a company from that market. The second is the instrumentalism of the model, through which the experiential knowledge created is used to reduce uncertainty – and hence the risk within – internationalization. Today, companies are internationalizing at greater speeds and are frequently skipping stages. There is no explanation regarding the effects of institutional mimetic behaviour, and companies may internationalize to imitate other companies that have done so. The force to legitimize the actions of management an opportunity can be viewed as a need for first-mover advantage. Last, firms can internationalize without experiential knowledge. Business opportunities are seen as a motivation for internationalizing without experiential knowledge.

Andersson (2000) perceived stages theory as a limitation to a company's strategic behaviour. Today, some companies internationalize within the first three years of their establishment. This phenomenon is called born globals, or international entrepreneurship. Obviously, these firms do not follow the same stages proposed by the learning theory of internationalization. Andersson (2004) addresses some of these issues in terms of industry characteristics, i.e. whether the industry is growing or mature. A mature company is expected to internationalize slowly through learning about the markets. Markets close to the home market are internationalized to first, as they are close in terms of psychic distance. Firms learn from their internationalization efforts, and use this knowledge to increase their international operations. This is in line with the Uppsala model. The difference lies in the fact that when such a firm internationalizes and learns more and more from this experience, they tend to become more dependent on the actions of their competitors. Thus, the firm will choose markets where it is not threatened or does not threaten its competitors. Firms from growing industries behave differently in their internationalization process. Industries evolve very quickly in growing industries, and firms from growing industries do not have time to learn the ever-changing industry conditions before they internationalize. Instead, these firms need to use their internal resources when they decide to internationalize. These internal resources include: entrepreneurial skills, key personnel and business networks. These companies will move closer to each other to observe their competitors' market actions. Andersson (2004) illustrate this in a two by two matrix (Table 2.3).

Table 2.3 Effect of industry characteristics and stage of internationalization *(adapted from Andersson, 2004)*

	Industry	Mature	Growth
Stage of Internationalization of the firm	**Early**	Learning Process	International Entrepreneurship
	Late	Oligopolistic Reaction	Dynamic Cluster

This theory tries to explain SME internationalization. Most early studies (Johanson and Wiedersheim-Paul, 1975 and Johanson and Vahlne, 1977, 1990) have studied SMEs and multinationals at the same time, however, as explained by Johanson in EIBA conference 2005, what can be considered "multinational" in the country of the research, could be considered an SME in other countries. Andersson (2004) made perhaps the most important contribution to theory here, by drawing a distinction between mature and growth industries, which served to explain SME internationalization more acutely than earlier contributions. The stages theory best applies to mature SMEs and their internationalization processes (Andersson, 2004), while international entrepreneurship studies best explain SMEs in growth stages.

2.3.2.2 Psychic distance

The learning theories recognise that there is a barrier to internationalization. The necessary experiential knowledge required for internationalization can only be collected from countries that have lower psychic distance. This section explains psychic distance for internationalization in great detail, with reference to the literature, and this will form the basis of ideas that are used extensively throughout this research.

International trade theorists (Beckermann, 1956 (first); Linnemann, 1966) used the concept of psychic distance before it was applied to the international business community. Psychic distance entered the international business literature through studies of Nordic multinationals and SMEs. Learning theories of internationalization and the Uppsala model were the first studies to use psychic distance.

Johanson and Vahlne (1977) and Johanson and Wiedersheim-Paul (1975) were the first to use psychic distance as part of their explanation of the internationalization process. In Johanson and Vahlne's (1977) model, psychic distance explains the limitations of why internationalization occurs in small steps towards markets that are less known to managers with higher commitments. As knowledge increases, the company starts to commit more to the foreign market. Psychic distance represents the most important limitation on what kind of decisions managers can make. The Uppsala school of internationalization has been applied to all sizes of organizations, and the effects of psychic distance are applicable to all organizations as well. One of the factors that influence managers is market information and uncertainty. The market knowledge is the information about markets and its characteristics. Some examples of such information are: present and future demand and supply, competition, channels for distribution, payment conditions, business climate, cultural patterns, structure of the market system, characteristics of the individual customer firms, and their personnel and transferability of money. All of these information requirements are actually needed for export-based internationalization; hence, equity-based internationalization has not been explained through these studies. The last stages of the Uppsala school model and other learning theory models in fact consider foreign direct investment as the last stage of internationalization. The experiential knowledge requirements for the internationalization stages are highly influenced by exporting. The information required are not related to the barriers that prevent internationalization but sort of information needed for internationalization. These types of knowledge are specified as market-specific information or knowledge. Johnson and Valhne (1977) divided market knowledge into two groups: knowledge that is available to a company before entering a market with a certain amount of commitment is called "objective knowledge", and is available to all companies as it is public; knowledge that can only be learned by operating in that market is termed "experiential knowledge". The stages start from exporting, and gradually increase to wholly owned subsidiaries of the parent company. The psychic distance is the knowledge that is a product of the deficiency of experiential and market-specific knowledge. According to these findings, Johanson and Vahlne (1977) define psychic distance as:

> The sum of factors preventing the flow of information from and to market. Examples are differences in language, education, business practices, culture and industrial development (Johanson and Vahlne, 1977: 24).

Other definitions of psychic distance can be found in Table 2.4 below.

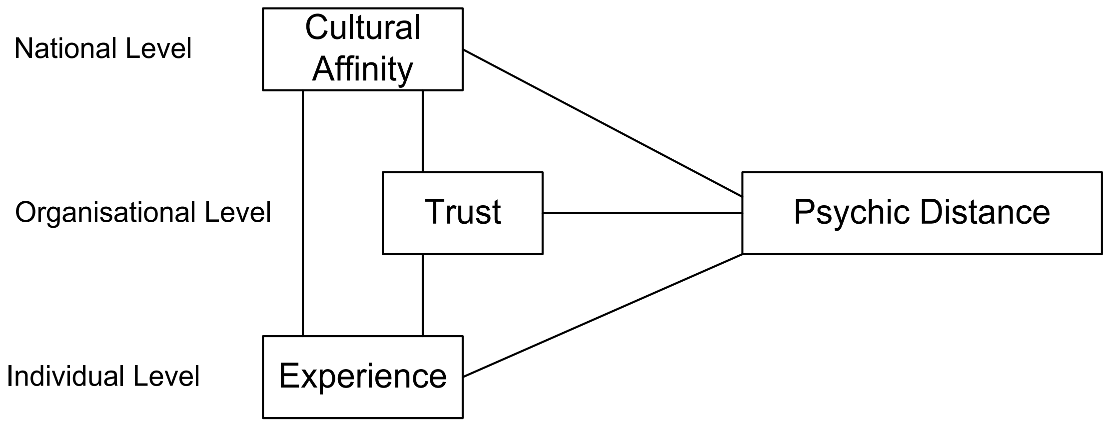
Table 2.4 Definitions of psychic distance

Author	Definition
Vahlne-Wiedersheim-Paul (1973)	Factors that prevent or disturb the flow of information between suppliers and customers
Nordstrom and Valhne (1994)	Factors preventing or disturbing firm's learning about and understanding of a foreign environment
O'Grady and Lane (1996)	A firm's degree of uncertainty about a foreign market resulting from cultural differences and other business difficulties that present a barrier to learning about the market and operating there
Lee (1998)	International marketer's perceived socio-cultural distance between home and target country in terms of language, business practices, legal and political systems and marketing infrastructure
Swift (1999)	Consequence of a number of interrelated factors and perception is a major determinant

The common theme from all of these definitions is the prevention of information flow for the decision maker, which is the key for successful internationalization.

Hallén and Wiedersheim-Paul (1984) observed that psychic distance is a combination of factors at the national, organizational and individual level (Figure 2.7).

Figure 2.7 Determinants of psychic distance *(adapted from Hallén and Wiedersheim-Paul, 1984)*



Cultural affinity is reported as reducing psychic distance, since it helps the company to correctly estimate needs and requirements. Mutual trust is needed so that a long-term relationship can be built. Experience will determine the perceptions of and decisions made by the manager. Trust and experience can only be gained through interaction and a similar culture. Conway and Swift (2000) illustrated the stages that are necessary for the development of a relationship, and matched these with the determinants of psychic distance from Hallén and Wiedersheim-Paul (1984) (Table 2.5).

Table 2.5 Psychic distance and relationship development

Source: Conway and Swift (2000) [based on Hallén & Wiedersheim-Paul, 1984]

Dow (2000) tabled research employing surrogate measures of psychological distance (Table 2.6). From his analysis of these studies, he demonstrated that examinations which employ key-informant-based studies are better predictors of psychic distance than those that do not. Geographic distance is a significant predictor working independently of the predictors of psychic distance. One downside of Dow's (2000) study, however, is that he only investigates the predictors of export market selection. This reduces the usefulness for equity-based internationalization of SMEs. Swift (1998) argued that psychic distance is a product of the personal perceptions of decision makers, which include their interpretation of the data and information available. Interpretation in turn is the product of personal experience and value systems, which are based on one's cultural background.

Conway and Swift (2000) identified 25 elements of culture, which can be found in Appendix 3. Swift (1998) identified psychic distance as a perception of the manager, which is dependent on this list of 20 items. However managers in SMEs are influential in the internationalization decision-making process, and this has not been researched previously.

Table 2.6 Research employing surrogate measures of psychic distance

(adapted from Dow, 2000)

	Authors	Psychological Distance Indicators
International Trade Literature	Linnemann (1966)	Geographic distance and three dummy variables
	Gruber and Vernon (1970)	Geographic distance and a dummy variable
	Hirsch and Lev (1973)	Geographic distance and a dummy variable
	Leamer (1974)	Geographic distance
	Geraci and Prewo (1977)	Three dummy variables
	Srivastava and Green (1986)	Geographic distance and three dummy variables
	Bergstrand (1989)	Geographic distance and two dummy variables
Scandinavian research of the 1970s	Vahlne and Wiedersheim-Paul (1977)	15 separate indicators
	Johanson and Wiedersheim-Paul (1975)	Single ordinal scale based on Vahlne and Wiedersheim-Paul's (1977) study
Studies employing Sethi and Hofstede's scales	Davidson (1983)	Single scale based on Sethi (1971)
	Kogut and Singh (1988)	Single scale based on Hofstede (1980)
	Benito and Gripsrud (1992)	Single scale based on Hofstede (1980)
	Grosse and Goldberg (1991)	Geographic distance and Hofstede scale
	Grosse and Trevino (1996)	Geographic distance and Hofstede scale
Studies employing key-informant-based scales	Dichtl, Koeglmayr and Muller (1990)	Single-item instrument: self-reported, post decision
	Holzmuller and Kasper (1990)	Single-item instrument: self-reported, post decision
	Kim and Hwang (1992)	Four-item instrument: self-reported, post decision
	Vahlne and Nordstrom (1992)	Single-item instrument: applied to an independent panel

Source: Dow (2000)

In a later study, Nordström and Vahlne (1992, cited in O'Grady and Lane, 1996) operationalized psychic distance through the following indicators: level of economic development in the importing countries, differences in the level of economic development between Sweden and the host countries, level of education in the importing countries, difference in the level of education between Sweden and the host countries, difference in business language, difference in culture and local language and existence of previous trading channels between Sweden and the host countries. They used Hofstede's (1980) dimensions of culture, structural indicator factors such as legal and administrative differences, and language differences. From this definition of psychic distance, they developed an index for measuring country rankings.

Kogut and Singh (1988) suggested that cultural distances between countries can explain the entry mode choice. They assumed that if the revenues are constant across alternatives of entry choices, managers will choose the entry mode most likely to minimize the perceived cost of entry and improve coordination with the subsidiary. Like Hallén and Wiedersheim-Paul (1984), they divided the influence of the home country's cultural characteristics into three levels: cultural characteristics of the nation, firm variables and industry variables. The use of cultural characteristics, and hence the culture itself, is not enough to explain psychic distance because the scales that measure culture do not directly capture factors such as business environment. Obviously, culture affects all of the factors of psychic distance, albeit indirectly in certain cases.

Kogut and Singh (1988) used four firm level variables: diversified companies will find it easier to enter a foreign market through acquisitions over Greenfield investments; companies will choose acquisitions compared to joint venture as the experience about the foreign market increases; multinational companies will choose acquisition over other entry choices as they can sustain the risk of an acquisition and integrating with another business; and larger firms will choose acquisitions compared to other forms of entry choices, as acquisitions need more financial and managerial resources than other entry forms. They used two industry-level variables. First, they chose R&D expenditure to sales and industry media and advertising expenditure to sales as control variables. Finally, they employed sectoral dummies for manufacturing and services. Their last group was country-level variables, which is divided into two specific subgroups. Joint ventures are selected as an entry mode over other choices as the cultural distance increases. This research has been applied solely to multinationals and large organizations. The findings of this research are quite interesting and useful in terms of understanding the relationship between psychic distance and mode of entry, and the same type of research needs to be conducted for SMEs. Cultural distance is associated with power distance, uncertainty avoidance, masculinity/femininity and individualism (Hofstede, 1980). Hofstede's (1980) dimensions are individualism, uncertainty avoidance, power distance, masculinity and long-term orientation. The greater the uncertainty avoidance of the host country, the more likely a company will be to choose joint ventures over other forms. Furthermore, the greater the uncertainty created by psychic distance, the more likely companies will be to choose to use joint ventures compared to wholly owned subsidiaries.

Evans and Mavondo (2002) criticize Kogut and Singh's (1988) measure of psychic distance for three reasons. First, the composite index depends on the scores obtained for each country in the period between 1968 and 1972. Second, the composite index is based on scores relative to the USA. Last, the index is based on work related to Hofstede's (1980) factors, rather than individuals' perceptions of a foreign country's general values and attitudes.

Evans and Mavondo (2002) recommend that several factors be used to measure psychic distance, including: cultural distance, business practice differences, communication differences, economic environment, legal and political environment and industry structure differences. They divide these into two groups of indices: cultural and business differences. Business differences are listed as: legal and political environment, economic environment, market structure, business practices and language. The most important contribution of Evans and Mavondo (2002) is the recognition of more business-related factors as antecedents of psychic distance, rather than very general factors (Singh, 1998), or cultural scales that measure differences between countries (Kogut and Singh, 1988 and Hofstede, 1980). These factors are also mentioned in O'Grady and Lane's (1996) study, wherein Canadian firms did not correctly estimate the differences in market structure and business practices as well as cultural distance, and failed in their internationalization into the USA market. The legal and political environment can be divided into three levels: inter-state, state and local. The effects of the European Union and NAFTA are considered to be at the inter-state level. It is obvious that firms entering a foreign market with a different legal and political environment will confront an abundance of uncertainty. Economic environment is another important factor that managers should consider during the internationalization process. Some important factors under economic environment are: gross national product or gross domestic product, economic stability, degree of government control over economic activity, currency fluctuations, demand for goods and services, banking sector capacity, and level of urbanization. It is common sense that if companies would like to internationalize without any consideration for the economic environment of the foreign market, they will find themselves dealing with a lot of uncertainty and a need to learn. This is also critical for the success of internationalization. Market structure can be measured by enterprise density and market concentration (measured by market share). Language differences can limit the speed of learning and technology transfer. Evans and Mavondo (2002) found two important results. First, cultural and business distances are not good predictors on their own. However, the use of cultural and business distance together is a better predictor. The last important finding from their study is that the success of companies in foreign markets is dependent on language skills.

Child, Ng and Wong (2002) conducted research into five Honk-Kong-based company case studies, and discovered five distance-creating factors: culture (including difference in language), level of economic development, level of technological development, geographic distance (including temporal and climatic changes). They considered the following factors as important and relevant when managers make decisions: political and social stability, corruption in business and government sectors, degree of transparency in the legal system, and the attitude of host governments toward overseas investors. This is reasonable, as the five case studies in their research have internationalized into China, as well as other countries. Child, Ng and Wong (2002) believe that macro developments derived from social movements, institutional changes, globalization and technological advance act as distance-compressing factors. Some technological changes that are presented as illustrations include mutual emulation and convergence of lifestyles, consumption patterns, human-rights standards, legal framework, and business processes. They also demonstrated the importance of the following factors: international education or professional management training of the decision maker, presence of a trusted friend or availability of a loyal stuff member in a particular overseas location, personal networks of the decision maker, sending trusted employees to the overseas location to manage the business and leaving the overseas business to a trusted friend to reduce the psychic distance. These are actually the same factors that are needed for born globals to internationalize quickly into new markets.

Gatignon and Anderson (1988) identified that companies who are internationalizing through equity ownership experience uncertainty as a result of socio-cultural distance. The highest impact of uncertainty is the country risk, which affects the control of the investing company.

Meyer (2001) examined the effects of psychic distance on transaction costs. Each entry mode can be associated with a transaction cost with varying levels starting from joint ventures (the lowest in equity-based internationalization) to acquisitions (highest in equity-based internationalization). The cost of psychic distance is associated with a lack of familiarity with institutions. This cost increases the establishment costs in every step of equity-based internationalization, and discourages complex operations and wholly owned acquisitions. This paper is one of the few within the psychic distance literature to look specifically at equity-based internationalization. Two other studies, which are important because they consider all forms of internationalization, are Evans and Mavondo (2002) and O'Grady and Lane (1996). Maitland and Nicholas (2002) uncovered similar results to Meyer (2001), finding that the motives for seeking local partners include local market knowledge, government contacts, cultural and social knowledge, commercial contacts, access to marketing/distribution network, past relationship, suitable going concern facility, host government requirement, access supply network, finance and spread of risk. It is clear that motives for selecting joint ventures are dependent on psychic distance. In addition, the causes of joint venture disharmony are presented as cultural and linguistic differences, different short-term expectations and general misunderstandings. Maitland and Nicholas (2002) provided another important contribution by assessing the factors of risk that affect psychic distance. These are: bureaucratic obstructionism, foreign exchange/currency risk, inadequate infrastructure, lack of intellectual property rights protection, profit/payment remittance restrictions, host country political uncertainty, government favoritism, lack of state neutrality, embryonic nature of reform process, low labour productivity, rising labour cost, labour laws, and labour disputes. They also showed similar results to O'Grady and Lane (1996) in terms of the psychic distance paradox. The Australian companies in their study made similar mistakes to O'Grady and Lane's (1996) Canadian retailers by assessing India as a psychically close country because they share similar legal and commercial backgrounds. The only way that the Australian companies invested in India survived was to build extensive dispersed networks. Part of the learning, according to the authors, is specific to the location, and includes knowledge about local tastes, government policy, commercial practice and market characteristics in the form of knowhow. This paper is again very useful in explaining the factors needed for equity-based internationalization. However none of these studies that consider the psychic distance factors for equity-based internationalization are specific to SMEs, and thus this represents a research gap.

Barkema, Bell and Pennings (1996) suggest that the cultural distance varies by mode and ownership structure. Higher barriers owing to psychic distance were found in double-layered learning within which the basic assumptions of the learner will change, while knowledge is added. Pan and Tse (2000) revealed that the internationalization process starts with a decision between non-equity- or equity-based internationalization. Macro-level information is needed to reduce psychic distance, followed by micro-level factors such as specific contract terms, human resource issues, distribution channels and so on. Dichtl, Koeglmayr and Muller (1990) examined the foreign market orientation of managers from the perspective of exporting. Managers with higher psychic distance from foreign markets and countries, limited education level, less proficiency in foreign languages, less travel experience to foreign countries than their colleagues, higher age, aversion to risk, unwillingness to change, and an expectation of lengthy job-related stays abroad having a negative effect on their career and families, display a negative attitude towards exporting (Dichtl, Koeglmayr and Muller's (1990) study is export-oriented, but the same criteria are valid for equity-based internationalization) and are not foreign market oriented. Foreign market orientation can be correlated to psychic distance, as the existence of psychic distance can be understood with reference to foreign market orientation. Eriksson, Johanson, Majkgard and Sharma (1997) demonstrate that a company's experience in previous internationalization efforts influence the perceived cost of the process. The accumulated internationalization experience based on business and institutional knowledge does not describe specific country markets, as it is a firm-specific knowledge that can be used in all markets. This knowledge affects the cost of internationalization indirectly through experiential market knowledge.

As stated by O'Grady and Lane (1996), the basic implication of psychic distance is that "psychically close countries are more similar, and that similarity is easier for firms to manage than dissimilarity, thereby making it more likely that they will succeed in similar markets" (O'Grady and Lane, 1996: 310). Another limitation of research on psychic distance in O'Grady and Lane's (1996) study is that it has not acknowledged how the psychic distance between countries affects the decision-makers' choice of entry. O'Grady and Lane (1996) argued that perceived similarity can be a cause of companies' failures in psychically close countries because the decision makers and managers are not prepared for the differences. They call this effect the "psychic distance paradox". To measure psychic distance, O'Grady and Lane (1996) used the following factors: achievement orientation, level of aggressiveness, level of optimism, action orientation, belief in hard work, attitudes toward authority (negative attitudes toward government/positive attitudes toward authority), belief in competitiveness, risk propensity, positive attitudes toward risk, masculinity dimension, uncertainty avoidance dimension, individualism/collectivism dimension, power distance dimension, commitment to winning, mastery over one's environment, cautiousness, and attitudes towards equality. These were used to measure why Canadian retailers internationalizing to the USA succeeded or failed. Similarity and proximity of two close countries can result in internationalizing through unchallenged assumptions. The experience of the decision maker helps the company to make better decisions. These types of experiences are gained through people who have experienced similar work environments and businesses in two different countries. O'Grady and Lane's (1996) suggest that experiential knowledge (Johanson and Vahlne, 1977) can only be gained through experience in that country. Managers who make assumptions may be mistaken in terms of of differences that they cannot know before internationalizing.

The acquisition of proper market-specific knowledge is of primary importance to resource-constrained SMEs (Wiedersheim-Paul, Olson and Welch, 1978; Douglas, Craig and Keegan, 1982). Kontinen and Ojala (2010) provided a very good example of the importance of accessing local market knowledge for family-owned SMEs from Finland internationalizing to France. They recognized that with limited market knowledge, SMEs will choose step-wise internationalization with indirect methods. Finnish, family-owned SMEs used many methods to overcome the lack of local market knowledge, including hiring local people and learning the language and culture of the country.

Davidson (1980) analysed the foreign subsidiaries of multinational enterprises from their inceptions and found three patterns. First, firms will invest where their competitors in the same industry have invested before. This is a mimic effect and most of the theories and their models do not really capture this behaviour. Hessels and Terjesen (2010) identified that in exporting, most SMEs will follow domestic customers or competitors to the same markets. However, this is partially related to psychic distance because companies can learn from each other and reduce the psychic distance required. Second, countries with similar cultures are preferred targets of investment. Last, market-specific experience in a country will yield to a wholly owned investment in later stages. This is in line with the Uppsala model of internationalization (Johanson and Vahlne, 1977, 1990) and other learning theories. However, the SME may choose to enter a market without previous market knowledge, or with limited market knowledge. This cannot be explained through the Uppsala school of internationalization. The findings of Child, Ng and Wong (2002), on the factors that reduce the psychic distance of managers, will determine the entry mode selection. However, research on this within SMEs is very limited, and needs to be conducted to understand whether SME managers behave similarly to large organizations.

Liesch and Knight (1999) introduce a “hurdle rate” explanation of the effects of cost of information acquisition and knowledge creation on psychic distance. In every entry mode decision, from the early stages of exporting to the later stages of equity investment, and from closed markets to far and higher-psychic-distance markets, SMEs need to overcome information acquisition and knowledge creation hurdles. SMEs feel ready to internationalize when the cost of information acquisition and knowledge creation to lower the psychic distance is acceptable. Liesch and Knight (1999) also propose a learning curve effect on information acquisition and knowledge creation. They suggest that as companies move from one hurdle to another, they will learn to be fluent in terms of how to acquire information and create knowledge. Denis and Depelteau (1985) and Eriksson et al. (1997) emphasize the importance of experiential knowledge acquired through experience in foreign markets in managerial decision making, and later state that a lack of such experiential knowledge affects the manager’s perception of the cost of internationalization. There are some advantages to SMEs in information processing from the environment and dissemination of that knowledge to the entire firm (Kirpalani and MacIntosh, 1980; Oviatt and McDougall, 1994). Coupled with the increasing importance of networks in internationalization (Johanson and Mattsson, 1988), learning from international markets can be best utilized in SMEs. The disadvantage of SMEs over large organizations is they have fewer human resources that can learn from the environment. There is no such study that shows whether these two can neutralize each other, however, or whether SMEs experience the same amount of psychic distance as large enterprises.

2.3.2.3 Implications of learning theories on SME internationalization, and the research gap

The Uppsala model of internationalization has been one of the few theories to try to explain SME internationalization (Johanson and Vahlne, 1977). However, the focus is mainly on the early internationalization of companies, based on exporting. The experiential knowledge required to overcome psychic distance (Johanson and Vahlne, 1977) is based on market-based information that is good for the export mode of entry. Equity-based market entries have very little need for market information, but do require other forms of experiential knowledge. The early learning theories showed that traditional companies internationalize slower than new high technology companies. Forsgren (2002) have many criticisms including on the experiential knowledge required to internationalize.

The only study that has taken account of SMEs is Ahokangas' (1998), in which SMEs are seen as resource seekers from the environment with limited ability. Calof and Beamish (1995) and Zahra, Ireland and Hitt (2000) recognize the importance of adopting the operations of the parent firm in the international environment. These authors treat the manufacturing capability – and hence operational advantage – as a resource and a source of knowledge. The adaptation of manufacturing technology in another country means that there is a need for change after transferring the resource.

Psychic distance in general is explained around the Uppsala school model of internationalization (Johanson and Vahlne, 1977, 1990), in which, as explained above, the emphasis is on export-, rather than the equity-based, internationalization. Some studies have explained psychic distance for equity-based internationalization (Evans and Mavondo, 2002; O'Grady and Lane, 1996; Maitland and Nicholas, 2002; Meyer, 2001), however they are all related to larger organizations. There is a significant research gap in terms of explaining the psychic distance factors in equity-based internationalization for SMEs. Another important development in psychic distance literature that has not been studied within SMEs, but only for large organizations, is the relationship of entry mode selection and psychic distance (Lieshc and Knight, 1999; Kogut and Singh, 1988). The equity-based internationalization psychic distance factors for SMEs also represents a research gap within the psychic distance literature in learning theories.

Learning theories have explained SME internationalization considerably more than economic theories. However, most of the models that have been discussed within the learning theories do not distinguish between SMEs and large organizations. To compound matters, the differences in definitions of SMEs across different countries make it even harder to distinguish which of these studies refer to SMEs. The Uppsala school of internationalization (Johanson and Vahlne, 1977) recognizes itself as a model that explains SME internationalization because research has been conducted using it with a sample of large Swedish organizations which can (still) be considered SMEs in many other countries. Another important caveat for learning theories is the fact that they are applicable to small economies with limited internal market size. The companies from economies with smaller internal markets, such as Switzerland, will internationalize faster than the companies from economies that have large internal markets. Hence, the smaller internal market economy will create smaller companies before internationalization.

There are many research gaps within learning theories of internationalization, and most of these are related to SME internationalization. First, most of the models of this theory are related to export-based internationalization, with the exception of the last stage of internationalization, which is direct investment for production. However, this low emphasis on equity-based internationlization creates a problem of not illustrating exactly what kind of experiential knowledge is required for foreign direct investment, and what the psychic distance factors that prevent knowledge flow are. The above research gap is even more important for SMEs, which have not been researched properly.

2.3.3 Network theories of internationalization

The third perspective on the internationalization process is the network approach, or network theories of internationalization. This approach sees networks as the starting point for internationalization activity. Companies usually use their networks to acquire the knowledge needed for the internationalization process. Network theories of internationalization are rooted in learning theories, particularly the Uppsala school. In this model, companies require network to enable their experiential learning (Johanson and Vahlne, 1977).

Johanson and Vahlne (1990) were the first to study internationalization as a network behaviour. Their study was based on the Uppsala school of internationalization, which is based on learning. They explained the internationalization process with reference to three development stages in networks of business relationships. The first stage is *extension,* which refers to investment in a network that is new to a firm. The second stage is *penetration*, wherein companies increase their resources to develop a position in a network. The last stage is *integration*, whereby companies imitate the internationalization of other companies in their international and national networks. From this model, it can be argued that some industries will be more internationalized than others (Andersen, 1993; Buckley and Ghauri, 1993). However, whether or not the organizations in these studies qualify as SMEs is questionable.

In Johanson and Mattsson's (1988) model of internationalization, there is a focus on a gradual learning of market knowledge and internalization through interaction within networks. Johanson and Mattsson (1988) use a network perspective to explain the internationalization strategy of a company. Companies will aim to reduce the need for knowledge development, minimize the need for adjustment, and exploit established network positions. Johanson and Mattsson (1988) propose four stages of internationalization (Table 2.7).

Table 2.7 Internationalization stages *(adapted from Johanson and Mattsson, 1988)*

Degree of Internationalization of the Firm ↓	Degree of Internationalization of the Network ↔	
	Low	High
Low	Early Starter	Late Starter
High	Lonely International	International among others

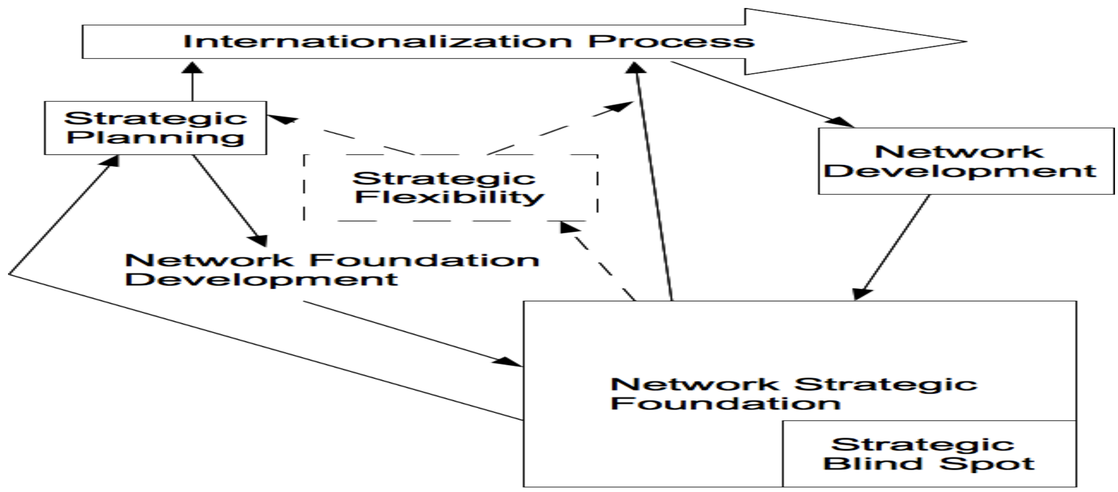
The internationalizing firm can take one of the four roles proposed by Johanson and Mattsson (1988). They argue that the level of learning in each of these roles is different, and hence that the level of learning is not the same for all organizations. The worst position is to have low degree of internationalization of the firm and the network. The firm cannot learn from the network under these conditions, and will spend time and capital on acquiring experiential knowledge about markets. The next two states are comparable in terms of their ability to learn: a company that has a high degree of internationalization but a low degree of network internationalization does not have a problem, as their knowledge about internationalization and the relevant markets will help them internationalize further; however, a company that has a low degree of internationalization but a high degree of network internationalization has an advantage over other firms, as it can learn from its network and internationalize quickly. Companies in the first two roles lead their network, whilst those in the third role are actually followers. The last role is a high degree of internationalization for the firm and the network. This actually involves learning between networks about international markets. The knowledge exchange at this level is very high. Johanson and Mattsson (1988) conducted their study using large organizations, however their findings can be equally applicable to SMEs.

Internationalization will eventually create a network structure for the company. The difference between the network theory and other internationalization theories is that networks are created to preserve, strengthen and increase the value of these relationships (Holm, Eriksson and Johanson, 1996). This is mostly suitable for SMEs, because internationalization to another country is a risky strategy. Other internationalization theories consider a firm's internationalization to be a rational activity through which companies try to use firm-specific assets to gain advantages in a foreign market. The network perspective defines this as a relationship through which companies need to identify and manage relationships so that they can gain those advantages (Morgan and Hunt, 1994). Morgan and Hunt (1994) and Uzzi (1997) identify trust and commitment as important factors that enable the achievement of benefits from internationalization from a network perspective. These relationship-based factors are important contributors to understanding internationalization by all organizations. Morgan and Hunt's (1994) and Uzzi's (1997) studies also used larger organizations, but again are equally applicable to smaller organizations, though no studies have tested this. The internationalization of any size of organization, according to these studies, is dependent on their network relationships. Tang (2011) recognized that there are four key behavioural aspects of networks for internationalization: proactiveness, commitment, openness to network diversity and strategy. Welch and Welch (1996) identified the importance of strategy and networks for internationalization, and this will be explained in detail below.

The network theory of internationalization is a relatively new development in the internationalization literature. Johanson and Mattsson (1988, 1993, cited in Buckley and Ghauri, 1993) described three models of internationalization. The first is the theory of internationalization, which is explained through transaction cost economics, and looks at the transfer of internally developed competencies and assets to another location to achieve superior production, products, market opportunities and/or knowledge. The second model comes from the process of internationalization by learning (Johanson and Vahlne, 1977). This was explained in greater detail above. The third model is the network approach, which is a development of the Uppsala model (Johanson and Vahlne, 1977). This approach, according to Johanson and Mattson (1988, 1993), concentrates on internationalization by establishing and cultivating relationships with partners in foreign networks. The similarity between the Uppsala model and the network model relates to the effects of learning and knowledge. In both, companies gradually internationalize further as they learn more about markets. Above the importance of trust and commitment was stated as critical for success in networks. Risk, uncertainty, control and commitment are other factors that complement trust and learning (Axinn, 1988; Welch and Wiedersheim-Paul, 1980). Sherer (2003) studied the critical success factors for manufacturing networks, and categorized these as follows: trust, commitment, selection choice, information technology, intermediary support of conduciveness of external environment.

Welch and Welch (1996) linked network theories of internationalization to strategic management. This states that internationalization is not reactive, but requires planning. The internationalization of the company starts from the strategic network foundation. Once the company recognizes an opportunity as a strategic blind spot, they can use their strategic flexibility to react or proact to it. The strategic flexibility in this context is the ability to react to the opportunity. This is reflected in their strategic planning. According to this strategic planning, the company makes a decision about internationalization, and this requires network development wherein the company learns about the international markets. Hence, this learning reveals more opportunities for the company within their network strategic foundation (Figure 2.8).

Figure 2.8 Internationalization and Strategic Networks *(adapted from Welch and Welch, 1996)*



Welch and Welch (1996) contributed to network theories by introducing strategic planning into them. However, their study applies to all organizations and does not differentiate SMEs.

D'Cruz and Rugman (1994) identified five partners in an international network: the multinational enterprise, key suppliers, key customers, selected competitors, and the non-business infrastructure (institutions such as education and government). Welch and Welch (1996) define network actors as foreign intermediaries, customers, alliance partners, suppliers, government officials and other entities. These partners are the source of knowledge for internationalization.

Chetty and Patterson (2002) expanded this definition of internationalization by adding capability, which they define as experiential learning about markets and applying these in order to gradually increase international operations. This learning process for Chetty and Patterson (2002) happens in networks. Although their study focused on exporting, it has some useful implications for internationalization in terms of location decisions (foreign direct investment).

The definition of capability, and its distinction from experience as the use of experience and knowledge from markets, makes it easier to explain why some companies, despite gaining experience, are not extending their international operations. This study has another important characteristic: its focus is on SMEs. Chetty and Patterson (2002) developed the ideas of Etemad and Wright (1999) and concluded that there is no single model that can sufficiently explain SME internationalization, and that the best way to do so would be to look at network theories of internationalization. However, the capability explanation is limited because it does not recognize choice theory. The biggest assumption is that all companies are motivated by the same types of investments. The internationalization decision is one of the ways in which to grow the firm, and the decision maker should make a decision on the possible rents that can be earned from different investment options. Their internationalization capability cannot solely explain the extent of their international operations.

2.3.3.1 International manufacturing networks

International operations management has divided internationalization activity into configuration and coordination activities. Configuration is similar to internationalization theories, while coordination is more akin to the management of international business networks. Nevertheless, international manufacturing networks use these two approaches to explain the behaviour of companies.

Colotla, Shi and Gregory (2003) examine the strategic importance of network configuration and coordination with respect to the competitiveness of international manufacturing. They developed a factory-network capability matrix to explain how different forces in these two dimensions affect competitiveness. Companies in international manufacturing networks have two options to improve their competitiveness. First, they can improve their network positions or improve factory-level competitive positions, which will result in competitive advantage over other companies. The combination of coordination and configuration advantages produces a competitive advantage for the company. However, two companies that have dissimilar configuration and coordination advantages may end up at the same level of competitive advantage; to change this, they need to improve in either configuration or coordination advantages. Companies can also improve both of these advantages. Configuration advantages include: proximity to suppliers, availability of labour, availability of skills and know-how, proximity to market, socio-political, competition, energy and others. Coordination advantages include: economies of scale and scope, manufacturing mobility, learning ability.

The factory level competitive position is divided into structural and infrastructural practices. The main advantage can be obtained from better infrastructural practices. These infrastructural decision areas are listed as organization structure, quality policy, production control, human resources, new product introduction, and performance measurement and reward.

The use of better infrastructural practices is considered as resource deployment. Companies gain advantages through the use and improvement of their resources, which is known as resource deployment (Makadok, 2001). There is also another mechanism to achieve competitive advantages from resources through resource picking. Superior equipment, processes and advanced manufacturing technology can all be considered better resources. Internal development or external adaptation of these new resources can enhance the resource base of the company.

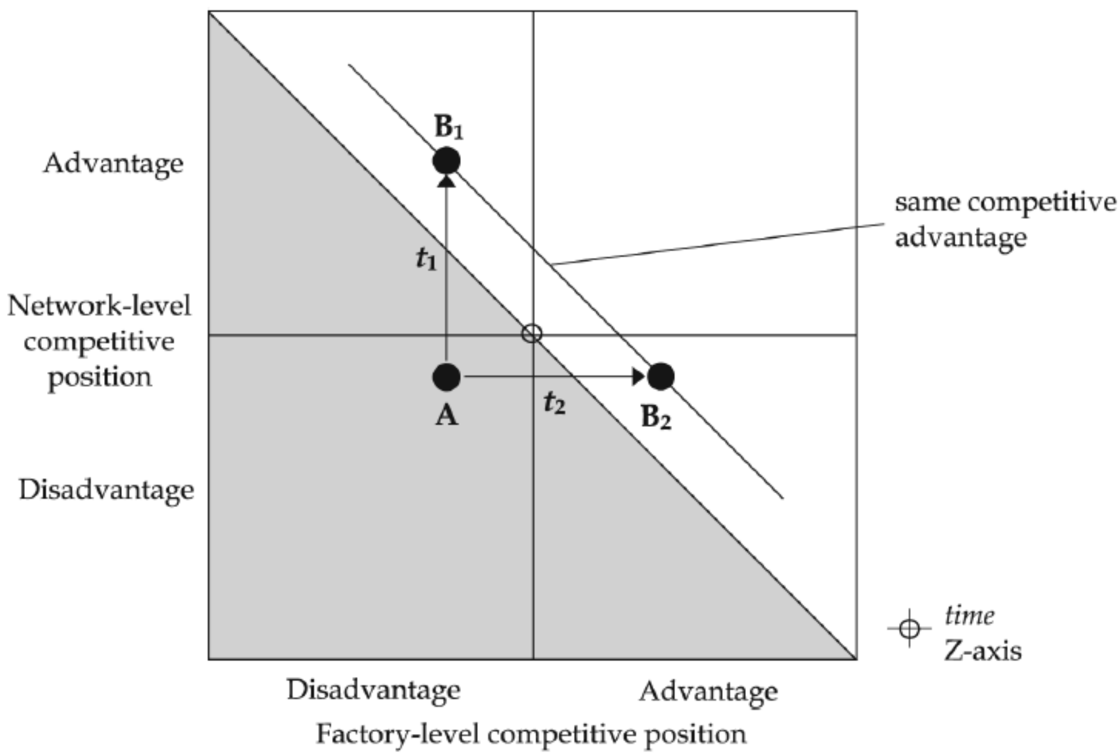
Network-level competitive position can also be achieved through structural and infrastructural practices. The former can be achieved through plant configuration. The location of the manufacturing facility, capacity and strategic importance are among the decision criteria that can be used. The latter is attained through greater coordination of resources within networks. Table 2.10 provides a matrix of structural and infrastructural practices that contribute to factory-level and network-level competitive positions.

Table 2.8 Matrix of structural and infrastructural practices' contribution to factory- and network-level competitive positions *(adapted from Colotla, Shi and Gregory, 2003)*

	Structural Practices	Infrastructural Practices
Factory-Level Competitive Position	Better equipment, processes and advanced manufacturing technology	Organization, quality policy, production control, human resources, new product introduction, and performance measurement and reward
Network-Level Competitive Position	Plant configuration	Coordination or resources in the network

The above factory network capability matrix represents how to reconcile these two distinct advantages. Within the zone of competitive advantage, a company can achieve factory- and network-level competitive advantage. Colotla, Shi and Gregory (2003) gave the following example to explain the use of isolines and how companies achieve results in factory- and network-level competitive positions. In Figure 2.9, below, the company is situated in position A when it has disadvantages at the factory or network level (the performance objectives therein will be discussed in greater detail below). The company has two choices: it can either relocate to another country so that it can gain advantages from structural changes from a network-level competitive position, or improve its infrastructural practices for a factory-level competitive position. B1 represents the improvement in structural practices in the network-level competitive position, and is achieved in time t_1. B2 represents the improvement in infrastructural practices in the factory-level competitive position, and is achieved in time t_2. Both of these changes will result in the same level of competitive advantage, which is demonstrated by the diagonal isoline. Colotla, Shi and Gregory (2003) recognized that there is "the need for developing strategy processes to help companies reconcile these two levels, addressing the strategic implications of the interaction and interplay of factory and network capabilities, and the strategic nature of capability building over time".

Figure 2.9 Example of factor and network level competitive position network *(adapted from Colotla, Shi and Gregory, 2003)*



There are some limitations to this tool. A structural change in the network-level competitive position may fail because of the infrastructural network and factory-level competitive positions. A structural network-level competitive position decision is not independent from other levels of decisions. This dependency can be extended to other competitive positions; the decisions made for any improvement in one type of competitive position will be affected and have effects on other decisions in competitive positions. The research presented here will show what kind of problems can arise during a relocation decision, and how they can be avoided through establishing a decision method to encompass all possible improvement in the competitive position spectrum.

Meijboom and Voss (1997) attempted to integrate coordination and configuration, but based their study on the eclectic paradigm and Ferdows' role of factory model. Shi (2003) identified the need to move from a single-factory-focused manufacturing strategy to a manufacturing network perspective (Table 2.11). In the same study, he identified four generic strategies for global manufacturing networks, which are strategic resource accessibility as capturing external resources, thriftiness ability as improving operations for higher economic and performance efficiency, manufacturing mobility as ability to deploy manufacturing resources to optimize internal resource utilization and learning ability asability to develop manufacturing capability (performance objectives) through continuous improvement and stimulating learning.

Shi (2003) expanded all these analyses into how international manufacturing networks are linked to global manufacturing strategy and business performance.

The international manufacturing networks contribute to the performance of the company through four advantages that can be created within these networks. These are: resource accessibility, thriftiness (efficiency), mobility (agility) and learning ability. The coordination mechanism provides an important lever to combine these advantages within the network so that each factory can contribute their cost, delivery, quality and flexibility advantages.

Table 2.9 Move from traditional factory focus to manufacturing network focus *(adapted from Shi, 2003)*

	Difference between two types of manufacturing systems	
Characteristics of the system's construction	Factory management system	International manufacturing network systems
Structural elements: (static levers controlling the architectural configurations of corporate international manufacturing system)	1 Capacity: amount, timing and type	1 Factory's characteristics: (as whole left column)
	2 Facilities: size, location, specialization	2 Geographic dispersion: distributed factory condition
	3 Technology: equipment, automation, linkage	3 Horizontal coordination: coordinated mechanism between factories in networks
	4 Vertical integration: direction, extent, balance	4 Vertical coordination: co-integration in value-adding chain
	5 Workforce: skill level, wage policies, employment security	5 Dynamic response mechanism: opportunity identity and manufacturing mobility
Infrastructure elements: (dynamic levers controlling the operational mechanism of corporate international manufacturing systems)	6 Quality: defect prevention, monitoring, intervention	6 Product life cycle (PLC) and knowledge transfer in international manufacturing networks
	7 Production planning/material control: sourcing policies, centralization, decision rules	7 Operational mechanism: network daily coordination, management information systems
	8-Organization structure: structure, control/reward system, role of staff groups	8 Dynamic capability building and network evolution: learning by operations

The combined advantages of different factories create product-level advantages in international markets, including cost, delivery, quality and flexibility. These are generic strategies in operations management. The products will result in financial and market performance in international markets. The financial performance is measured by profit, sales, return on investment and return on asset. Market performance is measured by market share and position (Shi, 2003).

The same study goes on to explain how to make international manufacturing strategy. According to Shi (2003), international manufacturing strategy is a product of international manufacturing capabilities, country culture characteristics and capabilities and corporate and strategic business unit strategy. The international manufacturing strategy will lead to network design and consequently to network operations. These network operations will eventually create new capabilities and information about international markets. This will change two of the key determinants of the international manufacturing strategy: capability learning will change international manufacturing capabilities, while information (about international markets) learning will change perceptions about country culture, characteristics and capabilities. The first type of learning will lead to technological breakthroughs, while the second type will lead to a trend of globalization for the company. Technological breakthroughs and a trend of globalization will change the infrastructure, environment, economy, and social and political factors, which are used for making corporate and strategic business unit decisions. This is one of the determinants of the international manufacturing strategy. The process of developing international manufacturing strategy is a loop wherein there is constant review and change resulting from the two types of learning: capability and information (about international markets). This study highlights three important commonalities between theories of internationalization. The first, information learning is present in all theories, and this leads to globalization trend. It includes market and experiential learning within learning theories of internationalization. The trend of globalization is the market commitment of the company in terms of state aspects. The change aspects of the company are explained through this type of learning.

The effects of networks are given in detail. The learning happens within the network operations or relations. This not only leads to information (about international markets) learning but also capability learning. The latter provides the technological breakthrough. This is similar to collaboration and resulting innovation within the networks.

The last, the resource-based perspective of internationalization is present in all theories. The corporate and business unit strategy, as well as products' competitiveness in markets, are all defined through the resources of the company.

2.3.3.2 Implications of network theories on SME internationalization, and the research gap

Network theories of internationalization postulate the importance of network relationships for internationalization with respect to collecting the market-specific knowledge required for learning theories of internationalization (Morgan and Hunt, 1994; Uzzi, 1997; Johanson and

Mattsson, 1988; 1993). Most of these studies have been focused on export-based internationalization, but eventually leading to equity-based internationalization. The knowledge requirement for each of these internationalization types differs. The level of network relationships and the type of knowledge required to learn may change, but still there is a need for good network relationships in order to achieve learning. These studies did not distinguish between SMEs and large organizations, however their samples are usually mixed, or can be considered as containing SMEs under certain countries' definitions. Network theories are useful to understand how and where the knowledge can be accumulated, however the only SME-specific studies in this field are Chetty and Patterson (2002) and Tesar, Boter and Bohman (2003). The importance given to innovation through internationalization shows that there are firms which choose to internationalize to achieve this advantage. However, the literature does not explain the role of SMEs and how can they achieve similar advantages.

2.4 Technology and knowledge transfer

Technology and knowledge transfer within this thesis is one of the areas from which internationalization decisions are explained. This has many connections to the previous knowledge presented above. The internationalization decision will include location, entry mode and motivation (role of factory in this dissertation) decisions. The second element of the decision-making process, entry mode, requires technology and knowledge transfer, which will determine the success of the internationalization. Hence, this thesis uses technology and knowledge transfer as a determinant of successful internationalization for SMEs.

Organizational practices constitute one area of transfer. Szulanski (1996) defines organizational practices as routine use of organizational knowledge, while Nelson and Winter (1982) identify evolutionary and tacit nature, and Kostova (1999) adds institutionalization of these practices in organizations which reflect the collective knowledge and competence of the organization. Organizational practices can range from employee evaluation to total quality management, and can be highly formalized or totally informal. Organizational practices such as total quality management can be classified as technical practices, whilst others fall into the social practices category. The organizational practices that give differentiated, competence-based sustainable advantage are also defined as strategic organizational practices (Kostova, 1999).

Internationalization allows technology transfer from one company to another. This advantage is based on the synergies and higher levels of efficiency that are available after technology transfer (Bartlett and Ghoshal, 2003; Kogut, 1991).

Various barriers to technology transfer can also be found in the literature (Ghoshal and Bartlett, 1988; Kedia and Bhagat, 1988; Szulanski, 1996; Zander and Kogut, 1995). Kostova (1999) focuses on two aspects of technology transfer: cognitive and psychological. These are believed to be embedded within the host and recipient originations. She analysed her constructs at three levels: country, organization and individual. These levels can be observed in social, organizational and relational contexts. Kostova (1999) based her analysis on institutionalization theory and organizational practices. The implications of this differ compared to previous studies, because the success is not only determined by transferability of knowledge, but also transferability of meaning and values.

Kostova (1999) defines the success of transfer as the degree of institutionalization of an organizational practice in the recipient organization. This is achieved through implementation and internalization. Implementation is achieved through following formal rules, while internalization is achieved when the recipient organization’s employees give a symbolic meaning and value to organizational practice. Kostova (1999) also mentions the possibility of a relationship between implementation and internalization. As implementation increases, so does internalization. Internalization is determined by practice commitment, satisfaction and employee psychological ownership. Practice commitment is a strong belief in, and acceptance of, the goals and values of the organizational practice, because of the relative strength of the individual’s involvement, identification, implementation and continuance of the organizational practice. Practice satisfaction is determined by the positive attitude and valuation of its importance to the organization. Employee psychological ownership is a state in which individuals recognize the practice as part of their extended themselves.

Social embeddedness is the institutional distance between host and recipient organizations. This is reflected as the cultural differences between different countries. The social context is defined by Kostova (1999) through three constructs: cognitive, normative and regulative. The cognitive dimension of national culture includes collective programming of the mind, which distinguishes between different categories of people; the normative dimension relates to differences in shared values; and the regulatory dimension is the regulatory framework of different countries. The organizational practices that are developed in certain institutional environments should be products of national culture in order to gain social legitimacy (isomorphic[2]). The transfer of an organizational practice may not be successful because of the differences in institutional environments of different countries.

Organizational embeddedness is defined under two constructs: favourability of learning and change, and compatibility with practice. Favourability of learning refers to the recipient organization's attitude towards change. If the recipient organization is change-oriented, than it is expected that the technology transfer will result in acceptance of the technology by individuals within the recipient organization. This will not work unless the values underlying technology/knowledge/practice and the culture of an organization are compatible. In a case of compatibility with practice, the individuals in the recipient organization will find it easy to internalize the technology.

[2] This explains that there are similarities between two organizations.

Relational embeddedness is based on the cooperative relationship. Four constructs are suggested by Kostova (1999). The commitment to the parent company or to the host company (in the case of a partnership without equity interest and equal equity) is defined as a willingness to show effort on behalf of the parent or host organization and stay as a member of that organization. Commitment increases the success of technology transfer. Identification with the parent or host can be explained as the extent to which the individuals in the recipient organization feel attached and feel themselves to be member of the parent or host organization. An individual which identifies with the parent company will share the same values, and hence find it easier to give meaning and value to the new practice/technology. This will also reduce the "not invented here" syndrome. Kostova (1999) defines trust of transfer coalition with reference to Bromiley and Cummings' (1995) idea that the parent company is expected to show good faith in compliance with any commitment, and be honest in discussions about these commitments. Furthermore, the parent company should not take advantage of the recipient organization. Trust has many positive effects. It reduces uncertainty, cost of communication and time in negotiations. The value of the technology for the recipient's organization increases as trust increases. In addition, it clarifies the motives and reliability of the parent company. The last construct used by Kostova (1999) is the power dependence relationship, wherein the recipient organization will implement a new practice/technology to be accepted by the parent/host. This construct does not affect the internalization of a practice.

One of the remedies to the barriers of technology transfer is absorptive capacity. Cohen and Levinthal (1990) stated that the ability to exploit any external knowledge is a function of prior knowledge in the form of basic skills, a shared language, and knowledge of basic science and technological developments. An absence of absorptive capacity within the recipient organization can work as a barrier to the technology transfer. Cohen and Levinthal (1990) identified three ways to increase the absorptive capacity of an organization: first, the company can conduct internal R&D; second, they can develop this through manufacturing operations; last, the personnel can receive external technical training. Cohen and Levinthal (1990) move from an individual (cognitive) to an organizational level of absorptive capacity. At the cognitive level, a person cannot learn unless he can associate new knowledge with the existing knowledge and frameworks that he has. This is also related to the problem-solving skills of individuals, and their creative capacity. In order to develop their absorptive capacity, an individual needs to learn a subject intensively, which will forge the association between the related items in the memory, and the knowledge to be learned. This will increase the likelihood of the retrieval of the knowledge later on (which is also called transformative capacity). Diversity and richness of prior knowledge forms a basis for learning. However, Schmidt (2010) identified that there are different forms of absorptive capacity, depending on the source of knowledge. These are: intra-industry, inter-industry and exploitation, and each require different methods of knowledge transfer. Intra-industry knowledge requires a broad diffusion of knowledge through informal networks, while inter-industry knowledge transfer requires less, but more specific, collaboration. Exploitive knowledge is scientific knowledge, which requires less broad dissemination, but must be converted from a scientific basis to an industrial application. Lee, Liang and Liu (2010) provided some evidence on the type of collaborations needed for international knowledge transfer. According to these authors, the two forms of collaborations include unilateral and bilateral contract-based alliances – the latter of which is needed for internalizing new knowledge.

Cohen and Levinthal (1990) proposed that an organization's absorptive capacity is the product of an accumulation of an individual's absorptive capacities. A firm's absorptive capacity depends on the people who interface between host sub-units and receiver sub-units and the environment. This is further enhanced by the absorptive capacity of the people through which these interfaces transmit their knowledge. Bhatt (2000) contemplated why individuals' accumulated absorptive capacities do not form the basis of organizational absorptive capacity, and suggested that there are managerial reasons for the conception of this problem. The learning culture of the organization may not permit knowledgeable members to exploit their resources. The primary reason for the failure of a learning culture is the managerial attitude towards learning and resource allocation for the exploration of new knowledge (Bhatt, 2000). Cohen and Levinthal (1990) suggested that the most basic knowledge necessary for sub-units is shared language and symbols (Dearborn and Simon, 1958; Katz and Kahn, 1966; Allen and Cohen, 1969; Tushman, 1978; Zenger and Lawrence, 1989), while the knowledge that is necessary for absorptive capacity is tacit and path-dependent.

Cohen and Levinthal (1990) propose some measures to increase companies' absorptive capacity, including: direct effect of ease of learning, technological opportunity as a high level of available technological information and appropriability are positive effects of spillovers in loosely dependent industries.

Lane and Lubatkin (1998) propose that recipient organization absorptive capacity is dependent on the specific type of new knowledge, similarities between compensation practices and organizational structures, and finally similarities in terms of organizational problems. Their basic assumption is that if a recipient organization wants to assimilate new knowledge, they need to have a similar knowledge processing system. This will make it easier for the recipient organization to internalize the new knowledge (Kostova, 1999). From this assumption, they develop their organizational dimensions of compensation systems, organizational structures and similarity of organizational problems. Organizational structure is measured against the degree of formalization and centralization. Von den Bosch, Volberda and De Boer (1999) used three common organizational forms, instead of dimensions of organizational behaviour. Similarities between organizational problems are perceived as an obstacle in commercializing new knowledge. Lane and Lubatkin (1998) suggested that organizations will make intelligible choices on which knowledge to acquire and develop over time. Their advantage is based on their knowledge about products and corresponding international markets. This relationship will create organizational rigidities, as companies will find it hard to assimilate new knowledge that has been created within other organizational constraints, since they will find it hard to value and give meaning to this new knowledge. Lane and Lubatkin (1998) found that prior knowledge, specialized knowledge, organizational structures and problems have a positive impact on absorptive capacity and learning; however, they found limited justification for similarities in compensation systems. Albino, Garavelli and Gorgoglione (2004) substantiate these findings by combining organizational structure and the cognitive processes involved. Cognitive processes are expected to support the similarities and dissimilarities between different organizations.

Grant (1996) proposed that absorptive capacity is formed through evaluation, acquisition, integration and commercial utilization of commercial knowledge. He went on to explain three dimensions of knowledge acquisition: first, organizations' efficiency with respect to identifying, assimilating and exploiting new knowledge in terms of cost and scale; second, the scope of knowledge that can be accessed by organizations; last, the flexibility of an organization to access new related knowledge whenever it is needed.

Liyanage and Barnard (2003) considered diversity between new knowledge and prior knowledge, which they call knowledge distance. Their findings are similar to Cohen and Levinthal's (1990): there is a limit to the similarity of knowledge, and there should be some differences so that the recipient organization will be willing to internalize the new knowledge through learning. Augier and Vondelø (1999) draw attention to the diverse nature of knowledge within the firm. They suggested that there are specialized "islands" of knowledge within the firm. These form the knowledge networks to fill the gaps and combine with relevant knowledge from other companies. These networks can be classified as loose networks, and their management creates two distinctive problems for companies. First, controlling the flows of knowledge between nodes of the network brings about problems of accessibility. Second, not all knowledge will be vital at all times; some companies will be redundant for a long time before they can contribute, and the knowledge required may need to be uncovered through scanning it from the environment. The advantage of a loose network is the weak relationships within it. This will allow what Liyanage and Barnard (2003) and Cohen and Levinthal (1990) discuss as the diversity between new knowledge and prior knowledge. On the other hand, the disadvantage of such weak ties is that most valuable knowledge to be transferred is tacit in nature, and thus can only be transferred through strong ties, allowing face-to-face interaction which, in turn, develops the necessary cognitive frameworks/mental models (Augier and Vondelø, 1999) or creates common values and meaning (Kostova, 1999). Langlois (1997) also reinforced the need for a similar cognitive system between the recipient and the host (environment/organization). Bhatt (2000) enunciates multiple interactions for organizational members to adjust their belief systems (similar to cognitive frameworks or value and meaning). Bergman, Jantunen and Saksa (2004) recommend the use of scenarios in knowledge networks to see how new knowledge can be combined. They also bring up the importance of *transformative capacity* in learning, and its relation as a prerequisite for absorptive capacity (Metclafe and James, 2000).

Van den Bosch, Volberda and De Boer (1999) add two specific organizational determinants to absorptive capacity – organizational forms and combinative capabilities – in an attempt to analyse the path dependency of absorptive capacity. Cohen and Levinthal (1990) mention the importance of interfaces in inter-sub-unit and between sub-unit and environment communication. Organizational structures or forms are closely related to Lane and Lubatkin's (1998) work. Previously, Kogut and Zander (1992) studied combinative capabilities by comparing three organizational forms: functional, matrix and divisional.Combinative capabilities can be divided into system, coordination and socialization capabilities. System capabilities are used to integrate external knowledge through written procedures, manuals, directions and policies in order to reduce variability in communication and coordination. Coordination capabilities are a product of training and job rotation, natural liaison devices (interfaces) and participation in decision making. They can be ad hoc or planned. Socialization capabilities are similar to internalization as set forth by Kostova (1999). They are related to a common meaning and value, which is expressed as a range from minimum common language and symbols to a common culture. Cohen and Levinthal (1990), Kostova (1999) and Grant (1996) relate absorptive capacity to this type of combinative capability. Van den Bosch, Volberda and De Boer (1999) add three other forms of combinative capabilities, which are more manageable than socialization capability. The importance of socialization capability can be seen within the knowledge management school, in which system capabilities are useful for exchanging explicit knowledge. Tacit knowledge can only be exchanged via socialization, which includes cooperative capabilities as well as socialization capabilities (Nonaka, Toyama and Konno, 2001).

The knowledge transfer happens to replicate one of the key performance objectives of the company in a subsidiary or another organization. These theory about performance objectives are presented in Appendix 4.

2.5 Synthesis of the literature

The internationalization literature can be divided into two major branches, which are economic theories and the learning theories. The latter has developed into network theories of internationalization. These branches of literature explain and develop the phenomenon for both multinationals and small and medium sized enterprise. The synthesis of these two branches is based on their communality and differences. The communality of the economic and learning theories are based on the motivation (Hymer, 1976), location and company specific advantages (Dunning, 1988, 1993, 2001). The motivation of internationalizing company is to gain rents that can increase their profitability, which can be attained by either selling more products to a new market, producing more effectively or efficiently or gaining different resources from the new foreign market. This can only be possible if the company has capabilities that are valuable to the customers and hence develop these skills further with the advantages the location can provide.

The differences between these theories are based on the implementation of internationalization. While the economic theories advocate use of entry modes as an implementation, internalization (Dunning, 1988. 1993, 2001), the learning theories claim that market knowledge is moderator to these market entries (Johanson and Wiedersheim-Paul, 1975, Johanson and Vahlne, 1977, 1990). The greater market knowledge lead to higher commitments to international markets through higher levels of entry mode. The perception of the manager as a decision maker is given importance in this case and the psychic distance provides an explanation why managers internationalize to markets that they are either familiar with or markets have similarities. The source of market knowledge for learning theories is experiential, which has been developed by network theories to network based sources.

The literature on internationalization for both SMEs and multinationals explains that the companies will seek new markets to increase their profitability or develop their competitiveness, through deploying their competitive advantage within new foreign markets to obtain the advantages in that markets. The mechanism to achieve this is through entry modes (indirect exporting, direct exporting, foreign direct investment, licensing, etc…). The effectiveness and efficiency of entry modes is dependent on the level of market knowledge. In Appendix 11 the synthesis and comparison of all different literature is presented.

2.7 Research gap and summary

The research in this paper focuses on the equity-based internationalization of UK manufacturing SMEs, which is explained around the technology and knowledge transfer required to achieve successful implementation of the internationalization decision.

There is a limited amount of research on equity-based internationalization of SMEs (Weikl and Grotz, 1999; Lu and Beamish, 2001), and several authors claim that their research can be considered for SMEs in other contexts (Johanson and Vahlne, 1977, 1990; Johanson and Mattsson 1988, 1993). However, all of these studies explain only one dimension or facet of SME internationalization. For instance, Weikl and Grotz (1999) investigated the technology and knowledge transfer differences between high-tech and traditional SMEs, while Lu and Beamish looked at the experience needed for successful SME internationalization. Nevertheless, an internationalization decision consists of three elements: location, entry mode and motivation (in this thesis this is replaced by "role of factory"). No study to date has considered a combination of these decision areas.

The internationalization literature, with its three dominant theories, does contain some information that is useful for SME internationalization. Economic theories, especially Dunning's (1988, 1993, 2001) model, explain internationalization from the perspectives of transaction cost economics and monopolistic advantage theory. Dunning's model (1988, 1993, 2001) defines internationalization with respect to ownership, location and internalization decisions, and refers to two of the internationalization decision areas – location and entry mode – while the ownership explains what is transferred in the internationalization. However, this model explains large organizations' and multinationals' internationalization, and fails to incorporate SMEs. Internalization is only explained as an entry mode choice, but without explaining the need for technology or knowledge transfer. Learning theories of internationalization claim that their models deal with internationalization for all sizes of organizations, however the reality is that the focus of these models is very export-oriented, rather than focusing on international manufacturing; therefore, they are not sufficient. Furthermore, network theories follow the same trend as learning theories.

Thus, there is a lack of studies in equity-based internationalization of SMEs that explain the concept holistically. This thesis aims to bridge this gap.

3 Methodology

3.1 Introduction

This thesis reports the research of a sequential mixed methodology that aims to create a methodological triangulation. This is achieved by mixing qualitative and quantitative methodologies. The first part of the chapter explains the mixed methodology literature. This is followed by a summary of the mixed methodology used in this thesis. The first of the methodologies used is action research. This qualitative research approach is explained with reference to the literature, and a summary is given of how it is used within the research for this thesis. The findings from this first qualitative research are used for the second stage, i.e. the quantitative research. Related literature and key attributes of the survey method are explained first. This is followed by a description of the development of the survey methodology within the research for this thesis.

The last section of this chapter, before the chapter summary, justifies the selection of research methodologies.

3.2 Mixed methodology

3.2.1 Paradigm wars and emergence of new paradigm

There are two dominant research methodologies, which have been shown as alternative ways to conduct research based on their philosophical stance. These two distinct forms, which were initially thought to be incompatible, are quantitative positivist/empiricist and qualitative constructivist/phenomenological approaches.

A challenge to these paradigms comes from a different approach, based on pragmatism. This new approach holds that the two earlier paradigms are not incompatible, but rather are complementary to each other in different and distinct ways (Brewer and Hunter, 1989; Patton, 1990). The existence of these paradigms determines how a researcher will conduct their inquiry, and what they will learn from it (Creswell, 2003).

Tashakkori and Teddlie (1998) attempted to compare these different paradigms based on their contributions and differences, while Lincon and Guba (1985) explained positivism through five different factors:

1. *Ontology*: The nature of reality is singular.
2. *Epistemology*: The relationship between the knower and known are independent from each other.
3. *Axiology*: There is no role for subjective values in the process.
4. *Generalisations*: Time- and context-free generalisation is possible.
5. *Casual linkages*: There are real causes between well-selected constructs.

Patton (1990) added a sixth dimension to this list for attributes of positivism:

6. *Deductive logic*: The process starts from a theory, and then different hypotheses are tested based on that theory.

There has been dissatisfaction with three particular attributes of positivism (Guba and Lincoln, 1994). These three attributes are ontology, epistemology and axiology. This has given rise to postpositivism and constructivism. Postpositivism has made changes to the problematic attributes of positivism (Reichardt and Rallis, 1994), including:

1. *Value-ladenness of inquiry*: Researcher brings their own values into the research.
2. *Theory-ladenness of facts*: The inquiry is affected by the theories, hypotheses or frameworks that are used.
3. *Nature of reality*: The understanding of reality is built during the research.

These three attributes are also shared with constructivism. Reichardt and Rallis (1994) judge modern quantitative research to be based on postpositivism. The basic trait of postpositivism is similar to positivism as it is deterministic (Creswell, 2003) in terms of the relationships therein, and reductionist in terms of ideas, which are divided into hypotheses or research questions. The laws or theories used determine which research questions or hypotheses are built upon.

The third (or, for many, second) paradigm is called constructivism (interpretivism, naturalism). Lincoln and Guba (1985) compared this to the five attributes of positivism presented above:

1. *Ontology*: The nature of reality is multiple and can coexist at the same time or at different times.
2. *Epistemology*: The relationship between knower and known is indissoluble.
3. *Axiology*: The inquiry is subjective.
4. *Generalisations*: Time- and context-free generalisation is impossible.

5. *Casual linkages*: It is impossible to distinguish causes and effects.

Tashakkori and Teddlie (1998) added a sixth attribute for the constructivism:

6. *Inductive logic*: The process starts from collecting data and then moves to theory from there.

The purists believe that there two research paradigms: postpositivism and constructivism. These two paradigms are incompatible, and the researcher should choose one of them. Datta (1994) clarified why these two paradigms should coexist in practice:

1. The paradigms have been used together for some time.
2. Funding agencies have supported mixed methodological research.
3. Both methodologies have influenced policy-making.
4. Both methodologies have been developed for many years.

Tashakkori and Teddlie (1998) and Patton (1990) stress a concentration on the research problem, and selection of the best available and multiple methods, while Cherryholmes (1992), Murphy (1990) and Creswell (2003) identified the following traits of the mixed methodology paradigm:

1. It is not committed to any philosophy. The researcher has the chance to choose freely from quantitative and qualitative research methods. This freedom can be exercised in choosing methods, techniques, and the procedures used for the research.
2. The data collection can be conducted via multiple different methods because this offers the best way to explain the research problem.

3. There is a need to explain why and how different research methodologies – quantitative and qualitative – have been used.
4. In a pragmatic tradition, the research happens within a specific context.
5. There is no requirement of prior theory for pragmatic research.

Reichardt and Rallis (1994) uncovered the underlying values that are shared between quantitative and qualitative paradigms. These are value-ladenness of inquiry, belief in the theory-ladenness of facts, belief that reality is multiple and constructed, belief in the fallibility of knowledge (i.e. a theory or causal relationship can not be proven) and belief in the underdetermination of theory by facts (data can be explained by different theories).

Tashakkori and Teddlie (1998) compared four different paradigms – positivism, postpositivism, pragmatism and constructivism – with respect to methods, logic, epistemology, axiology, ontology and causal linkages. Their comparison is presented in Table 3.1.

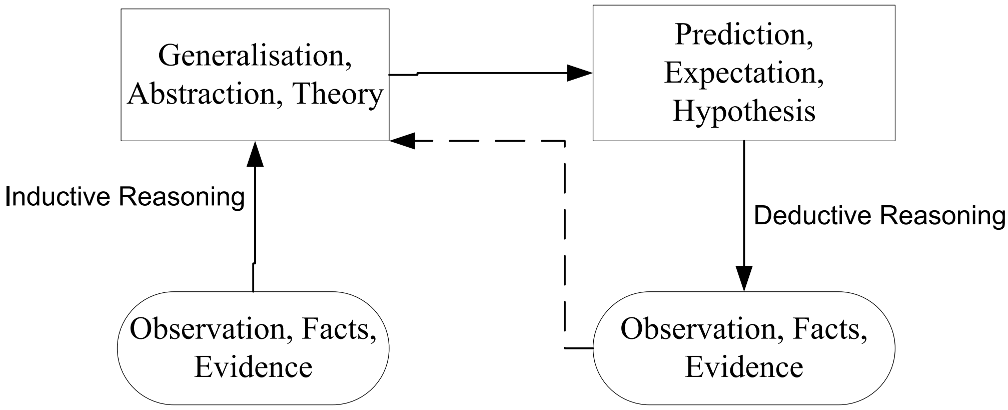
Table 3.1 Comparison of four important paradigms *(adapted from Tashakkori and Teddlie (1998))*

	Positivism	Postpositivism	Pragmatism	Constructivism
Method	Quantitative	Quantitative	Quantitative + qualitative	Qualitative
Logic	Deductive	Primarily deductive	Deductive + inductive	Inductive
Epistemology	Objective point of view	Findings can be objectively true	Both objective and subjective	Subjective point of view
Axiology	Inquiry is value-free	Values can be controlled	Values play a role in interpretation	Inquiry is value-bound
Ontology	Naïve realism	Critical realism	External reality	Relativism
Casual linkages	Real causes related to effects	Causes are probabilistic and can change over time	Causal relationships are there but it is hard to pin them down	Impossible to differentiate causes from effects

3.2.2 Attributes of mixed methodology

Mixed methodology studies use both inductive and deductive logic simultaneously. Krathwohl (1993) described how these traditions happen through research cycles. Tashakkori and Teddlie (1998) used this method to explain the research cycle for mixed methodology (Figure 3.1).

Figure 3.1 Research cycle for mixed methodology *(adapted from Tashakkori and Teddlie (1998))*



The research may start from anywhere in this cycle – i.e. from either deductive or inductive reasoning – and then be completed via the other research method. Epistemologically, the use of both inductive and deductive reasoning indicates that both subjective and objective data will be collected. Subjective data can even play the role of interaction between known and knower. A mixed methodology and pragmatist approach follows the postpositivist and constructivist value-driven approaches. The value of the researcher is important, and influences the area of the study, variables or constructs that are used, as well as the methods of data collection and how the researcher interprets the results (Tashakkori and Teddlie, 1998).

The research in this thesis starts with inductive reasoning, where the subjective data is collected and analysed. This has been achieved through action research. The TCS experience of the author has been linked with the study of SME internationalization. The analysis of this subjective data provided insights, which were then used to generate hypotheses for the deductive study. The nature of the second study cannot be called purely deductive, however, because it collects the perceptions of managers, rather than collection purely objective data that can be found in natural sciences. Nevertheless, the aim of the second study is to generalize the findings of the first inductive study – i.e. the action research. From a pragmatist point of view, neither of these studies are likely to provide excellent results by themselves: inductive studies are rich in context and results, but cannot be extended to explain other contexts; while deductive studies can be more generalizable, but lack the rich insights provided by inductive studies. The mixed methodology has therefore been chosen to overcome these predicaments.

Inductive studies were used first due to the nature of the research gap. To date, no studies have been conducted in relation to SME internationalization. There are studies on non-equity-based internationalization, but none that are equity-based. Extant knowledge on multinationals and their internationalization behaviour is not useful here because the differences in SME internationalization would not be captured if SMEs are studied as if they are multinationals. In this research, the inductive approach provided very little theoretical background or limitations at the start of the research. The phenomenon has been captured and analysed later according to the concepts and theories of internationalization, particularly those that are multinational- and equity-based. However, the second methodology was selected to identify whether the results of the inductive research are common across all SMEs in the UK.

Within pragmatism, there is an external reality and a choice of explanations (Cherryholmes, 1992). The explanations here will be chosen based on whether they provide a desired outcome. This thesis has been conducted with the aim of achieving a generalized knowledge on SME internationalization. The external reality also provided reasons why certain methods of data collection and analyses were chosen over others.

Greene, Caracelli and Graham (1989) detected five purposes for mixed methodology studies. The first is triangulation, which helps to converge the results. The use of mixed methods allows complementary or overlapping studies of a phenomenon to be conducted, in order to consider different aspects of it. The different methods can yield paradoxes, contradictions or new perspectives, and the first method can inform the following method. Hence, this will add scope to research. In this research, triangulation has been used, and the first method informs the second. The triangulation increased the generalizability of the results, while the first method provided the hypotheses of the second study.

3.2.3 Typology in mixed methodology research

When pragmatists talk about mixed-method research, they refer to the choice of strategy (Tashakkori and Teddlie, 1998; Creswell, 2003). Creswell, Clark, Gutmann and Hanson (2003) associated four decision criteria for mixed methods strategy.

The first decision criterion is the implementation sequence of qualitative and quantitative data. It was decided to use qualitative data first, and then quantitative data later. The reason for this decision was based on the lack of previous studies in this phenomenon, and the fact that studies on multinational internationalization are likely to contain very different results from those on SME internationalization, and using studies on multinational internationalization would mean that the researcher is explaining SMEs as a subset of this. On the other hand, collecting data with minimal influence from multinational internationalization theory means that any differences can be better captured.

The second decision criterion is the priority given to the qualitative and quantitative data collection. The priority was given to the qualitative study, again for the reasons explained above. The timing of the integration between qualitative and quantitative studies is the third criterion. It was decided that the studies would be combined after the qualitative study was finished, so that the results could be used as an input for the later quantitative study. The last criterion is the theoretical background of the study. Here, the multinational internationalization theories formed the basis; however, the qualitative study tried to take the least amount of theoretical background possible, so as to avoid being overtly influenced by previous studies, since, as explained above, the aim is to explain SME internationalization and its differences from the multinational internationalization.

Tashakkori and Teddlie (1998) identified another form of mixing strategy. They called this a mixed model methodology (mixed model studies). The priority here is given to a single research paradigm, such as qualitative research, but elements of the research such as data collection, analysis and integration are conducted in line with the quantitative tradition. Brewer and Hunter (1989) identified several areas of research in which a mixed model design can be used. These are formulation of the problem, building and testing of the theory, sampling, measurement, data collection and analysis, and reporting. This research used a sequential mixed methodology, and thus mixed model studies has not been employed.

Patton (1990) discussed three dimensions for classifying different mixed models. The first is the type of investigation, which can be exploratory or confirmatory. Exploratory investigations do not have any prior hypotheses, whilst confirmatory investigations are based on prior hypotheses arising from a theoretical foundation. This research starts with an exploratory approach, and then uses a predictory approach to explain a model of SME internationalization. The second dimension is the distinction between quantitative and qualitative approaches. Quantitative and qualitative research is seen as a combination of data collection and operations. The final dimension relates to the analyses and inferences drawn from the qualitative and quantitative research. This distinction, as outlined by Patton (1990), has been explained above.

There is also a sequential and concurrent distinction in the mixed methodology research design. A sequential mixed method design, as used in this thesis, is based on starting the research from one of the traditions, such as the qualitative approach, and following it with quantitative research. There are two possible research designs here (Tashakkori and Teddlie, 1998).

Greene and Caracelli (1997) pointed out the use of transformative design. In this type of mixed method research, data collected using the qualitative tradition is transformed to quantitative data, so that statistical analysis can be applied. The same strategy can be applied by collecting quantitative data and transforming it into qualitative data so as to analyse it from the latter tradition.

According to these research design strategies, Creswell (2003) identified six different types of research designs. The first two are sequential exploratory studies – there are two of these as it depends on which research tradition is used first. In a sequential transformative strategy, one of the datasets collected, either via quantitative or qualitative means, is transformed to the other tradition for analysis. Concurrent triangulation strategy involves the use of two studies at the same time to cross-validate and confirm the results. Concurrent nested strategy involves the use of one dominant strategy that directs the mixed-method study. The last type is concurrent triangulation strategy. This research used sequential exploratory study, which starts with a qualitative study.

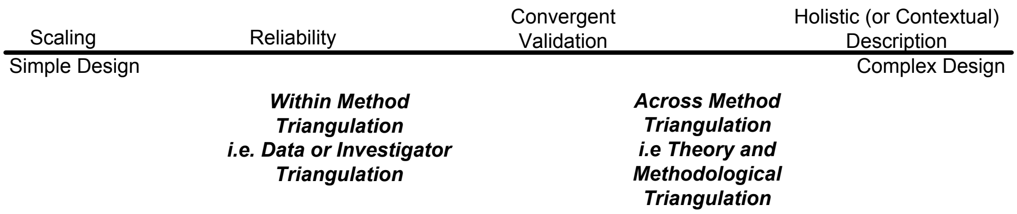
3.2.4 Triangulation

Denzin (1978) defined triangulation as a "combination of methodologies in the study of the same phenomenon", and identified four types of triangulation: "data triangulation" involves using various data sources;

"investigator triangulation" happens where there is more than one researcher involved in the study; "theory triangulation" happens when different theories are used at the interception stage; and "methodological triangulation" takes place when a variety of methodologies are used. In this research, theoretical and methodological triangulations are used. In action research – i.e. the qualitative study –data triangulation was used.

Patton (1990) discussed data, investigator and methodological triangulations, and Jick (1979) assigned the four different forms of triangulation different names. Figure 3.2 summarizes the four different forms of triangulation.

Figure 3.2 A continuum of triangulation design *(adapted from Jick (1979))*



The first two of these, scaling and reliability, correspond to method triangulation. The latter two, convergent reliability and a holistic description, can only be achieved by across-method triangulation. The mixed methodology achieves convergent validity and, if it reveals new insights, can provide holistic descriptions.

The triangulation used in this thesis is the across-method triangulation (Jick, 1979). This achieves minimum convergent validation in the research, and increases its theoretical validity. The use of across-method triangulation revealed new insights and this provided a holistic description of the phenomenon. In the quantitative study within-method triangulation was not used, however the qualitative study used various data to achieve within-method triangulation, which increases the reliability of the action research findings.

The advantages of triangulation include that fact that it increases confidence in results, provides new and innovative ways to research, exposes unseen dimensions of a phenomenon and integrates theories (Jick, 1979). This research benefits from all the advantages of the triangulation.

However, the triangulation strategy has disadvantages as well (Jick, 1979). For instance, it is difficult to reproduce results, the theoretical background or the focus of the research needs to be set in order to achieve higher research quality, and the amount of qualitative and quantitative research should be equal[1]. If a sequential design is followed, it will take a long time to complete the research. The main disadvantage of this research was mainly its duration, because of the sequential design. In addition, reproducing the results would be nearly impossible for the action research, though the survey could be reproduced to a degree, and thus the mixed methodology as a whole would be very hard to reproduce. While companies with similar problems and knowledge could be found, the managers' perspectives are unlikely to be similar to those identified in this

[1] Equality in here means that the studies are given equivalent importance hence influence the final conclusions equally.

research, and hence different results would be obtained in the qualitative part of the mixed methodology.

3.2.5 Validity and reliability in mixed method research

The validity and reliability of mixed-method studies depends on the validity and reliability of each study (Tashakkori and Teddlie, 1998; Creswell, 2003). This is discussed in greater detail in the following sections of this research. The reliability and validity of the qualitative and quantitative studies that form the mixed methodology are reported in the analysis sections in the following chapters.

Sampling is an important part of research, and affects the generalizability and external validity of the results. Different sampling strategies can be applied (Tashakkori and Teddlie, 1998). The sampling in this study was conducted at two different levels: the first is the action research, in which there was only one sample company. This was not conducive to ensuring the generalizability of the results, so a second, quantitative methodology was applied to increase generalizability. The internal validity of the results is another measure that is given importance by pragmatists.

However, Onwuegbuzie and Johnson (2006) discussed the validity of action research further. They take the view that the validity of mixed research studies should take into account the complementary strengths of quantitative and qualitative research. The value of mixed methodology research lies in the meta-inference that combines the quantitative and qualitative findings. Onwuegbuzie and Johnson (2006) listed nine legitimation methods for mixed methodology research, as follows.

1. *Sample integration legitimation* related to the question of how meta-inferences and generalizations are achieved within the mixed-method research design. Sequential research designs are the least problematic if they are applied to different samples. If the same samples are used for quantitative and qualitative inferences, then the generalizability and meta-inferences will be weak. The randomness of the sample is also important with respect to ensuring that the results are generalizable and meta-inferences are valid. This research used different samples for the qualitative and quantitative parts of the study. Randomness in the quantitative study has been achieved, and this will be discussed further in the sampling section of the survey research.
2. *Inside-outside legitimation* is the use of peer reviews to ensure that the views of the stakeholders within the research are captured. The second strategy to ensure this legitimation is to obtain the views of participants. These are applicable to qualitative research, as quantitative research is categorized as being objective. Another method is to use qualitative research as the insider view, and quantitative research as outsider view of the meta-inference. The qualitative research conducted here is the action research, wherin several participants' views and the researcher's learning were given importance, which improves this type of legitimation.
3. *Weakness minimization legitimation* aims to reduce the weaknesses of one methodology by the strengths of the other. The aim of the

research is to provide different inferences that can be weak or strongm and combine them into a strong meta-inference. This is achieved through using qualitative results as an input into the quantitative research. The aim is to increase the integration of both methods, and the inference of the last quantitative study is based on the inferences made in earlier studies.

4. *Sequential legitimation* is about changing the sequence of quantitative and qualitative research methodologies. This means that different meta-inferences will be achieved. Switching the sequence proves that the meta-inference is valid. The inferences made in this research design cannot be achieved if the sequence of the research has been changed, since sequence here provides certain insights that are shared throughout the study. However, after concluding this research, the inferences used here can be applied to other action research.
5. *Conversion legitimation* is when quantitative and qualitative data is converted to be used in the other method. This conversion process should be questioned, and is only viable for mixed model research. There is no conversion of data in sequential research.
6. *Paradigmatic mixing legitimation* involves looking at how integration is achieved at epistemological, ontological, axiological, methodological and rhetorical levels. At the epistemological level this research uses both subjective and, to a degree, objective methods; while the qualitative research is subjective, however, the qualitative research is not purely objective, since the perceptions of managers are used. In order to be purely objective, the research

should utilize more accurate measurement methods. Also, the objective approach cannot be taken at face value, because the first qualitative study provides the hypotheses for the second study; therefore, the subjective nature of the first study influences the second, more objective, part. At the ontological level, this research uses multiple realities and tries to explain them through interaction between the external and internal, and the theoretical background and context of the research. Axiologically, this is valued-bounded research in a value free research. The qualitative research is value-bounded, since the values of the action research participants affected the findings of the research. However, the survey-based method was conducted using a value-free approach. Nevertheless, the integration of two very different methodological studies means that the value-bounded inferences from the first qualitative research affects the second quantitative study. At the methodological level, induction is used more than deduction. The quantitative study is the only part that uses deduction, but it is not only partially deductive.

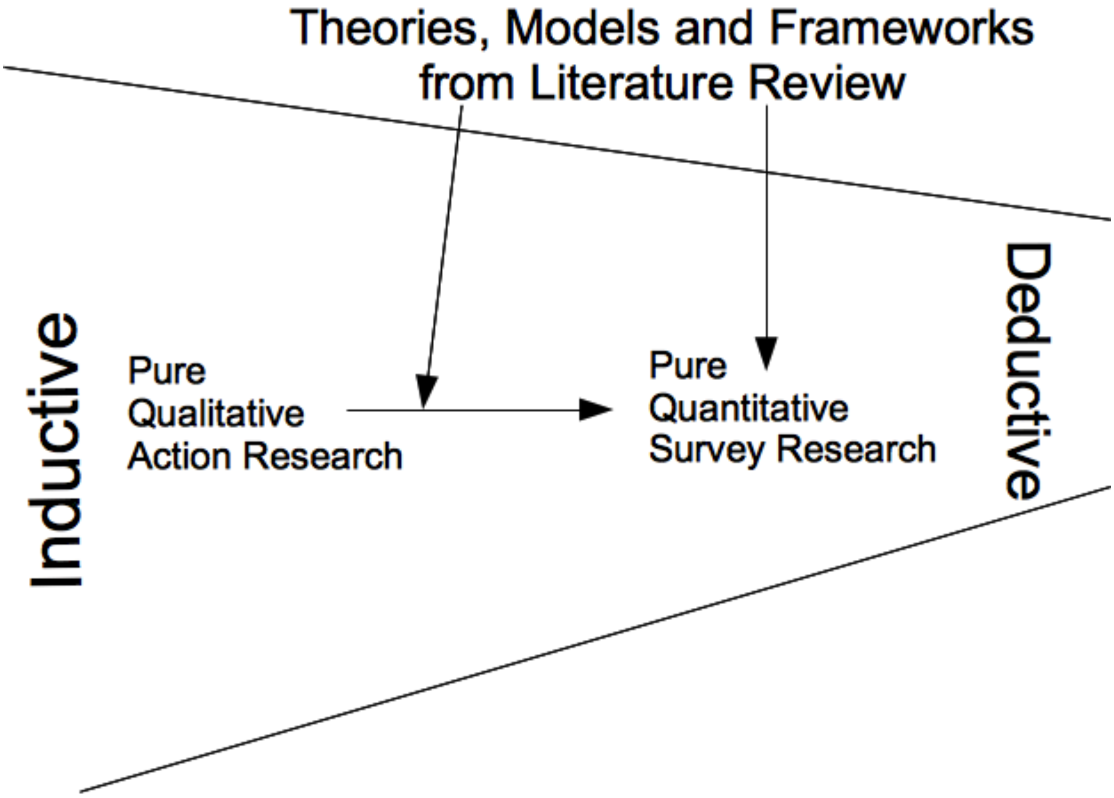
7. *Commensurability legitimation* is when Gestalt switches between qualitative and quantitative viewpoints are made in order to create a third viewpoint. This has not been used within this research.
8. *Multiple validities legitimation* is when the quantitative and qualitative methods are used with their own reliability and validity. This has been used in the following sections, where the reliability and validity of each methodological approach is discussed further.

9. *Political legitimation,* finally, is where the value of meta-inferences is taken back to the stakeholders of the research. This has been achieved in all levels of the research: in the qualitative section, in which the participation of stakeholders is key, political legitimation is particularly high; while the quantitative survey was shown to key stakeholders for approval.

3.3 Summary of research design used in mixed methodology

This is two-phase, sequential, mixed-method study, and will explore the behaviour of participants and decision makers to understand how they make decisions. This will be used to generalize through a sample population. The first phase involves a qualitative exploration of internationalization decision through reflections from the relevant practitioner. The themes from this qualitative study are then used in a quantitative study, in which a survey is conducted. These two phases are presented in Figure 3.3.

Figure 3.3 Mixed methodology research design



The first phase of this mixed method study is purely qualitative. Action research has been used to understand personal learning in a decision-making environment. The findings are then used in the survey stage, wherein quantitative date is collected analysed. Each stage of the research uses findings from the previous stage, and draws from the literature review. In terms of research tradition, the first study is purely inductive, while the second is deductive. The research therefore moves from inductive to deductive: the inductive part explores the decision-making process of the manager, while the deductive part helps increase generalization and build models out of the inductive findings. The aim is to achieve a high level of triangulation and explain a holistic view of the phenomenon. In Table 3.2, the timeframe and the breakdown of the research characteristics are presented.

Table 3.2 Timeframe and breakdown of research characteristics

	Prior Theory	Data Collection	Analysis	Interpretation
Action Research	None	Qualitative	Qualitative	Interpreted both together for triangulation purposes and to build a holistic view of internationalization decision-making
Survey	From action research and literature review	Quantitative	Quantitativ e	

Research Timeframe

The integration of these two different methods under the mixed method research is done at the interpretation stage. This provides the methodological and theoretical triangulation needed for a holistic view of the phenomenon.

3.4 Action research

Action research was first acknowledged by the work of John Collier (Collier, 1945: 275 cited in Noffke, 1997: 4), and then developed by Kurt Lewin (Lewin, 1946). For many, Lewin is considered as the father of action research. His work has been developed further by other academics, but his cycle of planning, acting, observing and reflecting is always used.

Lewin (1951) believed that qualitative research is subjective, and that taking the subject out of the context is nearly impossible. Reflecting on what the researcher has learned from practice actually involves transforming subjective knowledge into practice. Lewin (1951) developed "double loop learning" (Argyris 1974) into the action reflection cycle. The aim of the action researcher is to understand their practice within its context, through studying what has been learned from the reflection of the praxis (taking informed action) (Lewin, 1946, 1951; Kemmis and McTaggart, 1988; McNiff and Whitehead, 2002). The action research design that is accepted and applied within this thesis uses douple loop learning through two action and reflection cycles.

According to Lewin's (1946) cycle, the researcher must first plan around a problem and then take action to solve that problem. This results in observing the consequences of action and reflecting on that. The change that happens because of this cycle is called learning (McNiff and Whitehead, 2002). The problem being considered in the present paper is the internationalization of small and medium-sized UK manufacturing enterprises. The solution was developed in conjunction with the participants of the research. Application of the research identified several problems, which were solved during the second research cycle. The main problem within the second cycle is designed around the successful implementation of the internationalization decision through technology and knowledge transfer.

Stenhouse (1975) developed a similar methodological study on action research in the UK. He proposed that a researcher should observe the practitioner and reflect on their activity. In reality, this creates an external knowing of the practice, rather than tacit knowledge that has been developed through acting. The research in this thesis took a more participative approach, rather than that of observer, as proposed by Stenhouse (1975).

Carr and Kemmis (1986) developed Lewin's (1946) ideas in their work, adding another cycle after reflection. This is the second cycle of this research. This cycle starts with a revised plan, which is drawn from reflection on the first cycle, as proposed by Lewin's (1946) cycle. The learning that has happened from the first cycle is used for the revised plan. This is obviously carried through and acted upon, which leads to the observation of the revised plan's outcomes. The final stage of the revised plan again focuses on reflection, which leads to learning and new knowledge. The number of revised plans can continue to increase until a satisfactory result has been achieved from the action research (Kemmis and McTaggart, 1988). This research has two action plans, with each cycle following Lewin's (1946), and providing enhanced learning from the action research. The first cycle is planned to consider internationalization of UK manufacturing SMEs, wherein the participants tried to solve the problem. The second cycle looks at the problems arising from the internationalization decision. The idea is to identify the best internationalization decision-making process through understanding and solving the problems associated with it. It should be noted again that most of the research in the field to date has been conducted in the context of education research, and mostly through teachers. The number of revised cycles may be continuous in that context. In management research, internationalization can be perceived as a decision by the organization. This decision is rare and infrequent. This is even more uncommon in manufacturing SMEs. This leads to a problem of not having revised cycles within research on decision-making in areas such as internationalization. Carr and Kemmins’ (1986) development of Lewin’s (1945) model is not very applicable to this context; in addition, neither the original nor the revised model are really able to deal with emerging ideas from the field. This is because of the prescriptive nature of their proposed steps (McNiff and Whitehead, 2002). Thus, although the research in this thesis is presented using the cycles, Carr and Kemmins’ (1986) prescriptive ideals are not used. The research has been conducted in such a way that there was much iteration. This gives it more value as it can generate new ideas.

Indeed, there has been some criticism on the prescriptive nature of action research theories. Elliott (1991) indicated that during the research phase ideas either transform themselves or are generated from the research. Through acting once learning begins, new ideas will surface. Elliott (1991) believes that these new ideas should be part of the research, and that the analysis and fact-finding should be extended as much as possible. McKernan (1991) believes that sequential cycles is short of the time required for the research, and that the researcher should not be fixated with the prescribed problem but let the problem evolve as the research continues. This research follows McKernan’s (1991) beliefs. The distinction between the first and second cycle is deceptive, however: the research continues, but the cycles provide a method to show important milestones or changes in the direction of problem solving. Within this research, the first cycle related to internationalization decision, and the problems in this cycle are solved in the second cycle. Clearly, these are continuations of the same research; but there was a change in the emphasis of problem solving. According to Elliott (1991), this provides an opportunity for the researcher to include these new ideas into the analysis. The problems from the first cycle of decision making provided this opportunity to include new ideas into the second cycle. The last criticism from Elliott (1991) relates to judging where the implementation ends in action research. Reflection in action research should come after the end of the implementation stage; however, in reality, this may overlap with implementation. The reality of action research in this thesis takes into account Elliott's (1991) disapproval of the separation of action and implementation, and integrates action and reflection, rather than action and implementation. There is a continuing reflection within the action research. This is not presented in rhetoric as such, but rather in sequential style. Ebbutt (1985) agrees that the reality of action research is different from how Lewin (1946, 1951) and other researchers that followed his theory have explained, suggesting that it is a messy affair with plenty of iterations. The preconception of improvement may not be realized, but learning will still be achieved through acting (McNiff and Whitehead, 2002). This was certainly true for the first cycle. The prescribed models cannot really be followed, because the plans may not be successful and researchers change their plans as they go along. Bourdieu (1990) argues in favour of this, as the models only try to catch the synopsis of what has occurred during the research. During this research, the models attempt to give structure to a messy data collection, interpretation and reflection cycle. Higgins (2000) further points out that action research does not follow a linear approach, but rather an iterative one wherein much can go wrong and thus will need to be corrected. Action research is not about achieving results in an action, therefore, but about learning from mistakes or when things go wrong. McNiff and Whitehead (2002) consider these models as guidelines.

Another important issue is the need to consider the people in the research, who will have different motivations and expectations. Reflection within the research should serve all of its stakeholders (McNiff and Whitehead, 2002). This was true for this research, since all stakeholders were motivated by different outcomes. This was more evident when the resources or the finance of the project is stretched.

Mills (2003) identified three different schools of action research. Some have been discussed above in detail. The first is critical action research, which is influenced by critical thinking. This actually relates to collaborative democratic research that seeks new knowledge. The second tradition is technical action research, which includes structured means of problem solving. The third is practical action research, wherein the main emphasis is on asking questions such as "How can I improve my practice?". This research follows the critical and practical schools of action research during the research phase, but technical action research in the reporting phase.

Gummesson (2000) identified ten major attributes of action research:

1. Action research is about an action and responsible from implementation of that action. The action in this research is internationalization decision making. There is a dual purpose for the action research.
2. The researcher should find a way to solve the problem of the company, and to achieve learning that will contribute to knowledge of the discipline. This was designed around the TCS project, wherein the learning occurred from solving problems within two different cycles.
3. Action research requires interaction between researcher and stakeholders of the project. This interaction is valuable, as it will allow the researcher to collect data about the opinions of the participants. Several stakeholders were always part of the both cycles of research, and these changed from the first to the second cycle. The stakeholders were active participants of the problem solving.
4. Action research, properly conducted, provides a holistic view of the practice. This is reflected in the complexity of the findings of the action research, which show that a holistic view of the internationalization of UK manufacturing SMEs has been captured. This model has been reduced to a smaller model in which only the most important constructs have been tested via the quantitative study that followed the action research.
5. Action research, through taking action, is basically is about change: the final implementation will result in a change from the initial stage, and this change provides an opportunity for the researcher

to evaluate and learn from it. The change in this thesis was foreign production by the subsidiary of the sample company. This was achieved via the two cycles.

6. Action research, like all other research, should be done ethically.
7. Action research uses various types of data-gathering methods, as discussed below.
8. Action research requires a good understanding of its context. This is important as it provides the action researcher with an understanding of different variables and how they are interlinked. The context of this research has been explained in detail at the start of the analysis section for each cycle, though the context slightly changed from the first to the second cycle. Providing context is very important for the reader, because without it the decisions and problem-solving initiatives cannot be understood fully.
9. Action research is conducted while the change is happening. This is in contrast to other research methods, which provide observations of a phenomenon; in action research the researcher is inside the phenomenon, can obtain a first-hand account of what is happening, and reports back their evaluation and reflections. This is an account of what the researcher has learned from the implementation and change. The reflections presented in action research analysis reflect the learning that has been achieved through action research.
10. Action research cannot be judged by the same quality criteria as other research methods. There is a need for a fresh quality criteria, and this will be discussed below under reliability and validity in action research.

3.4.1 Data collection in action research

Data collection in action research is done in multiple ways, as identified by McNiff and Whitehead (2002). Pen and paper methods include field notes, diaries, logs, reports and questionnaires; live data collection happens with sociometric methods, interviews and discussions; and ostensive data collection is done through still presentations, and audiotaped and videotaped interviews. In this thesis, the data are collected through interviews, discussions and reports, which were then presented to the stakeholders; their feedback was used for the benefit of the project. The interviews were conducted one-to-one with several stakeholders, and were informal and discussion-oriented. The interviews were not transcribed because they were very lengthy and numerous, with the stakeholders having several discussions with the researcher and each other. This would correspond to a discussion every two to three days. However, the analysis section of this project provides a summary of the data collected. Most of these data, especially the knowledge on internationalization analysis, came from written reports; the rest were noted as when and how interviews happened. This informal means of data collection has advantages as well as disadvantages. There was no structure in terms of the questions asked, but this is compensated through asking questions that are important at that moment. This generation ability was very valuable, as was the ability to ask questions several different times, rather than in separate interviews. Being part of the problem-solving team and living and learning within the research also provides the opportunity to ask questions and be critical at the same time as data are generated, though few authors on action research have reported this as an advantage. Most of the data are generated during the action, therefore, and can only be captured through lengthy field notes after each day. Instead the researcher has used reports to the stakeholders to show the progress as well as their feedback. Coughlan and Coghlan (2002) classified data collection under hard and soft data: the data collection methods listed by McNiff and Whitehead (2002) (field notes, diaries, reports, questionnaires) are all hard-data collection methods, while sociometric methods and interviews and discussions are soft-data collection methods. Ostensive methods can be classified as both.

3.4.2 Action research in operations management

There are two key papers on operations management that discuss the use of action research within operations management. Westbrook (1995) considers action research as a variation of case study research. An obvious modification is the participation of the researcher, which changes the researcher from an inactive observer to someone that is part of the change and reflects on the learning that is occurring from that change. Westbrook (1995) studied action research papers in the operations management field in European publications. The results showed that there has been a lack of this methodology within the operations management literature. The studies that can be claimed to resemble action research depart from action research on three different levels. First, most of the research actually implements a standard approach, and thus there is a limit on what can be learned from the implementation. This research looks at the decision-making process, as well as its implementation. The implementation was very important because it highlighted the problems within the decision making. Second, the action research has been done in such a way that the researcher behaves like a consultant. The results are reported as a success from a consulting point of view, as the obstacles and problems are not explained in the reports. Sometimes an unsuccessful implementation may mean more and can explain more than a successful implementation. Also, action research problems, obstacles and even issues in terms of success are highly valuable, as they may lead to higher levels of learning. The research reported in this thesis actually looks at the pitfalls of decision making in two cycles. The unsuccessful decision making and the problems faced before, during and after are deliberately explained to give richness to the findings. If these are not explained, and only how the problem is solved is depicted, then the main advantage of learning is lost and never transferred. Last, the reports generally lack details on the context and description of the implementation. These were given priority because the standard approach to reporting by Carr and Kemmins (1986) is used to explain the cycles. This standard method of designing action research was not used during research, but instead was useful in reporting the analysis and reflections of the research. The researcher did not act as a consultant in the first cycle, but rather took the role of implementer. The consultancy was required in the second cycle, in which the researcher was specifically asked to lead the problem-solving efforts. The stakeholders of the project were happy for the researcher to take a lead role, though the researcher took their opinions into account and relied on their experience.

Coughlan and Coghlan (2002) studied the amount and nature of action research in operations management. Their study was conducted between 1998 and 2000. They found that out of 299 papers in conference proceedings, there were only 26 examples of action research. Out of these 26, only eight can be considered purely action research studies. Nevertheless, the number of studies in operations management that uses action research methodology is increasing slowly.

Westbrook (1995) believes that action research should be done through overcoming many different pitfalls. He proposes a simple model of action research, which does not use the focus-develop and apply process, though he states that his model is not far from Lewin’s (1946). Westbrook (1995) stated that when conducting action research, there is a need to agree on the problem with the collaborating company. This does not mean agreeing on a solution or expected outcome, but is more of an agreement on what the problem is or what is to be studied. This was done within the TCS meetings. After the original TCS project was abandoned, it was changed to focus on the internationalization of UK manufacturing SMEs. This was decided in a meeting between the TCS associate (researcher), TCS consultant, academic advisor and the managing director. The problem was identified for the first cycle as the internationalization of Sturge Industries Ltd. The boundaries of the project, including resources, time and participants, was acknowledged within this meeting. The second cycle had a different problem definition. The results and problems of the first cycle were accepted as the aim of the second cycle. This aimed to solve the problems associated with the internationalization decision. While conducting action research, it is wise to seek multiple points of view from the participants, who are generally know as the stakeholders of the project. Their views will differ on certain issues, and this will provide richness to the description. This was achieved through forming problem-solving teams within the TCS project. The list of participants here are identified and recorded within the action research analysis chapter.

Westbrook (1995) believes that data should be recorded in a semi-structured way. In reality, this may not always be possible at all times, and at others may result in more structured records than those proposed by him. The reason for this is that there is a need to collect data in any form possible. Sometimes, for instance, the researcher may find themselves in front of a coffee machine talking about the problem and possible solutions. The most important breakthroughs in the second cycle were achieved via visits to the foreign partner, during dinner. These opportunities are very valuable and the researcher was able to learn a lot from them. The participant should also check what the researcher has written or give their approval on the researcher's interpretation of what has happened. This was done with all stakeholders within the action research. These people were also participants of the problem-solving team. Westbrook (1995) believes that researchers should prefer factual data over the opinions of participants, although opinions are a form of data as well. The researcher believes that the opinions of the participants actually shape the actions taken, hence the data collected about them in this study. Opinions are also helpful during the inference stage. Objectivity is hard to establish within action research, since actions are highly subjective and cannot be free from the perceptions of the people who are doing them. The most important data are actually those that can be obtained from the field. Using research teams is difficult, with respect to controlling what is happening in different contexts. There is also a need for some standardization so that the research teams collect similar that data that can be compared and contrasted, and this is not possible in action research as new variables are discovered in the field – action research is truly an inductive process. Therefore, this research used one researcher at all times. There were participants, but they were more providing information to be used or part of the problem-solving efforts. The inductive process saw new variables emerging for the second cycle. The amount of visits to the collaborating company should also be considered carefully. The first cycle was carried out every day in the collaborating company, and therefore the number of visits were not planned for the first year; however, during the second cycle the number of visits was planned carefully.

Coughlan and Coghlan (2002) proposed a competing model by which to conduct action research within operations management. Their model starts with context and purpose. In this stage, the researcher should ask questions such as why the research is necessary, and justify the need for it. Another important component in this stage is the extent of choice the collaborating company has. This will determine what will change, when and how. Nevertheless, the main issue at this stage is the justification of the research through a coherent understanding within the stakeholders and participants of the research. This is actually not very different from Westbrook (1995), who prioritized problem-setting as the starting point for action research. The context and the problem were set at the start during a meeting with all stakeholders of the project. This meeting created a coherent perspective and outlined the expectations of the action research. The next stage in Coughlan and Coghlan's (2002) model is the data-gathering stage. This has been explained above, in section 3.3. Following data gathering, the data should be fed back into the system of the organization. This may reveal many different valuable insights into the data collected. The data analysis follows the data feedback stage. In action research, data analysis takes place simultaneously with data collection. In the case of this project, this increased the feedback from all stakeholders. The data collection and feedback stages continue while the researcher analyses the data. The data analyses take the form of a collaborative study within the participants of the action research. Collaboration provides two important advantages in action research. First, the decision taken for the implementation, and hence the action, is justified during the initial stages, and all the stakeholders agree on it. It will be them who implement the action, and their approval reduces the risk of change resistance. Second, the researcher understands how the participants think about the action. This is a form of data that is very valuable to the researcher, as discussed above. Westbrook (1995) believed that opinions are a form of data, but that more objective semi-structured data should be collected. The researcher agrees with Coughlan and Coghlan (2002) that data can be collected through collaboration between stakeholders. This provides an agreement on the analysis, as well as what data should be collected next; it also reduces the "not invented in here" effect within one organization. However, if the action research is about the relationship between two different organizations, then it may be good for one organization, but less so for the other. This is where a great deal of learning happens. The next stage in Coughlan and Coghlan's (2002) model is action planning. At this stage, implementation by the company begins. The researcher has two options according to how the research project is defined: he can be an active participant in the implementation, or an observer until the end of implementation, at which point he will come back and evaluate it according to what has gone wrong and what could have been done better. This may lead to another cycle of data gathering, feedback, analysis, action planning and implementation. The action researcher in this thesis followed the second role, in which after the decision making he played the part of observer. This led to another cycle, in which the researcher tried to solve the problems associated with the first cycle. Coughlan and Coghlan (2002) include a meta-step in their model, which is monitoring. The aim of this step is to understand the basic assumptions in every step, and monitor whether the action research is properly applied.

3.4.3 Validity of action research

There is widespread acceptance of a difference between traditional research and action research in terms of quality criteria (McNiff and Whitehead, 2002; Gummesson , 2000; Coughlan and Coghlan, 2002; Westbrook, 1995). There are many reasons why traditional research quality criteria do not apply to action research, but one of these stands out here: participation, which is an inherent part of action research (McNiff and Whitehead, 2002, Coughlan and Coghlan, 2002), is not acceptable in traditional research methods.

McNiff and Whitehead (2002), Mcniff, Lomax and Whitehead (2003) and Whitehead (2006) propose that Habermas' (1979) criteria for validation should be the norm for validation in action research. McNiff and Whitehead (2002) listed these criteria as follows: the statements made in reporting should be true; the speech act is expected to be comprehensible; the speaker should be a participator and the main researcher; and the situation should be appropriate for the problem considered (McNiff and Whitehead, 2002: p. 104).

Westbrook (1995) thinks that validation in action research resembles the case study methodology. However, the researcher believes that action research is fundamentally different from the case study approach because of the participation required by the researcher. In addition, the case study approach, depending on the questions asked, can be very structured, while action research can never be so. In case studies, the researcher spends limited time with the company, while in action research the researcher may spend very long hours and be and recognized as a part of the organization. The validation of the research is a major discussion where most contributors to this discussion do not recognize it either, and ask for a separate independent method of validation (McNiff and Whitehead, 2002; Gummesson , 2000; Coughlan and Coghlan, 2002). McNiff, Lomax and Whitehead (2003) identified several validation methods and ordered them in increasing levels of validation. These are self-validation, peer validation, validation of management, collaborating company validation, academic validation and general pubic validation (Mcniff, Lomax and Whitehead, 2003: p. 108-109). McNiff and Whitehead (2002) also divided validation into self-validation and colleagues' validation. Self-validation involves being critical about the author. This was achieved through reflections of each cycle, and their link to relevant theories within the literature. Colleagues' validation is divided into "critical friend" and "validation group". There can be more than one critical friend, and they should be involved with the project early on. The critical friend here was the managing director of the company. He was involved in all cycles, and he read and validated the reports. The validation group is a selection of participants and stakeholders in the research who meet at predetermined intervals to check on the research. In the first cycle, the validation group was the TCS meeting group, who discussed various aspects of the project implementation, and checked each detail. Academic validation is achieved via the assessment of the general academic public, and was achieved here through the academic supervisor, who was also part of the TCS group. The ethical validity of the study was achieved by adhering to Habermas' (1979) criteria and using participants who were actively informed and to the need of public interest (Whitehead, 2006).

Who should validate and why has been discussed in great detail above, but how they should validate has not yet been discussed here other than with reference to Habermas' (1979) criteria. Several authors have studied how action research should be validated. For instance, Winter (1989) reported on six standards of validation in action research. There is a need for reflective critique, and this should be observed as generation of new research questions. This was achieved in the first cycle as a new research question was developed – i.e. "how can SMEs transfer their knowledge into foreign operations?". However, the second cycle generated the hypotheses of the quantitative study that followed the action research. This became the link between the qualitative and quantitative studies that formed the mixed methodology. The reflective critique was also compared against the available literature on equity-based internationalization. This helped in relating the reflections to previous research, and where they fit within different theories. There is a need for a discussion that will critique every part of the research, and an awareness of the changing nature of the research over time. This was achieved in the analysis section. The critiques were made through explaining how the priorities of the stakeholders changed, and the negotiation process within different organizations. Participation is critical, as there is a need to collect data from multiple sources. The analysis section of this thesis reports when and where each participant contributed to the action research. Risk is part of the process, and should be accepted within the research. The action research team, especially the managing director, tried to reduce risk according to perspectives on what should be done. The managing director was interested in issues such as exchange rates, for instance, which were primarily included in the first cycle. The managing director wanted to reduce risk in the second cycle through negotiating with a win-win attitude. However, as the other partner was very stringent and did not move from their point of view, the negotiations did not go further. The participants in the research should also contribute with their own points of view to the end result. Through conversations between all stakeholders, everyone contributed their ideas: the managing director identified ways to analyse the problem; the accounting manager identified important problems that may be faced in terms of calculation and the overall project; and the technical manager, now the operations manager, identified most of the issues in the second cycle. The stakeholders in the foreign operations also contributed to the outcome with their respective perceptions. After reflection, there is a need to show a conversion and coordination with the accepted theory in order to provide the inferences; this is detailed within the analysis chapter of this research.

Reason and Bradbury (2001) listed five standards for validation in action research. The research should show evidence of cooperation between participants. There is a need for constant and iterative reflection within the research, which should result in a change or improvement in the practice. The iterative reflection in this research was hard to demonstrate, and this is why the concluding reflections of the action research in each cycle have been shown. However, within the descriptions of what has been done within the cycles, the iterations can be seen. The results of the research should advance the current theoretical background, or create a new one. The researcher believes that in light of the current research gap, any knowledge development will advance the SME internationalization literature. The research is highly significant to the general academic world and the public – and particularly to the collaborating company, as it defines their future. However, it also has significant importance to the academic world, and the public world through the companies' well-being.

The results of the project should lead to new and sustainable infrastructure. This was achieved through a new foreign production partner to the collaborating company.
These two lists have many common means of achieving validation in action research.

The validation of action research, according to Westbrook (1995) and Coughlan and Coghlan (2002), is very similar to the above discussion. First, there is a need for self-validation. The most important source of validation according to Westbrook (1995) and Coughlan and Coghlan (2002) is the validation of multiple participants, stakeholders, and others who are reading the research. Coughlan and Coghlan (2002) also add another form of validation to the above lists – the flow of the action research cycles. This ensures that the research has been done in a systematic way and that the knowledge created is acceptable. As mentioned above, action research does not follow prescribed steps but rather is an iterative process wherein there is a need to be open to reveal new variables and issues within the practice (Ebbutt, 1985; Bourdieu, 1990; Elliott, 1991; McKernan, 1991; Higgins, 2000). There is also a chance of failure, as well as many obstacles (Higgins, 2000). Coughlan and Coghlan (2002) advocated that using a proposed action research cycle may not fully reflect the realities of research, but the reporting of the research can most definitely be done using the steps in the cycle, giving evidence of the iterations and obstacles that have been faced during the research. This research was done in two cycles. While it was iterative and chaotic at times, the reporting followed a very standard action research reporting framework, which is mostly used by academics in education. The academics from education studies are the main people who have developed action research in recent years.

3.5 Summary of action research methodology used

The researcher followed Lewin's (1946) cycle of action research. The main problem identified was the internationalization of the UK manufacturing SMEs, and this has been studied under two cycles. The first cycle relates to the SME's decision making. Once this was implemented, reflections identified some problems regarding the implementation of the internationalization decision. The second cycle started from here, and aimed to answer how can we transfer technological knowledge within the SME network. Coughan and Coghlan (2002) proposed their own version of the action research cycle. This has been followed throughout the research; the steps taken and validity of the research will be discussed below.

3.6 Survey research

Survey research involves studying many cases, either with or without temporal variation (Gerring, 2007). The cases in social sciences are people or their context, and these form the units of analyses (Rossi, Wright and Anderson, 1983). Several features of survey research differentiate it from qualitative research. The first is the size of the cases analysed, as stated above. The second is the ability to generalize to a population through a sample (Rea and Parker, 1992). This represents the use of a purposeful random or non-random sample to understand the population. Some surveys are done to a whole population. Surveys are meant to be analysed by quantitative techniques rather than qualitative..

Several forms of survey research can be distinguished based on their relationship with theory. These are: exploratory, confirmatory and descriptive surveys (Filipini, 1997 and Malhorta and Gover, 1998).

Exploratory surveys are used to understand a phenomenon before a more in-depth survey is conducted. The theoretical development of the phenomenon may not be enough to understand and develop constructs and their relationships. This may be useful for preliminary study with primary or secondary data (Forza, 2002 and 2009). This form of survey study is useful for uncovering new aspects of the phenomenon or relationships that have never been explored previously. De Vaus (2004) indicates that the result of an exploratory research is to eliminate as many alternative patterns of explanations or relationships as possible. The structure of the research should take a probable and reasonable (logical) casual relationship, and make sure that it is credible and convincing at the end of the research.

Confirmatory (theory-testing or explanatory) surveys are founded on a well-explained theory (Handfield and Melnyk, 1998), from which the concepts and propositions are developed. The process can be either deductive or inductive. Deduction is the process used in this reserach. Hypotheses are developed through a model and tested after data collection. Induction is used to generate hypotheses after collecting the data and then testing them (Forza, 2002 and 2009).

This research has used a survey that lies between confirmatory and exploratory surveys. Hypotheses are developed through the action research, which is then used to test and identify any relationships, for the testing purposes. This test has been done to develop for the exploratory study. Bagozzi and Phillips (1982) propose combining deductive and indusctive processes under a holistic construal. This approach starts with a deductive view and develops a model, which is used to generate hypotheses and test them after data collection. The second phase of this approach starts with going back to the data, reformulating new hypotheses, and testing them until acceptable relationships are found. The holistic construal starts with theory-testing and ends with theory-generating research. This research follows the opposite process, and tries to develop an exploratory study in which induction is done first, followed by deduction, though second part of this research is not purely deductive. De Vaus (2004) partitioned confirmatory survey research into classical experimental group, panel design, quasi-panel design, retrospective panel design, retrospective experimental design, and cross sectional (correlation design) or one-group post-test only design. The distinction between these is based on having a control group and treating temporal variation. Table 3.3 shows how these different confirmatory survey designs are compared according to the control group and temporal variation factors.

Table 3.3 Types of confirmatory survey designs

		Temporal Variation		
		None	*Low*	*High*
Control Group	*Not Present*	Retrospective panel design		Panel design
	Present	Classical experimental design & cross sectional design	Retrospective experimental design & quasi-panel design	

This research follows retrospective panel design. It does not take temporal variation into account, and does not use a control group.

The panel design collects data about one group of people or unit of analysis over a long period of time. The other extreme of this is the classical experimental design, in which two groups of people or units of analysis are compared to each other at a moment in time. Other designs are variations of these two basic and very different research designs. This is excessively deterministic and there can be many different ways a researcher can combine temporal variation and control groups. De Vaus (2004) advises six stages of theory testing:

1. The theory to be tested is stated.
2. A conceptual framework or propositions based on the theory are proposed. These will explain the relationship between two variables.
3. The hypotheses are written from this conceptual framework, and can be tested statistically.
4. The data are collected
5. The data are analysed.
6. Final hypotheses are reviewed against the theory.

This research follows a very similar approach, though the theory is replaced with the hypotheses generated from the action research. This has some advantages because the phenomenon is explained through inductive research, which captures the details.

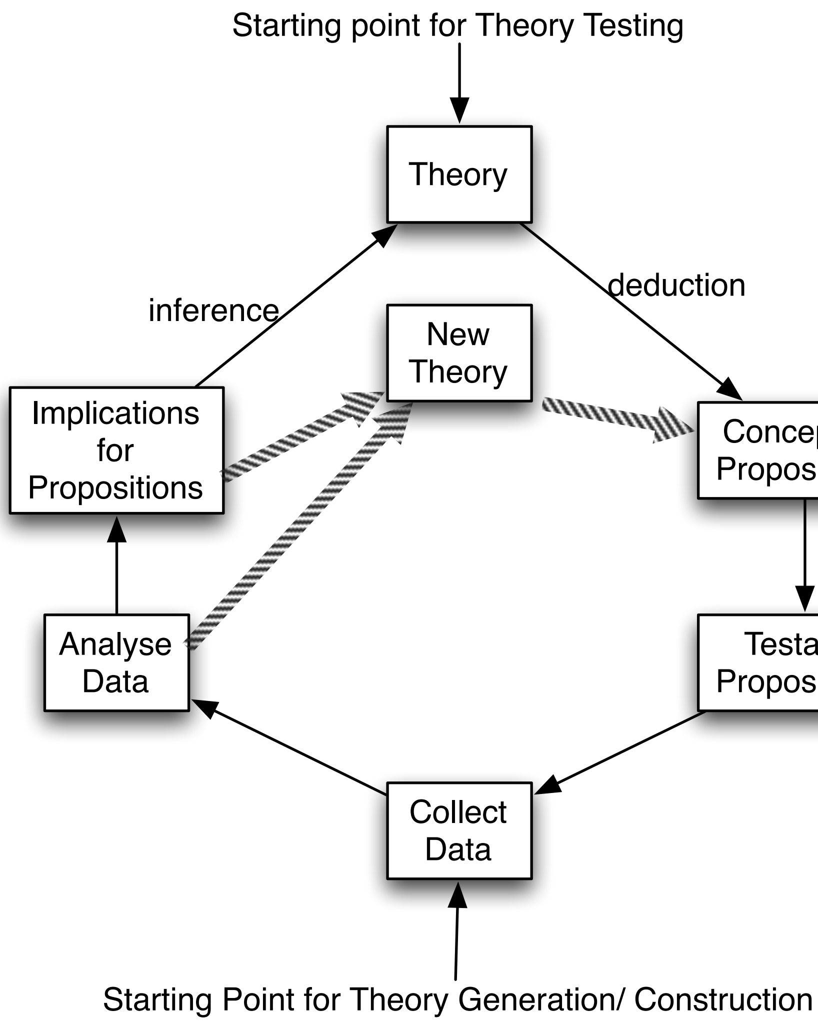
Descriptive survey research aims to understand the significance and distribution of the phenomenon in a population. The contribution of this research design can include theory-building/-generating/-refining (Forza 2002,2009 and Malhorta and Grover, 1998). This involves a process in which the researcher starts by collecting data, and then builds theory around observations. This is an inductive process. The researcher may start with a conceptual framework or model, and collects data from here. After that, the data is used to generate hypotheses. De Vaus (2004) explains how to generate meaning from observations or data: the aim is to find common variables between observations, which are then compared against the existing theories that the observations are based on. This will lead to the development of new relationships that have never been explored before. The theories may explain the observations to a degree, and these may be refined through new observations or contradictions between theory and observation. Every observation is a contextualized, and analysing the context will also help to understand its relationship with the theory. One other stage that can be used in theory building/construction of the research design is to go back to the respondents and ask them for their views on the constructs and relationships that have been identified.

Another method suggested by De Vaus (2004) is introspection. This is more or less role playing, and trying to predict respondents' answers based on the constructs and relationships identified. The issue is how representative the constructs and relationships that have been discovered are. There are two levels of representativeness: the first is how well the particular constructs and relationships explain the general population from their contextual background; the second it that explanations should be plausible through different theories available to explain the phenomenon.

However, while the survey research design can be inductive to a degree, it will always be somewhat deductive because there is a need for a minimum research framework. This means that if the phenomenon is not known to a degree, then survey research is not a suitable design (Forza, 2002 and 2009).

The survey research process has been formulated by several authors. Forza (2002, 2009) advocates a very linear research process, while De Vaus (2004) promotes a more closed-loop process. There is not much difference between these, because both rely on deductive reasoning. The closed-loop research process envisages the cumulative effect of theoretical development, as well as the relationship between theory generation/construction and theory development. The linear process uses the theoretical level as a starting point, from which the population, constructs and hypotheses are decided. The second stage is the design of the survey. Decisions are made in relation to questionnaire design, sampling, data collection method and measurement instruments. This is followed by a pilot study, which involves administrating the study to a smaller sample, cleaning the response, checking non-responses, and assessing of measurement quality. The next stage is data collection, which is followed by analysis and report generation (Forza, 2002, 2009). The need for a theoretical foundation is highest in theory testing survey design, and lowest in exploratory research. In exploratory research there is a need to identify constructs and define them in detail (Forza, 2002 and 2009). In analysis and measurement quality assessment theory testing is the most rigorous, while in an exploratory research design a single-item construct with descriptive statistics can be sufficient. The closed-loop survey process is illustrated below (Figure 3.4) (De Vaus, 2004).

Figure 3.4 Closed-loop survey research process *(adapted from De Veus, 2004)*



The relationship between theory building and testing can be seen from the closed-loop survey research process. The theory generation will start from the data collection and then analysis, which may lead to a new theory. This new theory, which will follow the theory testing, will generate conceptual and testable propositions. The theory generation or construction may not start from the theory, but rather from other resources listed by De Vaus (2004), including gut feeling and logic (rationalist approach). The theories from the empirical stand will dictate the data collected. Theories provide meaning and significance to the data collected and analysed (De Vaus, 2004). This research followed a different approach compared to the closed-loop survey research process. The start of the process involves a theory which is based on the findings of the action research. This may not be a new theory, but a body of knowledge that has been developed within the inductive research. This is then used to create conceptual and testable propositions, followed by data collection and analysis. The last stage is the interpretation of findings against theories and propositions. These contribute to the knowledge created in the action research.

Forza (2002, 2009) stated that before starting the research, a clear idea of the phenomenon that is aimed to be investigated should be set so that the construct definitions for measurement are known – this is possible with a comprehensive literature review, which suits the theory testing tradition. In this research, the literature review of the phenomenon allowed the research gap to be identified, and the action research then developed the idea further. This formed the purpose and contribution of the research.

As discussed above, De Vaus (2004) provides a better explanation on the relationship of theory-generating and -testing survey research. The theory-generating survey does not have to start from the theory itself, but from collected data. Nevertheless, this should also be based on some degree of theory that will set the boundaries of the data collection.

The theoretical model provides a framework for the research. According to Forza (2002, 2009), the constructs can be dependent, independent, intervening or moderating. Once every construct is categorized, this will generate the relationships between them. Here, the theoretical model was developed in the action research, which provided the construct names and their definitions. Their relationships are explained in detail with reference to their magnitude and direction. The context on which the relationships are based are explained in different parts of this research.

The theoretical framework can be shown as a diagram in which constructs are related to each other via arrows. These will result in hypothesis generation, as the arrows in the theoretical framework represent the hypothesis of the study (Forza 2002, 2009; De Vaus 2004). This translation should be based on the unit of analysis. Flynn, Sakakibara, Schroeder, Bates and Flynn (1990) identified that individuals, groups, factories, divisions, companies, projects and systems can be the unit of analysis in operations management research. In this research, the companies and their managers are the unit of analysis. Sekaran (1992) explained that units of analysis will determine the sampling, data collection and analysis. This is discussed below in the survey development section. The difference between an individual and a company will be very large, as their populations will differ. If the researcher collects information from one unit of analysis and infers at another level, this is called a cross-level inference problem (Babbie, 1990).

The hypotheses will be composed of constructs. The measurement of these constructs is essential. Koste and Malhorte (1999) suggested that the items that explain the construct should be based on its theoretical meaning. The theoretical background of the research was presented in the literature review chapter, and the construct definitions are presented below in the survey development section. The number of indicators to be used, and their wording, is important. Other researchers may have already used the same constructs in question. The alternative is to use their measurement. The constructs are defined independently of previous research. The indicators can be perceptual as well as objective, however most indicators used for the constructs are perceptual. Different constructs will also need different types of questions. Furthermore, The construct definition should be subject to two validity measures. First, the construct measurement should have content validity. This can be confirmed through indicators that are independent from each other, but explain the theoretical meaning (Nunnally and Benrstein, 1994). This was measured within the analysis section. Second, the construct measurement should have face validity. This can be achieved in multiple ways (Forza, 2002, 2009). The first is to use subject experts that can be asked about their assessment of each item, and Lawshe's (1975) content validity ratio can then be used to calculate the validity of each construct. This was used for face validity, which is reported in the survey development section of this chapter. Another approach is to ask subject experts to match items to the constructs. Q-sorts can be applied for face validity.

Once the constructs are defined and can be measured, the next step is to compose the hypotheses. The theoretical framework is the provider of the hypotheses, which come from the relationships between the constructs under the theoretical framework. The question is the direction and relation of the hypotheses between constructs. Forza (2002, 2009) indicates that a hypothesis can be an if-then or relative statement about two constructs. A directional hypothesis is defined with less, more, positive, negative or like statements. There is an opportunity to write non-directional hypotheses as well when the phenomenon is not known well and the aim of the research is exploratory or theory generating/constructing. The hypotheses generated can be seen below in survey development section.

After the hypotheses are known, the next stage is to decide on the sampling technique. Forza (2002, 2009) explains that sampling is done through two stages. First, a population frame, i.e. which industries the companies will come from, is decided. This can be done by using international standard industrial classification numbers (SIC). The definition of problem in the action research or even before at the identification of the research gap this was decided as UK manufacturing enterprises. The sampling was done according to SIC codes. Details and the list of SIC codes can be found below in the survey development section. The research aims and objectives, as well as a conceptual framework, may help and constrain the type of organizations that can be selected. If a study is about suppliers, then companies' positions in the supply chain can be a deciding factor. Second, a sample design should be decided on – i.e. which companies will be selected from the population.

There are two types of sampling available. Random sampling has five steps (De Vaus, 2004): obtain the population frame; rank each case; make decisions on required sample size; obtain random numbers of the same sample size; and select the cases that correspond to the random numbers. The next type of random sampling available is systematic sampling. The first three steps are the same as in random sampling, as explained above. The fourth step is to divide the population size to the required sample size – this serves as the mode of selection. Random selection of numbers from a specified number set provides the structure to choose cases from the population such as number 5 is selected from the number set and the case 5 is selected from the population. Stratified sampling aims to produce more representative sampling through grouping the population into different variables. The population frame is divided into these stratums, and random or systematic random sampling is then applied to these lists. Multi-stage cluster sampling is the last of the random sampling methods available to researchers. First, the largest unit sized is clustered, and the systematic random sampling method is applied to the first cluster. The resultant sample is then clustered again, and systematic random sampling is once more applied. This process goes on until the required sample size is achieved.

A decision on the sample size needs to be made during the sampling design. This decision is a trade-off between the significance level and statistical power of the test (Forza, 2002, 2009). The significance level is where the relationship is measured with a confidence, where the alpha level is the error that can be made in this measurement; the statistical power of the test is where the relationship is there but the test does not recognize it. If the significance level is set to low, then to achieve statistical power the researcher should increase the sample size. Forza (2002, 2009) illustrated sample size requirements according to this trade-off, as shown in Table 3.4. The effect size is the difference between two samples, where the smaller the difference detected, the better the validity and reliability indicated. All sampling decisions used within this research are explained in detail in the survey development section.

There are many data collection methods for surveys. Forza (2009) rated mailed surveys, personal interviews, telephone surveys and e-surveys. Mailed surveys were used here because of their high response rate, but this resulted a long execution time.

Table 3.4 Statistical power vs. significance level trade-off and sample size *(adapted from Forza, 2009)*

	Stat. Power= 0.6		Stat. Power= 0.8	
	α =0.05	α =0.01	α =0.05	α =0.01
Large effect (strong associations)	12	18	17	24
Medium effect (medium associations)	30	45	44	62
Small effect (small associations)	179	274	271	385

After deciding on the sample size and samples to be used, the questionnaire must be designed. There are several issues here that need attention. De Vaus (2004) advises that in terms of wording of the questions, language should be simple – questions should: be short, not lead to a specific answer, not be worded negatively, be clear and precise with no ambiguity, have a clear frame of answer, not artificially create an opinion, not contain words that offer different interpretations (such as often), not contain the answer within, not be emotionally leading, use one format without many italic and bold sections, not have too much detail, and not be related to a prestigious person or institution. In addition, respondents should have enough knowledge to answer the question. Terminology that the respondents are familiar with, should be used. The meaning of certain phrases should be understood equally by all respondents, and a decision must be required for personal or impersonal questions (Forza, 2009). These were checked within the face validation and pilot study of the survey design. The details are given below in the survey development section.

The respondents should answer the questions. There are two types of questions that can be used in social sciences. Open-ended questions leave respondents free to decide how they will answer he question (De Vaus, 2004). This is an important source of data for exploratory research, and differences between respondents can be avoided through coding. The second alternative, which is used at length in survey research, is closed-ended questions, whereby possible answers are provided and respondents are forced to select one. All questions used within this survey are closed-ended questions, and utilize scales, which is common in social sciences. The questions seek the differences in managers' perceptions, and use Likert scales to measure them. Options for questions also include ordinal, nominal or ratio questions, but interval questions were used here. Forza (2009) also explains that the sophistication of the scale increases from nominal to ratio. This increase provides an opportunity to collect more precise and richer data that can be used in advanced statistical analysis. This research uses interval data, which is the second most sophisticated data that can be collected (Forza, 2009).

Another important issue that needs to be considered is the layout of the questionnaire. Forza (2009) gives a list of important layout considerations such as presentability, alignment, instructions for each question and introduction to the questionnaire. The order of the questions is also very important, as they should follow a logical sequence. These aspects will help the respondents to answer, and hence will increase the response rate. The use of coloured paper can also help to increase the response rate, since bright colours remind the respondents to complete the questionnaire Forza, 2009). The order of the questions in the survey was tested in two stages: the face validity test of the survey provided the expert knowledge on the structure of the questionnaire, while the pilot study provided further information on the respondent views on the order of the questions. Colored paper was used in the execution stage. More detail is given below in the survey development section.

To increase the response rate, Dillman (2007) suggests the use of rewards, reducing cost – for example by providing prepaid envelopes – and building a relationship through acknowledging the company through revealing personal traits. Thus, the questionnaire in this study was sent with prepaid envelopes. It is also important that the questionnaire is sent to the right person in the company. These are two reasons for this: first, if the wrong person is reached the response rate will decrease because the person who received the questionnaire will not fill it in if he or she thinks that it is not related to them; second, persons with no knowledge about the phenomenon should be avoided (Collins and Cordon, 1997). In this study, calls were made to the company in order to request details on the right person to send the questionnaire to, and also to request permission to send it. This ensured the right person was reached.

The response rate of a survey can be increased by using several methods besides the main data collection system selected. There are several stages of survey execution. The first is the initial contact, which can be done via letter, telephone call, or both. As explained above, this can be used to identify the right person to send the questionnaire to, and to obtain the respondent's agreement to complete the questionnaire. The next stage is to use an aforementioned method to collect data. Unreturned surveys can be a big problem, and this will be discussed below – the third stage is designed to avoid this risk. Where no reply was received, or where there was a lot of missing data, the respondents should be contacted again through a letter or telephone call and asked to complete the questionnaire. This stage can be repeated as many times as possible until an acceptable response rate is achieved (Flynn et al., 1999; Collins and Cordon, 1997; Dillman, 2007). Forza (2002, 2009) advises using telephone calls rather than letters during the first and third stages. In this study, following an initial phone call and dispatch of the survey via post, a follow-up call was made and another round of surveys sent out to companies that did not respond. They were then called them again and asked whether they had sent the survey back already.

The survey was executed according to the guidelines explained above, and was divided into two stages. The first stage was the pilot study. The purpose of the pilot study was to examine the quality of the survey based on measures of the construct, the inference power and the design of the measurement instrument. This was done through three types of people: colleagues, industry experts and the target respondents (Dillman, 1978). The colleagues judged the theoretical constructs; the industry experts revealed any questions or areas that had not been included or that ignored industry characteristics; and the target respondents identified any difficulties and problems encountered while answering the questionnaire. Fowler (1993) advises using a few respondents from the random sample to complete the questionnaire. The researcher was inactive during the pilot stage, and watched the respondents complete it. This provided the chance to observe and take notes when the respondents found the questionnaire difficult or became bored. Following completion, the researcher was able to probe whether the instructions and questions were clear, examine the wording of the answers given, and consider whether the survey execution is acceptable. Any changes can then be applied to the questionnaire.

Non-response is an important problem that can alter the sampling, and hence the results should be evaluated for another context. This also creates a generalizability problem. This is even more severe for theory-testing research. There is a debate on the response rate in operations management research, and is identified as being between 20% (Malhorta and Gover, 1998) and 50% (Flynn et al, 1990), with an average of 32% (Frohlich, 2002).

An assessment of measurement quality is done for validity and reliability. Validity considers whether there is a match between the theoretical background of the construct, and what has been measured. Reliability relates to the closeness of the response from different sample units (Carmines and Zeller, 1979), and can be measured via four methods: test and retest, alternative form, split halves and internal consistency. The most common of these is the internal consistency method (Nunnally, 1978), wherein the most popular is Cronbach's alpha (α) (Cronbach, 1951). Forza (2002, 2009) also advises that Crobach's α is the most reliable measure. Nunnally (1978) proposes $\alpha >0.6$ for newly developed constructs, and $\alpha >0.7$ for constructs that has been developed before. These are acceptable figures, but $\alpha >0.8$ is extremely reliable.

Construct validity looks at how the measured response compares to expected content validity, while construct unidimensionality considers whether the questions asked represent two constructs. These should not be correlated with other questions/variables. The variables should be strongly associated with only one latent variable.

Convergent and divergent validity relate to the difference between the response from the sample units. This should be low. Discriminant validity examines the differences between measurements of different constructs. Convergent and discriminant validity can be tested via many methods, but the most popular is confirmatory factor analysis. Criterion-related validity is about discriminating between two different sample units that are quite different from each other. This can be achieved through either concurrent validity or predictive validity: concurrent validity focuses on the current differences between the two sample units, while predictive validity explores the future difference (Forza 2002, 2009). All reliability and validity issues are dealt with in the analysis chapter. However, certain validation and reliability measures were used that are suitable for variance-based structural equation modeling.

Before starting the analysis, the last action a researcher should take is to treat any missing data. Missing data has a negative impact on the statistical power and causes missing data bias (Roth et al., 1999; Tsikriktsis, 2005). The magnitude of missing data is very important: Tsikriktsis (2005) advises that 10% missing data has very little impact, while 20% has considerable impact and more than 30% has a high impact. The pattern of missing data is also very important, since if the missing data is concentrated on certain part of the survey then the impact can be very high. Forza (2002, 2009) believes that the best time to deal with missing data is during the pilot study and execution stages. In the pilot study, any questions that were difficult for the respondents should be corrected. The execution stage provides an opportunity to call the respondents and ask them for the missing values. This makes it possible to understand why these questions have not been completed.

Tsikritksis (2005) provides a table that compares different ways in which to compare different missing data treatment methods in operations management. The next section provides detailed information on this.

3.6.1 Survey research design development

The aim of the survey research can be defined under two aspects. First, what the overall research is planning to achieve. Second, the survey research can be classified as exploratory, theory-generating/-constructing, or theory testing. The differences between these have been explained above. The aim will in turn define how the research is designed. The aim of the current study is to generalize on the results of the action research about the decision-making process of internationalizing SMEs. One of the drawbacks of action research is that it does not provide generalizable results hence this survey aims to solve this problem.

The research design aims towards theory-generating and -testing at the same time. This follows Bagozzi and Phillips' (1982) approach. The process starts with a clear view on what is to be researched, and this is followed by the deduction process (Figures 3.3 and 3.4). The results from the theory testing are evaluated, and new hypotheses are formulated and tested until acceptable relationships are found. This is called holistic construal, which starts with theory testing and ends with theory generation. The advantage of this approach is more visible in the analysis stage. The analysis is done through structural equation modeling, and this type of research design lets the researcher be most creative. The particular version of structural equation modelling used is stronger in theory generation than testing. The prediction of the model is given more importance than the model significance.

3.6.1.1 Construct definitions

Eight constructs are used in the analysis. Before explaining the meaning and questions that go into the constructs, two important measures of construct design will be explored below.

Content validity examines the match between the measurement and theoretical meaning of the construct. The measurement system should be based on the theoretical development of the construct. The individual items (questions) should be part of, and explain, the theoretical concept. This was achieved here by selecting the questions from theoretical studies conducted by previous authors, and trying to explain as much of these as possible, including the full meaning of the construct. Another approach is to use a previous study that has high construct validity. In this study, all constructs are designed from their theoretical development. This is achieved by using the literature review presented in Chapter 2. The items selected for each construct represent different dimensions of the construct, and possible correlations between them were avoided through not selecting items that have close meanings.

Face validity also helps to ensure that constructs have content validity. This explores whether the constructs are good measures of theoretical background through the eyes of subject experts. This was achieved through meeting with subject experts, and asking them which of these items are essential for the measurement of the construct. This is used in calculating Lawshe's (1975) content validity ratio (CVR_i):

$CRV_i = (n_e-(n/2)/(n/2)$

n= number of experts

n_e*= experts who say that indicator is essential*

The calculations for CVR_i have been done using 10 subject experts. These are:

1. Dr Naomi Brookes – One of the supervisors of the PhD. Expert in operations advantages.
2. Prof. S. Roper – Expert in absorptive capacity psychic distance, innovation and internationalization.
3. Prof. J. Love – Expert in international business and internationalization.
4. Prof. Beyza Oba – Expert in organizational theory and strategy (networks).
5. Dr Ufuk Cakmakci – Expert in innovation, networks and operations management.
6. Dr Serdar Karabati – Expert in internationalization of SMEs.
7. Prof. Lale Duruiz – Expert in operations advantages and technology transfer.
8. Prof. Hacer Ansal – Expert in operations advantage, global operations, technology and knowledge transfer.
9. Paul Cox – Managing Director of Sturge Industries (Practitioner)
10. Zeki Pirinci – Managing Director of Pirinci AS (Practitioner)

The average CRV_i values for all constructs can be seen in Table 3.5.

Table 3.5 Average CRV_i values for constructs

Construct Name	Average CRVi
Absorptive capacity	0.72
Psychic distance	0.63
Operations advantage	0.81
Innovation capability	0.59
Network relationships	0.61
Role of factory	1
Entry modes	0.86
Level of internationalization	0.57

The face validity study showed that, on average, the CRV_i values are very high. This study also revealed some of the items that are either correlated or have the chance to be correlated. The experts indicated that there are some indicators missing, and these were included in the measurement of constructs. This was the case for innovation and level of internationalization. This helped to capture the whole of the theoretical meaning of the construct. The above panel of experts were also used as part of the pilot study of the questionnaire. The inclusion of practitioners as subject experts had the advantage to capture that was not listed within the literature. This did not materialized as they did not come with new indicators but questioned the usefulness of many indicators. The practitioners were more critical than the academic subject experts, though the academics scrutinized the study in terms of its theoretical meaning and coherence.

3.6.1.1.1 Absorptive capacity

Absorptive capacity (Table 3.6) explains the capability of the individual or organization to use their prior knowledge to absorb new knowledge from their environment (Cohen and Levinthal, 1990).

Table 3.6 Absorptive capacity measurement model

Absorptive capacity	Source
Strong belief in and acceptance of the value of technology by employees	Kostova (1999)
Successful implementation of technology transfer through following formal rules	Kostova (1999)
Cultural differences in understanding, evaluating regulatory frameworks and shared values	Kostova (1999)
Organizational similarities in structure, common problems and compensation practices	Kostova (1999)
Prior similar technological and scientific knowledge base	Cohen and Levinthal (1990)
Knowledge and communication competence of knowledge-sharing employees	Cohen and Levinthal (1990)
Commitment, trust and interdependence of organizations and their employees	Bromiley and Cummings (1995)
Ease of codifying (in blueprints, instructions, formulas, etc.) and teaching technological knowledge	Kogut and Zander (1992)
Complexity (interdependent techniques, routines, individuals and resources) of technological knowledge	Brouthers and Nakos (2004)
Ability to choose which tacit technological knowledge to maintain	Metcalfe and James (2000)
Ability to maintain tacit technological knowledge	Metcalfe and James (2000)
Ability to recreate maintained tacit technological knowledge	Metcalfe and James (2000)

Kostova (1999) worked on the acceptance of organizational practice in another organization. The first four questions used are the results of her research. Two indicators – prior knowledge and getting the right people to share knowledge – from Cohen and Levinthal's (1990) paper serve as important contributions, and are the key determinants of the absorptive capacity. Kogut and Zander (1992) examined many different issues about absorptive capacity, which they share with other studies. One unique contribution of this paper to the literature is that the ease of codifying knowledge makes it easier to transfer. The complexity of knowledge as asset specificity (Brouther and Nakos, 2004) makes it harder to transfer knowledge. This item negatively contributes to the construct when it is compared to other items. The last three items of this construct are related to the transformative capacity of the organization (Metcalfe and James, 2000). The knowledge may have been developed some time ago, and transformative capacity ensures that this can be retrieved for absorptive capacity and technology and knowledge transfer.

The overall construct measures the key aspects of absorptive capacity, and none of the items are related to each other than complexity and ease of codifying knowledge, which are negatively correlated. Nevertheless, it is not assumed that if knowledge is hard to codify it is complex – there are other explanations for this, such as lack of knowledge by the company. The wording relating to ability to choose, maintain and retrieve tacit technological knowledge is very similar, however the subject experts and practitioners did not identify this as a problem, and stated that the items were easy to understand.

3.6.1.1.2 Psychic distance

This construct was first introduced with reference to iternationalization by Vahlne and Widersheim-Paul (1973) and Johanson and Vahlne (1977). Psychic distance (Table 3.7) explains the decision-makers' lack of knowledge before committing to international markets.

Table 3.7 Psychic distance measurement model

Psychic Distance	Source
Knowledge on foreign market: i.e. demand, supply, customer tastes, market concentration	O'Grady and Lane (1996)
Knowledge on cultural differences: i.e. time keeping/punctuality, working hours, body language	Swift (1998)
Knowledge on business practice differences: i.e. aggressiveness, optimism, money transfer, ethics	O'Grady and Lane (1996)
Knowledge on communication differences: i.e. general and business language	O'Grady and Lane (1996), Evans and Mavondo (2002), Child, Ng and Wong (2002)
Knowledge on differences in economic environment: i.e. economic development, stability, currency risk, labour productivity and cost	Maitland and Nicholas (2002), O'Grady and Lane (1996)
Knowledge on differences in legal and political environment: i.e. bureaucracy, labour law	Maitland and Nicholas (2002); Child, Ng and Wong (2002), Evans and Mavondo (2002)
Geographic distance	Dow (2002)

The list of factors explained by the authors above is extensive. For instance, Swift (1998) alone explained psychic distance according to 25 factors, though it is impossible to measure 25 items for one construct. Thematic clustering is therefore used to create a single item that can explain and represent multiple items. Swift (1998) explains psychic distance with reference to cultural differences, which is grouped under knowledge on cultural differences. In this study, the respondents were asked to identify which of these differences represent key knowledge in their decision-making process. The same question was asked in relation to their understanding of the receiver organization's decision maker. The action research results obtained from the previous chapter showed that the psychic distance for equity-based internationalization of SMEs are different than non-equity based internationalization (export). The business practice difference, communication differences, economic environment differences, and legal and political environment differences were noted as key variables in explaining equity-based internationalization of SMEs (O'Grady and Lane, 1996; Evand and Mavondo, 2002; Child, Ng and Wong, 2002; Maitland and Nicholas, 2002). Market-based information was seen as an important factor for non-equity-based internationalization, while O'Grady and Lane (1996) used knowledge on foreign market to explain the difficulties of Canadian firms operating in the US (equity based). The action research did not reveal such a result, because the motivation of the company was not market-seeking internationalization. This was included in the construct as the sample will include companies whose motivations are market-seeking, foreign direct investments. Another important reason to include this item is that it ensures completeness with respect to the construct being measured, and provides a good opportunity to test the results of the action research. The last item in the construct is geographical proximity, which came from one of the classical studies and is the most cited item in psychic distance (Dow, 2002). The action research results show that geographical proximity is not significant in equity-based internationalization, but is part of the domain of the theoretical construct, and including it makes the domain complete.

3.6.1.1.3 Operations capability

Operations capability is measured under cost, flexibility, quality and delivery advantages (Table 3.8). There are multiple meanings for each of these advantages, which represent different ways in which the advantages can be gained. In this study, there is no distinction between trade-offs (Skinner, 1969), cumulative model of operations advantages (Ferdows and De Meyer, 1990; Rosenzweig and Roth, 2004; Nakane, 1986; Noble, 1995) or performance frontiers (Swamidass, 1991). This is why we do not use any of the models of operations advantage, but rather just provide definitions of the advantages.

Table 3.8 Operations advantage measurement model

Operations Advantages	Measures	Source
Direct production cost	Cost	Noble (1997)
Labour productivity	Cost	Noble (1997)
Capacity utilization	Cost	Noble (1997)
Reducing inventory	Cost	Noble (1997)
Overall factory cost	Cost	Noble (1997)
Productivity	Cost	Noble (1997)
High quality conformance	Quality	Gervin (1984)
High product durability	Quality	Gervin (1984)
High product reliability	Quality	Gervin (1984)
Flexibility to alternate routes in a production system	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility to produce different volumes	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility to change product design for customer requirements	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility to run processes unattended	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility to change process design	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Short product lead-time	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Promptness in solving complaints	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Conformity to functional specifications	Quality	Gervin (1984)
Ease of service product	Quality	Gervin (1984)
Short order-to-delivery time	Delivery	Noble (1997)
On-time delivery	Delivery	Noble (1997)
Perceived quality	Quality	Gervin (1984)
Appearance (Aesthetics)	Quality	Gervin (1984)
Material handling flexibility	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility of the process to produce many products	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility to produce many parts without setups	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility in planning operations	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility to increase capacity	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)
Flexibility to serve changing markets	Flexibility	Gupta and Sommers (1992), Sethi and Sethi (1990)

Our emphasis is on the transfer of these advantages, not on how they are generated or linked together. The cost is defined by five items, as used by Noble (1997) in his study of the cumulative nature of operations advantages. Dimensions of quality have been studied by Gervin (1984); all the dimensions of his study are included as items for quality, other than aesthetics, as the subject experts believed that this item does not represent the theoretical domain of quality that this research is interested in. Flexibility has been studied extensively. The most detailed dimensions of flexibility are presented by Gupta and Sommers (1992) and Sethi and Sethi (1990). Gupta and Sommers (1992) suggest 9 items for flexibility, and Sethi and Sethi (1990) identify 11. Combining these two studies provides 13 items by which to measure flexibility. The last item to measure was delivery, and there were two items for this. These items were taken directly from a study by Noble (1997).

3.6.1.1.4 Role of the factory

A measurement model for the role of the factory was directly taken from a study by Ferdows (1989) (Table 3.9).

Table 3.9 Role of the factory measurement model

Role of Factory Construct	Source
Role limited just to producing items to low cost with no or limited collaboration and local autonomy	Ferdows (1989)
Role limited just to producing items at low cost with more collaboration and local autonomy	Ferdows (1989)
Role limited to serving specific regional markets with no or limited collaboration and local autonomy	Ferdows (1989)
Role limited to serving specific regional markets with more collaboration and local autonomy	Ferdows (1989)
Role limited to exploiting local advantages with no or limited collaboration and local autonomy	Ferdows (1989)
Role limited to exploiting local advantages with more collaboration and local autonomy	Ferdows (1989)

This construct is measured as a single-item construct using an ordinal scale, and the remainder are measured as interval data (Likert scales). The company is asked to give one choice for the most typical network partner in their international manufacturing network.

3.6.1.1.5 Innovation advantage

Innovation advantage (Table 3.10) has been measured using multiple items.

Table 3.10 Innovation advantage measurement model

Innovation Advantage	Source
New customers are acquired through innovative products (increase market share)	Banbury and Mitchell (1995); Acs, Morck, shaver and Yeung (1997)
Innovation activity of the company results in repeat purchases by customers	Cooper (1999)
Profit earned and potential from innovation activity	Davlia, Epstein and Shelton (2005); Teece (1986);Levitt (1962), Roberts (1999)
Balanced portfolio of innovative projects	Mikkola (2001); Wind and Mahajan (1988)
Effective and productive execution of innovative projects	Lampel (2001); Bonner, Ruekert and Walker (2002)
Time, budget, incentives, commitment and focus on innovation	Cowbey (1993); O'Reilly (1989); Kuzmarski (1996)
Level of knowledge exchange within organization and between the organization and its environment	Tsai (2002); Nickerson and Zenger (2004)
Coherent and aligned innovation strategy executed by the organization	Gimenez (2000); Goel, Gonzales-Moreno and Saez-Martinez (2003)
Appropriate management infrastructure for effective innovation implementation	Teesce, Pisano and Shuen (1997); Ettlie, Bridges and O'Keefe (1984); Pierce and Delbecq (1977)

These items have been taken from different authors, and each show a different dimension of innovation management. The assumption in this research is that effective management of innovation will yield an advantage to a company. The first three items from Table 3.15 measure the innovation performance of the company, while the remainder are good innovation management practices. The subject experts advised including several of these practices, such as good project management for innovation. These are measured as interval data (Likert scales).

3.6.1.1.6 Extent/level of internationalization

This has been included to identify the importance of international operations for the SMEs. Intense international activity means that the company is highly internationalized, which in turn means that the company has already given several internationalization decisions (Table 3.11).

Table 3.11 Level of internationalization measurement model

Extent of Internationalisation	Source
What is the percentage of foreign sales to total sales?	Calof and Beamish (1995); Preece, Milcs and Baetz (1999)
What is the percentage of value of foreign assets to total assets?	Kedia and Mozumdar (2003); Thomas and Eden (2004)
What is the percentage of foreign employees to total employees?	Contractor, Kundu and Hsu (2003); Roth (1992)
What percentage of the total range of products is made in foreign operations?	Johanson and Vahlne (1990); Daniles and Bracker (1989); Hamel and Prahalad (1985)

The first item examines the ratio of foreign sales to total sales (also called international sales intensity by Calof and Beamish (1995)); the second item explores the ratio between foreign assets to total assets; the third looks at the ratio of foreign employees; and the fourth considers the total range of products produced in foreign operations.

The construct is a measure of how much of the SME's operations are based in international factories. We are interested in their decision-making experience.

3.6.1.1.7 Network relationship/commitment – trust relationship measurement model

This construct is directly related to the action research findings. The network relationships and how they are used to internalize location advantages have been explained. Central to internalization is the development of trust and commitment (Table 3.12) between partnering organizations.

Table 3.12 Trust and commitment measurement model

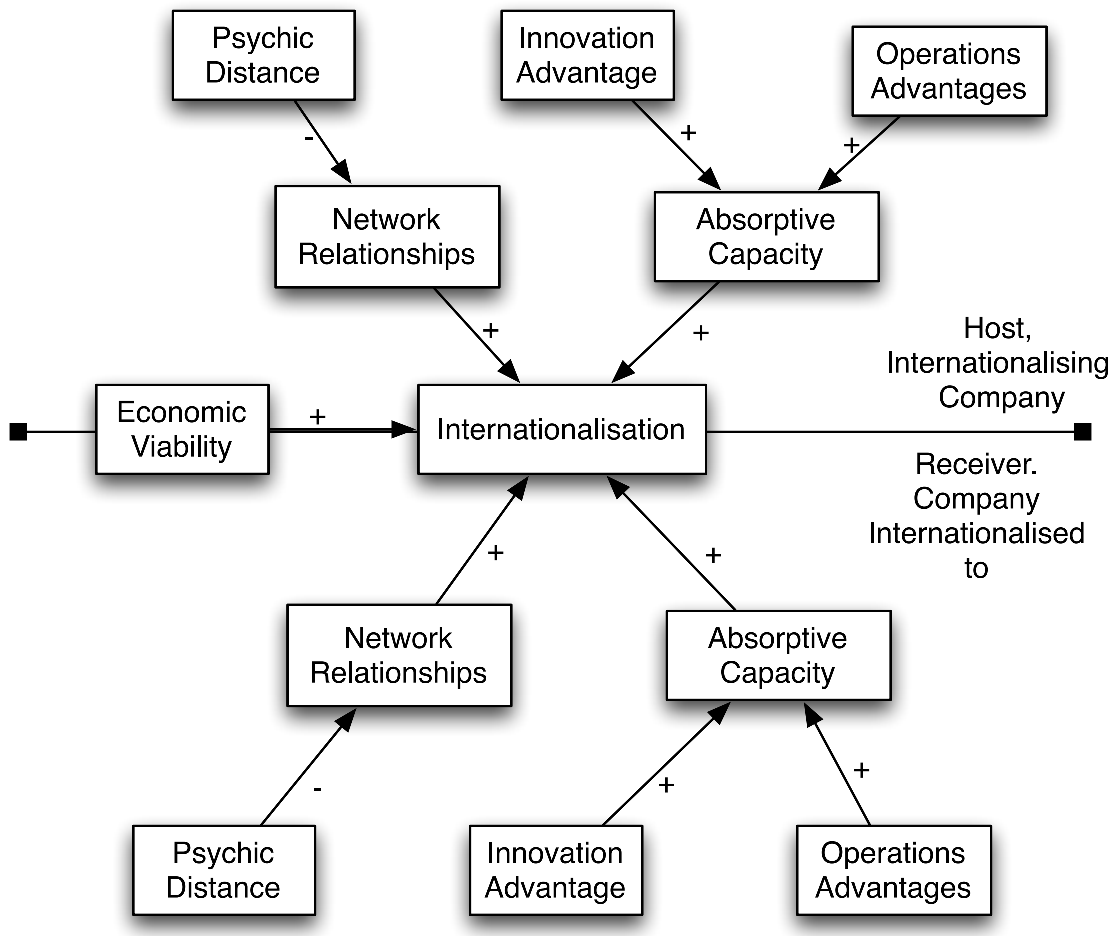
Network Relationships – Trust and Commitment	Source
Organization makes, in good faith, efforts to behave in accordance with commitments	Meyer and Allen (1991); Buchanan (1974); Steers (1974); Dirks and Ferrin (2001)
Organization is honest in whatever discussion precedes such commitments	Simons (1999); Laka-Mathebula (2004); Becker (1998); Paine (1994)
Organization does not take advantage of the other partner, even when the opportunity to do so is available	Das and Teng (1998, 2001); Tomkins (2001), Boersma, Buckley and Ghauri (2003)
Similarities in procedures for control influence many purposes	Saxton (1997); Kim and Park (2002); Geringer and Hebert (1989)
Similarities in reward and incentive systems have a positive effect on inter-company relations	Hitt et al. (2004); Simonin (2004); Hill and Haskisson (1987)
Each organization can meet its objectives without affecting the other	Das and Teng (1996); Kauser and Shaw (2004); Hoffman and Schlasser (2001); Koza and Lewin (1998)
The organizations' goals are consistent and compatible	Das and Teng (2003); Niederkopfler (1991); Schmidt and Kochan (1977)

The seven items above are designed to measure the relationship aspects of the networks.

3.6.1.2 Conceptual/theoretical model and hypotheses

The model was developed in the action research. The model will be tested for theory generation for three different models (Figure 3.5).

Figure 3.5 Theoretical model



The relationships here are explained in the action research findings. This theoretical model is developed further for statistical analysis. The first development is an assumption: economic viability is assumed to be equal in several location choices for an SME. The reason behind this is that we are looking at the importance of internationalization in terms of the decision-making process. The economic viability can be offset by the cost of internalization, and thus these two should be considered together. The decision maker needs to study the economic viability of all locations. The most viable locations can then be assessed on their advantages of internationalization. This study tries to explain, test and generate a theory regarding which factors are most important in assessing the internationalization advantage.

Figure 3.5 models internationalization as the final decision. This is actually made up of multiple decisions, including location decision, entry mode decision, and the role that will be given to the new factory within the network (Ferdows, 1989). These will determine the location and relationship aspects of the new network partner. The survey theoretical model is divided into three parts, and tests the same model for these three different types of decisions.

The first model (Figure 3.6) considers the entry mode decision of internationalization. The model looks at characteristics of both the host and the receiver organization. The host organization's characteristics are the technology transfer ability of the host (function of its absorptive capacity), and the network relationship. If the absorptive capacity of the host increases, we expect that they will select a lower level of entry mode. This means that they will not commit to partnerships. If they do not have the ability to transfer knowledge, then they are likely to invest more and control the international operation. This control means that their entry mode is higher than the high technology transfer capability. The following hypothesis is therefore posited:

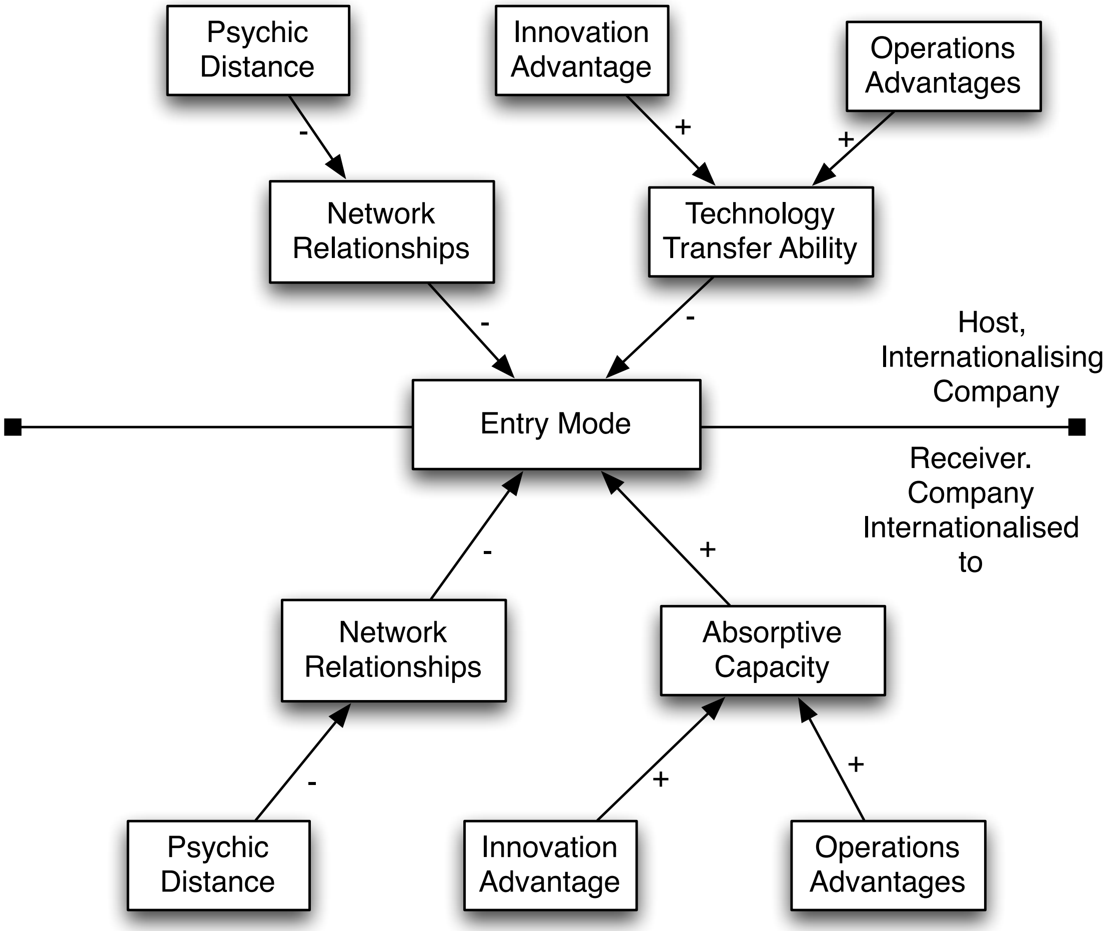
Hypothesis 1a: The technology transfer ability of the host organization will negatively affect the entry mode selection (host).

The network relationships are measured according to trust, control and commitment, which were captured from the action research findings. The network relationships should act in the same way as technology transfer ability. If a company has high trust in a possible partner and does not need to control them, they will be willing to invest into the partnership, rather than investing higher for a green field investment. Thus, the network relationship is negatively related to entry mode and a second hypothesis is suggested:

Hypothesis 2a: Network relationships (trust, control and commitment) negatively affect the entry mode decision (host).

The network relationship for the host is defined according to their perception of psychic distance towards equity-based internationalization. This was one of the results of the action research. The psychic distance should negatively affect the network relationship, since an increase in psychic distance will reduce trust and increase control. This will eventually decrease the commitment.

Figure 3.6 Entry mode- theoretical model



Hypothesis 3a: Psychic distance negatively affects the network relationships (trust, control and commitment) (host).

The technology transfer ability is composed of two advantages. Operations advantage relates to generic operation advantages in operations strategy literature. This knowledge is expected to be a source of absorptive capacity.

Hypothesis 4a: Operations advantage positively affects the absorptive capacity (host).

Absorptive capacity was first introduced and studied with reference to innovation management (Cohen and Levinthal, 1990). The innovation capability of an organization positively affects its absorptive capacity. The organization, which is actively innovating, is already absorbing knowledge from external bodies.

Hypothesis 5a: Innovation advantage positively affects the absorptive capacity (host).

The model is mirrored, and the similar constructs measured, for the receiver organization. The reader should note it is the *receiver's* characteristics that affect a decision maker. The absorptive capacity of the receiving organization will positively affect the entry mode because the increase in absorptive capacity will mean that the host company can choose higher modes of entry, such as wholly owned investment in that country. The amount of knowledge that needs to be transferred increases with the higher levels of entry mode.

Hypothesis 6a: The absorptive capacity of the receiver positively affects the entry mode decision (receiver).

The network relationships (trust, control and commitment) will negatively affect the entry mode decision. If the receiver does not trust the host, wants to control the relationship and has little commitment, the host company will choose higher levels of entry mode. This is motivated by the need to control the relationship.

Hypothesis 7a: The network relationship (trust, control and commitment) of the receiver organization negatively affects the entry mode decision (receiver).

The network relationship of the receiver organization (trust, control and commitment) is affected by the psychic distance that they perceive. The psychic distance of the receiver organization or country will negatively influence the trust of the receiver. Less trust means more control and reduced commitment from the receiver organization.

Hypothesis 8a: Psychic distance of the receiver organization negatively affects the network relationship of the receiver organization (receiver).

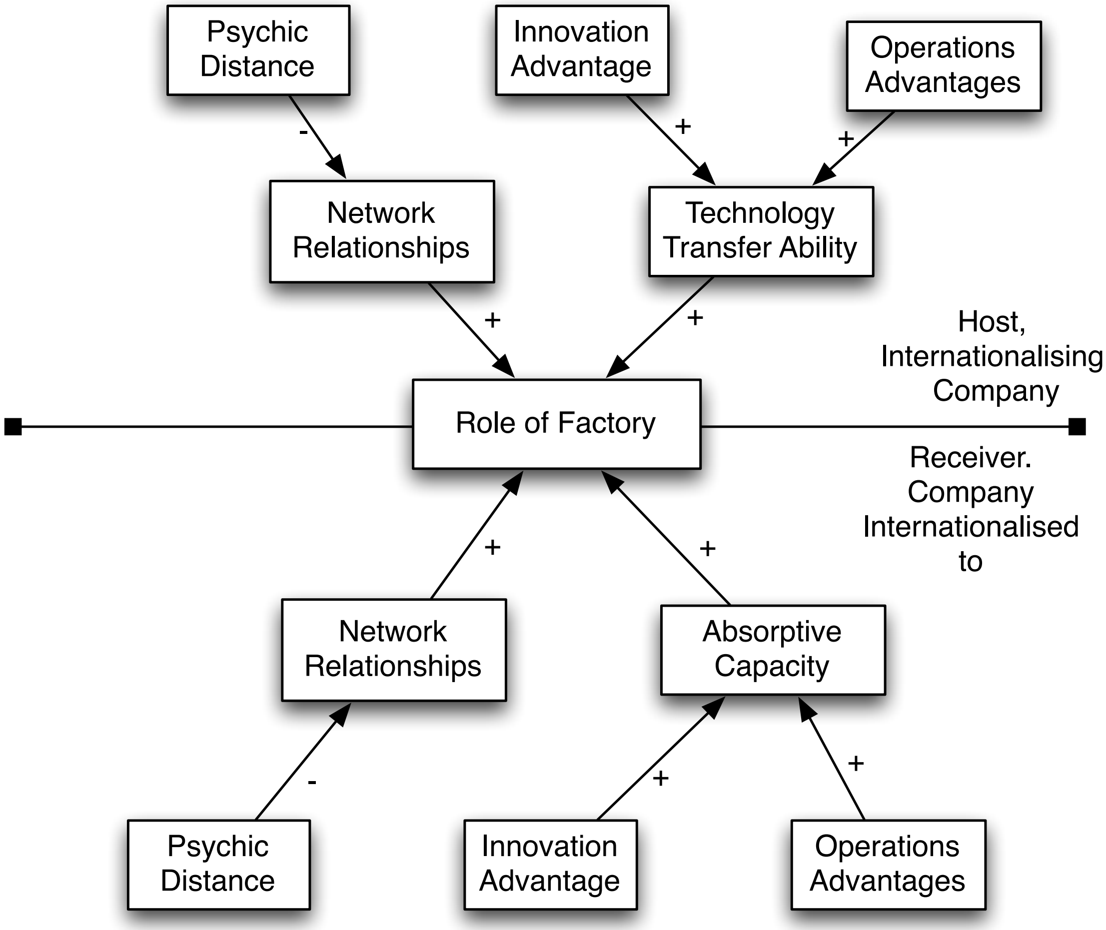
The absorptive capacity of the receiver is the accumulated knowledge of their operations and innovation advantages. The knowledge that they create becomes their prior knowledge, and this will help them to absorb more knowledge.

Hypothesis 9a: Operations advantage of the receiver organization positively affects the absorptive capacity of the receiver organization (receiver).

Hypothesis 10a: Innovation advantage of the receiver organization positively affects the absorptive capacity of the receiver organization (receiver).

The next decision for internationalization is the role of the factory (Figure 3.7) (Ferdows, 1989). This will explain the importance given to the new location. Higher roles mean that the new network partner positively contributes to the network with innovations and other sources of information. The technology and knowledge transfer will be a two-way process, rather than from host to receiver. The model is exactly tested with the same constructs.

Figure 3.7 Role of factory – theoretical model



The decision about role of factory will be directly affected by the host organization's characteristics. The technology transfer ability of the host organization will help to transfer more knowledge to a higher role of factory. The network relationships (trust, control and commitment) will be needed to give a higher role for the new factory in the network.

Hypothesis 1b: The technology transfer ability of the host organization positively affects the decision on the role of the factory (host).

Hypothesis 2b: The network relationship (trust, commitment and control) of the host organization positively affects the decision on the role of the factory (host).

The network relationship is dependent on the psychic distance that the decision maker has. High psychic distance means that the decision maker will be reluctant to assign higher roles because the receiver will not have adequate levels of trust and commitment.

Hypothesis 3b: Psychic distance of the host organization negatively affects the network relationship characteristics of the host organization (host).

The absorptive capacity involves accumulation of knowledge. The technology transfer ability of the organization is also related to the knowledge that they have. More knowledge means a better capability to absorb and transfer knowledge. The source of this knowledge is their operations and innovation advantages.

Hypothesis 4b: Operations advantage of the host organization will positively affect the technology transfer/absorptive capacity of the host organization (host).

Hypothesis 5b: Innovation advantage of the host organization will positively affect the technology transfer/absorptive capacity of the host organization (host).

The absorptive capacity of the receiver organization and their network relationship traits will be important criteria for the decision maker in their decision on the role of the factory. The higher of these traits will be rewarded with a higher factory role. The decision maker will expect higher absorptive capacity and network relationship traits in higher factory roles.

Hypothesis 6b: The absorptive capacity of the receiver organization will positively affect the decision on the role of the factory (receiver).

Hypothesis 7b: The network relationship characteristics of the receiver organization will positively affect the decision on the role of the factory (receiver).

The network relationship traits of the receiver organization will be determined by the psychic distance that they perceive. Higher psychic distance will reduce the network relationship traits of the organization.

Hypothesis 8b: Psychic distance of the receiver organization negatively affects the network relationship characteristics of the receiver organization (receiver).

The absorptive capacity of the receiver organization, like the host organization, will be composed of their operations and innovation advantages.

Hypothesis 9b: Operations capability of the receiver organization positively affects the absorptive capacity of the receiver organization (receiver).

Hypothesis 10b: Innovation capability of the receiver organization positively affects the absorptive capacity of the receiver organization (receiver).

The next part of internationalization that is used within the model is level of internationalization (Figure 3.8). This construct aims to understand the difference between SMEs with different level of internationalization experience. Highly internationalized SMEs will give importance to certain variables that are crucial. This will be based on knowledge that they have learned from repeated decision-making processes.

The host characteristics of technology transfer ability and network relationship traits will determine the level of internationalization. A host with an ability to transfer knowledge will internationalize more. Similarly, if the host feels more trust and commitment because they have less psychic distance, they will again internationalize more. The same is true for the receiver organization. If the receiver has high absorptive capacity, the decision maker will make more internationalization decisions. The network relationship characteristics of the receiver will determine the decision maker’s tendency to make more internationalization decisions.

Hypothesis 1c: The technology transfer ability of the host organization positively affects the level of internationalization (host).

Hypothesis 2c: The network relationship characteristics of the host positively affect the level of internationalization (host).

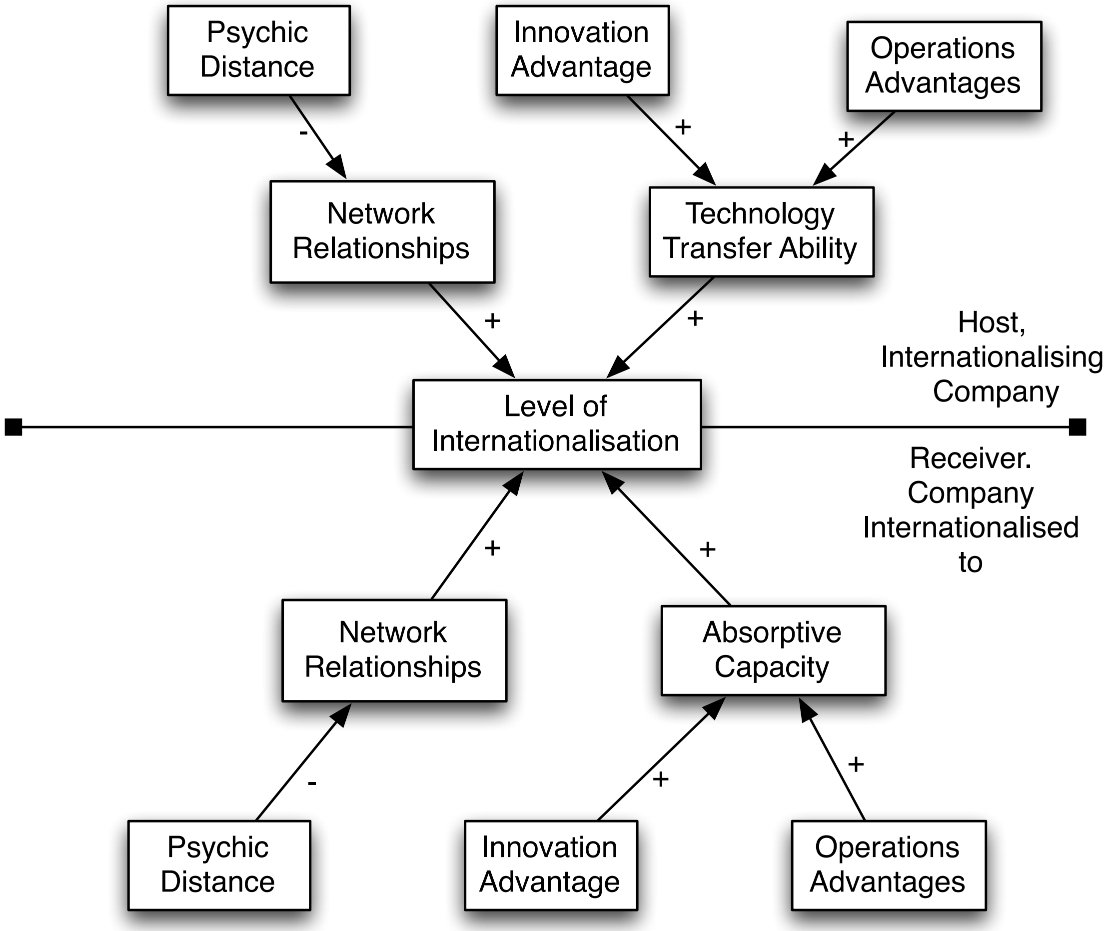
Hypothesis 6c: The absorptive capacity of the receiver organization positively affects the level of internationalization (receiver).

Hypothesis 7c: The network relationship characteristics of the receiver positively affect the level of internationalization (receiver).

The network relationships for host and receiver are determined by their respective psychic distance. The network relationships decrease if the psychic distance increases for the decision maker, as well as the people who will implement the technology and knowledge transfer in the receiver organization.

Hypothesis 3c: Psychic distance of the host organization negatively affects their network relationship characteristics (host).

Figure 3.8 Level of internationalization – theoretical model



Hypothesis 8c: Psychic distance of the receiver organization negatively affects the network relationship characteristics (receiver).

The absorptive capacity of the host and receiver involves accumulation of operations and innovation advantages. These advantages are the source of prior knowledge for the receiver and the knowledge to transfer for the host. The more knowledge they gain from these advantages, the better they become at transferring knowledge or absorbing it.

Hypothesis 4c: Operations advantage of the host organization positively affects the technology transfer ability (host).

Hypothesis 5c: Innovation advantage of the host organization positively affects their technology transfer ability (host).

Hypothesis 9c: Operations advantage of the receiver organization positively affects their absorptive capacity (receiver).

Hypothesis 10c: Innovation advantage of the receiver organization positively affects their absorptive capacity.

The list of all hypotheses for each model is presented in Appendix 5.

3.6.1.3 Sampling

There are three important issues that need to be considered in sampling. These are population frame, sampling methods and significance and statistical power trade-off.

The *population frame* was obtained from three databases. These are Fame, Europages and D&B Who Owns Whom. The companies were selected according to definitions given by HM Revenue and Customs. In 2003 (6th of May), the EU Commission's definition for SME classification was accepted by HM Revenue and Customs. According to this classification, SMEs have:

- 250 or fewer employees
- Annual turnover not exceeding 50 million euros
- Total balance sheet of 43 million euros

Another important characteristic that is used to select companies is their foreign ownership. SMEs that own more than 25% of a subsidiary in a foreign country were selected.

All companies were UK-based, and in manufacturing industries. This was ensured through selecting the companies with 20.--- SIC codes.

Internationalization is a decision that takes companies to foreign markets. The sample has been selected with a view that the managing directors in SMEs will be responsible to give these decisions. There are two reasons why this parameter in sampling has been selected. First, the managing director of Sturge Industries Ltd was the decision maker in the action research. Next, the discussion of individual vs. group level decision making favours individual level of decision making within SMEs (Thorpe et al., 2005; Dew et al., 2004). Also the managerial styles, perceptions, intuition, experience, attitudes and values have an important impact on the SME manager's decision making (Ekanem and Smallbone, 2007 and Bharati and Chaudhury, 2006).

The D&B Who owns Whom database was the most extensive information source. This contains all the names and statuses of the foreign subsidiaries. The search in the D&B database revealed 18,863 companies, whilst Fame had only 567 companies, and Europages had even fewer.

The *sampling method* used was stratified systematic random sampling. First, the 567 companies from Fame were compared to the 18,863 companies in D&B Who Own Whom. If they appeared in both databases they were selected. This resulted in a total of 386 companies. Another criteria was applied to the company selection here: any SMEs that are owned by large companies but have their own manufacturing subsidiary in another country were deselected. By this means, the 386 common companies between Fame and D&B Who Owns Whom dropped to 204 companies, and the 18,863 companies in D&B dropped to 5,237. Of these 5,237 companies, those that are not owned by a large company and own a 25% stake in a foreign country were selected. Systematic random sampling was then applied: the companies were ranked, and every fifth company was selected. This gave a sample of 1,047 companies. The sample was then checked for correctness in terms of the information. If the company website was available, it was visited to confirm that the company is a manufacturing SME. In addition, checks were made as to whether the SME had a manufacturing facility abroad. These checks were made to avoid the risk of using out-of-date information. If the companies did not have the necessary information in their database or did not have a database, they were called to check whether they qualified for the survey. In this manner, the list of 1,047 companies dropped to 973. The sample size was decided to be 1,000 companies, so from the list of 4,190 companies remaining, each 155th company was selected to bring the sample size back up to 1,000. The 27 additional companies were again checked via their web pages, or were called. From here, two further companies were dropped and those next ranked below them on the list of 4,190 were chosen, until two qualifying companies were obtained. This method gave a 1,000 UK manufacturing SMEs, which each own a minimum of 25% of a foreign manufacturing facility.

The response rate for this survey was 320 acceptable responses, with less than 20% data missing – the total number of replies was 387, and 67 of the responses had more than 20% missing data. Another 24 were returned without any responses. This means that there was a 32% usable response rate, and 38% with the companies whose replies were missing too much data. Frohlich (2002) reported that an average response rate should be 32% in operations management surveys, and therefore our response rate was acceptable. According to Forza (2009), we can detect a 0.01 significance level, with almost 80% statistical power. The analysis method used for this survey also increases the statistical power. At this level of significance, and statistical power and sample size, even the smallest effects can be detected (Table 3.4).

3.6.1.4 Questionnaire design and pilot study

The questionnaire (appendix 6) was designed according to the principles set by DeVaus (2004). The language, wording, structure and position of all questions were checked, and the questionnaire was filtered for ambiguous, double-barreled, emotionally loaded, negative or directing questions.

The pilot study was conducted using two groups of people. The first group included eight academics, who judged the face validity of the items and constructs, as well as the theoretical constructs and the layout of the survey. The survey was then taken to 10 possible respondents, including the managing director of Sturge Industries Ltd, to complete while they were observed (Fowler, 1993). Once they had completed the questionnaire, the researcher asked about any questions they found it difficult to answer. Problems such as wording, and conceptual or application-related reasons were discussed. Most of the problems faced by the pilot study respondents related to the wording of the questions, since they found some to be very technical. This was solved by giving examples of what each question meant, next to the technical terminology. The revised survey was then taken back to six of the pilot study respondents for their approval. All of them commented that there had been a clear improvement in the design of the survey.

3.6.1.5 Execution

The execution of the survey followed a method advised by Dillman (1978) and improved by Forza (2002, 2009). The steps taken for execution are:

1. All companies were called first to identify the right person to send the questionnaire to. A problem was encountered in the reticence of the secretaries with regards to giving the right name. Initially, the names of the managing directors of these companies were sought, as the decision maker for Sturge Industries Ltd is the managing director.

2. The managing directors were called on a separate occasion to ask their permission to send a copy of the survey. For the managing directors who refused to respond, an attempt was made to convince them that they would learn from the exercise, as well as helping a young PhD student to gain his degree. If they still refused, they were told that they would still receive a copy of it, in case they changed their mind when they saw the survey. Other important information gathered from the managing directors over the phone included whether they were the decision maker for internationalization. Out of 1,000 companies 982 out of the managing directors acknowledged themselves as the decision makers. The remaining 18 were asked who was the decision maker. One company replied that it was the previous owner gave the decision but managing director was asked whether he could complete the survey. The other 17 companies identified other people as the decision makers. When they were asked who this was, these 17 companies told the researcher to send the survey to them to pass on to the right people to complete (two replies were obtained from those companies). Eight of the managing directors of these companies gave the names of the people who were responsible for internationalization decision making.
3. The surveys were mailed to the 1,000 companies, using the exact names. (Appendix 7, covering letter for first mail-out)
4. One week later, the managing directors were called again to ask whether they had received the survey, and when they would be sending it back. The managing directors that refused to complete

the survey were told that they may gain some benefits from it after the results were distributed, and assured that the names of the companies in the survey would be kept confidential. The survey replies were seen by three people.

5. Three weeks later, those companies that did not reply were called again to ask the managing directors whether they had sent it (as it may have gotten lost in the post). The researcher found that 10 respondents claimed to have sent back a completed survey which never arrived. Another stack of surveys were sent to companies who may have lost it or never received it because of postal problems.

Through this method and the use of bright green, yellow and pink paper (most were bright green) a 32% response rate was achieved.

3.6.1.6 Non-response

The average response rate of 32% suggested by Frohlich (2002) for operations management research was met. The analysis method has a high statistical power and deals with missing values through the central algorithm. The non-response bias is very low for the proposed analysis method, as well as the way the execution of the survey dealt with this problem reduced the negative effects.

3.6.2 Structural equation modelling

Structural equation modelling has been widely applied in management research, particularly in marketing. The origins of this second-generation multivariate analysis method dates back to 1916 (Bollen, 1989), and the first application of structural equation modelling was used in marketing (Bogazzi, 1980). There are several forms of structural equation modelling: for many researchers, the term "structural equation modelling" corresponds to the use of covariance-based techniques, which are called covariance structure modelling (CSM) (Shah and Goldstein, 2006) or covariance-based structural equation modelling (CB-SEM) (Hair, Ringle and Sarstedt, 2011). These techniques are commonly used in marketing, consumer behaviour literature and management research. The alternative to CB-SEM is partial least square structural equation modelling (PLS-SEM) Hair, Ringle and Sarstedt, 2011).

Each of these different structural equation methods will be discussed in detail below. The advantages and disadvantages of using one alternative over another will be explained within the discussion of PLS-SEM.

3.6.2.1 Covariance-based structural equation modelling

CB-SEM estimates the model parameters of linear relationships between manifest and latent variables (Shah and Goldstein, 2006). The variables can be endogenous (dependent) or exogenous (independent). The aim of structural equation modelling is to minimize the difference between the theoretical and estimated covariance matrix (Hair, Ringle and Sarstedt, 2011). The manifest variables explain the latent variables, while latent variables construct the relationships of the model. CB-SEM uses this to "confirm" the model, rather than discover an acceptable model (Gefen, Straub and Boudreau, 2000). The relationships between latent variables are also called a path; hence, the analysis method is sometimes also called path analysis. The path will have directionality, and this will reveal relationships between the latent variables. The manifest variables are loaded into the latent variables. A specific model has been designed and tested using structural equation modelling.

The manifest variables can only be reflective, and cannot take a formative form (Bollen, 1989). The reflective measurement models are based on the latent variables causing the manifest variables. The alternative measurement model is a formative one, in which the manifest variables cause the latent variables. The formative measures require an index in which all the causes should be included compared to reflective manifest variables, depending on the development of a scale. The CB-SEM does not accept formative measurement models unless special additional constraints are included into the model (Fornell, Rhee and Yi, 1991).

The sample size for CB-SEM is quite an important determinant of the reliability and validation of the model (Jackson, 2003). The optimum size of the sample is based on many parameters, including the number of manifest and latent variables, multivariate normality, and the estimation method used (Shah and Goldstein, 2006). There is general agreement on a ratio of 10:1 – i.e. for every single manifest variable there is a need for 10 samples. Shah and Goldstein (2006) identified that this ratio has been lower for operations management research; 67.9% of the research papers published in operations management that used CB-SEM have used less the 10:1 ratio, while 35.7% have used less than 5:1.

The alternative explanation for the sample selection process is the statistical power of the analysis. CB-SEM is based on minimizing the differences between the theoretical and estimated covariance matrixes (Hair, Ringle and Sarstedt, 2011), which involves finding a non-significant difference between these two covariance matrixes. The analysis may not detect any differences and produce model parameters based on this estimate, because the statistical power is not strong enough to detect actual differences. A statistical power that is higher than 0.80 in terms of degrees of freedom is acceptable (MacCallum, Browne and Sugawara, 1992). The degrees of freedom are calculated by $d.F. = (1/2)\{p(p+1)\} - q$, where p is the number of manifest variables and q is the number of latent variables that need to be estimated. This shows that the way that a model is specified can result in high or low degrees of freedom. Shah and Goldstein (2006) report that only 37% of the research papers published in operations management with CB-SEM studies have higher or equivalent degrees of freedom for reliable parameter estimates. The design of the model will result in certain degrees of freedom, with smaller sample sizes requiring greater degrees of freedom (Shah and Goldstein, 2006).

The manifest variable needed to measure a latent variable is expected to be more than one. Marsh, Bella and McDonald (1988) recognize that there is a need for large number of manifest variables for each latent variable, in order to ensure reliable estimation of the variable. However, this increases the number of parameters to estimate, which requires a large sample size. Confirmatory factor analysis can be used to reduce the number of manifest variables. The single indicator is only useful if the manifest variable can thoroughly represent the latent variable. The measurement of reliability is ignored in single-item constructs.

CB-SEM can measure both recursive and non-recursive models. In non-recursive models, where there is a correlation between errors or feedback loops, requires special attention in terms of model identification.

The data for CB-SEM is expected to have minimal missing values and to be normally distributed. If these data requirements are violated, there are possibilities of convergence failures, biased parameter estimates, inflated goodness of fit indices, and underestimated standard errors (Shah and Goldstein, 2006).

CB-SEM evaluates the results on three levels. The first is the overall fit of the model. The overall measures of fit can range from x^2 to GFI and AGFI. These are also divided into absolute measure of fit and incremental measure of fit (Bollen, 1989). The second evaluation is done for measurement model fit through assessing construct reliability, and convergent and discriminant validity with their individual parameter estimates. The last evaluation is done for the structural model fit through analysing the path estimates and their strengths (sign and magnitude).

3.6.2.2 Variance-based structural equation modelling (PLS-SEM)

Variance-based structural equation modelling does not aim to create a theoretical covariance matrix or try to match the real covariance matrix, but rather attempts to explain the latent variable through a reduction of the variability of each manifest variable (Hair, Ringle and Sarstedt, 2011).

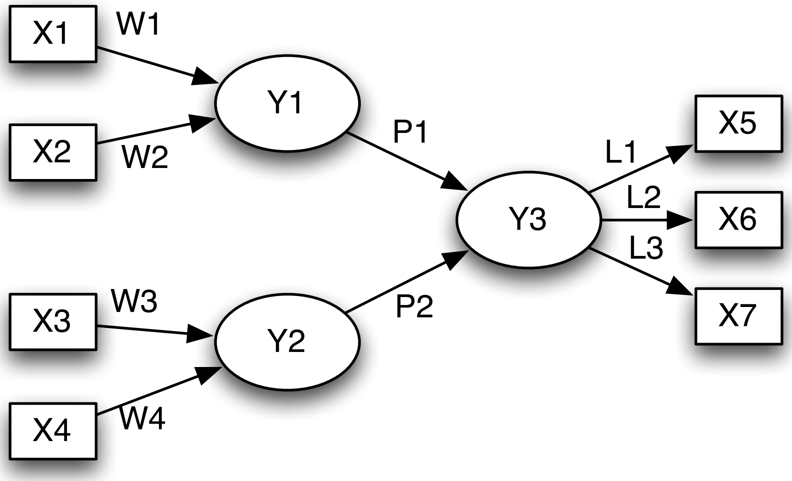
The PLS-SEM approach differs from CB-SEM in many ways: there is a philosophical difference between CB-SEM and PLS-SEM, and Hair, Ringle and Sarstedt (2011) believe that these approaches are good for different types of research. If the research is oriented towards confirmation and testing, for instance, then CB-SEM should be used. If there is no strong previous theory and a need for their development, the choice should be PLS-SEM. This distinction is based on other attributes of these two complementary types of structural equation modelling.

PLS-SEM uses an algorithm, which requires smaller sample sizes while estimating more complex models. CB-SEM, on the other hand, requires normality and other distribution assumptions, while the algorithm allows PLS-SEM to operate with less stringent requirements. However, this creates many differences in terms of evaluation of the results (Hair, Ringle and Sarstedt, 2011). PLS-SEM treats the manifest variables in proportion to their explanation of the dependent variable. This means that the variance between manifest variables within the same independent variable is not treated like CB-SEM. The results of these two approaches will differ, but the use of good measures and data will yield very similar results (Tenenhaus, 2008). The results of CB-SEM can provide a very poor measurement model, yet a strong relationship between latent variables; conversely, PLS-SEM will provide an acceptable measurement model but a weak relationship between latent variables. This is a result of the treatment of manifest variables by these different approaches (Hair, Black, Babin and Anderson, 2010).

PLS-SEM requires a similar path model, latent variables and manifest variables to CB-SEM. However, there are several differences between CB-SEM and PLS-SEM. The first is the use of a formative, as well as reflective, measurement model. The second is that PLS-SEM only allows for recursive models, while CB-SEM can estimate the parameters of non-recursive models (Hair, Ringle and Sarstedt, 2011).

The PLS-SEM algorithm has two stages (Lohmöller, 1989). The first estimates latent variable scores by following four stages. The second is where the loadings or the outer weights are calculated. The reflective models reveal loadings, and the manifest variables are treated through single regressions. The formative measurement model is treated as a multiple regression, and the indicator estimates are called an outer weight. The structural model is made of relationships between dependent and independent latent variables. These latent variables are used to calculate the regression coefficients between them through partial least square regression. Figure 3.9 demonstrates a path model.

Figure 3.9 Example of a PLS-SEM path model



X1, X2…X7 are the indicators. X1, X2, X3 and X4 are used for formative measurement of Y1 and Y2 latent constructs. W1, W2, W3 and W4 show their loadings to their respective latent variables. These are estimated through multiple regression. The indicators X5, X6 and X7 are used for the reflective measurement model for the latent variable Y3. These estimates are achieved through regression with every single indicator. The latent variables Y1 and Y2 are connected to latent variables Y3 via arrows. These arrows represent the path model between these latent variables. P1 and P2 represent the strength of relationships between these latent variables, which are estimated from partial regression models. The scores P1 and P2 should be treated as regression coefficients.

Hair, Ringle and Sarstedt (2011) explain the PLS-SEM algorithm through the two stages of Lohmöller (1989) (Table 3.13). The first stage has four parts, while the second stage has only one.

Table 3.13 PLS-SEM Algorithm presented in stages and steps *(adapted from Hair, Ringle and Sarstedt, 2011)*

Stage One: Iterative estimation of latent variable scores
Step1: The approximation of the latent variable scores Y1, Y2 and Y3 are estimated through manifest variables and from step 4.
Step 2: Proxies for latent variable relations P1 and P2 are estimated.
Step 3: Inner approximation of latent variable scores are estimated based on Y1, Y2 and Y3, and P1 and P2.
Step 4: The proxies for scores of the measurement models are estimated.
Stage Two: Final estimation of all scores, loadings, weights and coefficients through ordinary least squares of each partial equation

PLS-SEM is chosen over CB-SEM where there is a need to have a more robust analysis with a smaller sample size and more complex models. The focus in PLS-SEM is on the regression, which minimizes the error variance in the dependent latent variable (Hair, Ringle and Sarstedt, 2011). Nevertheless, the PLS-SEM has some disadvantages when compared against CB-SEM. The first disadvantage is the two-stage algorithm. PLS-SEM estimates the scores of the outer model first. These are then used to estimate the scores of the inner model. The researcher has to first analyse the outer model and the scores of the indicators. The measurement model should be corrected, and used to estimate the relations between the latent variables. The perfect measurement model will ensure that the results of PLS-SEM are very similar to the results of the CB-SEM approach.

One of the advantages of CB-SEM is the availability of goodness of fit indices. These ensure that the model can be judged as to whether or not it is acceptable. PLS-SEM is considered to be predictive, because there is no global goodness of fit measure for model evaluation.

There is also a debate on differences between the results of CB-SEM compared to PLS-SEM. There is a belief that PLS-SEM estimation is not consistent, and is biased. Reinartz, Haenlein and Henseler (2009) studied evidence of the bias, and found that between methods there is a small amount of difference that is not significant enough to affect the results. Jöreskog and Wold (1992) also found that with a large sample size and many indicators for latent variables the problem of this bias is rectified. Reinartz, Haenlein and Henseler (2009) discovered that the variability of the error estimated by PLS-SEM is significantly smaller than in the CB-SEM approach. This provides better estimation in more complex models, and when the assumptions of distribution are not achieved. The noteworthy advantage of the PLS-SEM approach is the ability to estimate the parameters of complex models, because it has a superior statistical power. This power can be used for theory testing if the model of the theory is very complex. The CB-SEM approach should be used if the theory can be modelled with few latent variables and manifest variables. The required sample size and corresponding statistical power increases as the number of latent and corresponding manifest variables increase (Rindskopf, 1984). Hair, Ringle and Sarstedt (2011) explained that in PLS the minimum sample size is counted through multiplying the internal paths by 10. However Chin et al. (1996) added the requirement of multiplying the maximum number of formative indicator number with 10 and then comparing this final number with the multiplication of internal paths with 10 will reveal the maximum number of sample sizes required to have for generalizability of the results. In covariance based structural equation modelling 200 responses are advised for generalizability of the results by Hair et al. (1995). In this study the number of responses is 320 and the required after multiplying internal paths with 10 is 160. There are no formative measures used within this research and this proves that there is a high level of generalizability. Hair, Ringle and Sarstedt (2011) provide a table that aims to direct researchers to select the correct method in structural equation modelling approaches. Table 3.14 displays information on how to select the right structural equation modelling approach.

Table 3.14 How to select the right structural equation modelling approach *(adapted from Hair, Ringle and Sarstedt, 2011)*

Research Goals
If the research aim is to find key variables and their manifest variables (PLS-SEM)
If the research aim is to test, confirm or compare theories (CB-SEM)
If the research aim is to explore or develop a theory (PLS-SEM)
Measurement Model Specifications
Formative measurement models are needed and used (PLS-SEM)
Error needs to covary (CB-SEM)
Structural Model
Complex structural model with many latent variables and indicators (PLS-SEM)
Nonrecursive Model (CB-SEM)
Data Characteristics and Algorithm
Large sample size with correct distributional assumptions (CB-SEM)
Small sample size with no restrictions on distributional characteristics (PLS-SEM)
Model Evaluation
If latent variable scores are needed for future analysis (PLS-SEM)
If a global goodness-fit criteria is needed (CB-SEM)
If measurement model invariance needs to be measured (CB-SEM)

This dissertation uses the PLS-SEM approach because:

- The research aim is to explore and develop a theory rather than test, confirm or compare theories.

- A complex model with many latent variables and indicators will be used. The statistical power would be very low with CB-SEM. The model is recursive.
- A large sample size is used, but it is still not enough to provide statistical power.
- There is a need for latent variable scores for one single latent variable.

The evaluation of PLS-SEM should start with measurement models. The reflective model is evaluated against its validity and reliability. The construct validity can be achieved with reference to Cronbach's alpha. A more useful measure for PLS-SEM is the composite reliability, which does not assume that all indicators equally contribute to the latent variable. This is similar to how PLS-SEM treats manifest variables. The composite reliability should be 0.6 to 0.7 in exploratory research. If the research is more advanced than the exploratory stage, the expected values should be 0.7 to 0.9 (Nunnally and Bernstein, 1994).

The loadings of the manifest variables should be more than 0.7. Indicators with loadings of around 0.4 to 0.7 can be considered to be eliminated of they increase composite reliability. However, sometimes even if the composite reliability increases with their removal, the researcher may not eliminate them on the basis of content validity. Nevertheless, those manifest variables that score less than 0.4 should always be eliminated from the calculations (Hair, Ringle and Sarstedt, 2011).

The measurement model of reflective constructs is also evaluated through their convergent and discriminant validity. The convergent validity of the measurement model is evaluated through the average variance extracted (AVE), which should be higher than 0.5 (Hair, Ringle and Sarstedt, 2011).

Table 3.15 Evaluation of PLS-SEM estimated parameters *(adapted from Hair, Ringle and Sarstedt, 2011)*.

Reflective Measurement Models
Internal consistency reliability: composite reliability>0.7 (exploratory >0.6)
Indicator reliability: loadings > 0.7
Convergent validity: AVE > 0.5
Discriminant validity: AVE of each construct should be higher than the square of the correlation of constructs and any indicator loading should be higher than its cross-loadings.
Formative Measurement Models
Indicator significance measured through the t-values obtained from bootstrapping.
Multicollinearity: VIF<0.5
Unobserved heterogeneity should be assessed.
Insignificant indicators can be regrouped under new constructs.
Structural Model
R Square: 0.75 = substantial, 0.5 = moderate, 0.25 = weak for marketing research
Patch coefficients assessed through t-values obtained from bootstrapping.
Predictive relevance measured through cross-validated redundancy obtained through blindfolding.
Assessment of the unobserved heterogeneity.

The discriminant validity is obtained through two methods. The first is where the latent construct should have more shared variance with its manifest variables than other latent variables (Fornell and Larcker, 1981). This is also called the Fornell-Larcker criterion. The second method is that the AVE of the latent construct should be higher than the latent construct's highest correlation with other latent variables.

Table 3.20 explains the assessment of PLS-Model estimate scores. In this dissertation, reflective models are used. Therefore, evaluation of the formative measurement models will not explained further. The reason why all measures were selected as reflective is the approach taken to focus on maximizing the overlap between interchangeable indicators (Diamantopoulos and Winklhofer, 2001). The indicators are the reasons or consequences of the construct rather than by means of causes. The downside of the formative measurement models are, they cannot be treated for measurement error and omitting any indicators will change the meaning of the construct, however reflective measurement models will not suffer from these problems.

Evaluation of the structural model is done through four important assessments. The first assessment is the R^2. This is dependent on the specific field of study, but for marketing research 0.75 is considered to be strong, while 0.5 is moderate and 0.25 is weak (Hair, Ringle and Sarstedt, 2011). Cohen (1988) evaluated R^2 values for behavioural science, and reported that 0.26, 0.13 and 0.02 are strong, moderate and weak, respectively. In this dissertation, we are interested in managers' decision making. Cohen's (1988) suggestion will therefore be used to assess the R^2 values, as the study deals more with behavioural science than marketing.

The next evaluation is done to the path coefficient. This is achieved through looking at the standardized beta coefficients of ordinary least square regressions. The significance of each path coefficient is understood through bootstrapping, from which t-values for two-tailed test are acquired. The critical values are 1.65 (10% significance level), 1.96 (5% significance level) and 2.58 (1% significance level).

The third assessment is done to achieve an understanding about the predictive power of the model. The Stone-Geisser Q^2 test is used to assess the predictive power of the model (Stone, 1974; Geisser, 1974). This is achieved through blindfolding, which is a technique to omit every *d*th item, and uses the rest of the data to predict omissions.

Hair, Ringle and Sarstedt (2011) suggest the use of 5 or 10 as the *d* value. Blindfolding will provide a cross-validated redundancy measure value (Q^2), which should be over 0. The scores over 0 for latent variables mean that those latent variables have predictive significance.

The last assessment looks at whether the data used have unobserved heterogeneity.

There have been some developments to create a goodness of fit index for PLS-SEM. Tenenhaus, Amato and Vinzi's (2004) goodness of fit is based on the geometric mean of average communality and average R^2; they also propose that the values of 0.36, 0.25 and 0.1 are large, medium and small, respectively. This can be used to assess the general model fit.

3.7 Justification of research methodology

The extant research on SME internationalization is focused mostly on their export behaviour. This thesis investigates equity-based internationalization, where there is an investment from the company to produce goods in another country. The literature in operations management matches the lack of literature in the international business discipline. The focus on the former discipline was to select a location with reference to certain parameters, and thus the discussion in many papers relates to the selection of these parameters. There are few papers focused on how to use these parameters and make a decision; however, most of these papers were not clear on whether the decision making and internationalization is suitable for SME managers. These studies also failed to consider the difficulties an SME manager faces when they are making a decision.

The research has started as a project in the TCS scheme. As a TCS associate, the relevant literature was used as much as possible. The participatory nature of TCS and the lack of literature on SME internationalization meant that inductive methods of research were more suitable than deductive ones. The appropriate research methodologies were evident from the start. The decision was not made by the author or the supervisor, but by the type of work being done, which lends itself to one category of inductive research. The participatory nature of the TCS project led to action research being chosen over other methods, including case studies.

The action research provided a wealth of information and knowledge about SME internationalization. The problem was that it took a considerably long time to complete, and it is very hard to generalize the reflections from one action research case study to other SMEs. This generalizability problem was the reason why a second method was used to analyse the issue. The results of the action research provided the factors that affect the decision making of the SME manager. These were easily related to relevant literature, which provided insight to be built on.

The second methodology to be used was selected out of case studies and survey – either of which would have provided more generalizability to the study and its results. The survey method was chosen as the aim was to understand the commonalities in international manufacturing within the UK. Researching the success of decision making meant that we needed to be able to see different levels of internationalization within our sample. This would have been harder to achieve with case studies. The survey provided a better means by which to capture many different levels of success and understand what differentiates highly successful firms from others. This would have been harder in case studies because there would be a need for two samples of companies – highly successful and others. In turn, the case study protocol would have needed to be designed to ask semi-structured questions that would increase the possibility of conducting cross-case-study analysis. This would be theoretically possible, but perhaps not practically. The difficulty of finding successful companies and convincing them to join the study would also have been a problem. The sample sizes of control and actual should be similar; if the successful companies were very few, then the control sample would need to be either equivalent to this, or slightly larger. This would not have been conducive to generalizability. The survey methodology was therefore selected. The second methodology used was predominantly deductive in nature.

Once the two different but complementary methodologies had been selected, it was obvious that neither of them would be dominant over the other, but that they would work together. This meant that a mixed methodology was used.

This thesis started by identifying constraints on the possible methodologies. These constraints forced the author to select methodologies later that mend some of the drawbacks of the initial method. This has resulted in mixed methodology research.

3.8 Validation of the studies

Below, the validation of the investigations is presented for mixed methodology and action research. Validation of the survey research can be found within the survey findings chapter.

3.8.1 Validation of mixed methodology used

Onwuegbuzie and Johnson (2006) proposed nine measures for the validation of mixed methodology research. These measures are:

1. *Sample integration legitimation*: The research uses a sequential mixed methodology research design, where qualitative study is done to a non-random sample. The quantitative study follows the initial study, to ensure that the results can be generalized. This is achieved through using a separate, random sample for the quantitative study.
2. *Inside-outside legitimation*: The sequential mixed methodology design helped to provide an insider view first, and an outsider view

second. The qualitative research in this study provided the insider view. The validation of the action research allowed the peer view (outsider) and participant view (insider) to be captured at the time of the study. The inside-outside legitimation is therefore achieved within the qualitative study, and between the qualitative and quantitative studies.

3. *Weakness minimization legitimation*: The weakness of the action research lies in its generalizability, or lack thereof. The results are intertwined into the context of the analysis, and the explanations are therefore rich and provide details of first-hand experience. However, one single company was used, and the research design does not aim to discover universal inferences. The action research may provide a result with minimal systematic error, and hence be valid, but could also include random errors that are high, hence equating to low reliability. The research aim and objectives have never been studied and reported before. This required an exploratory study to which a quantitative study could be applied. The action research achieved this. The results provided the basis for the constructs and hypotheses of the survey. The survey conversely provided the generalizability to the findings. The results of the survey study increased the confidence of the action research results.
4. *Sequential legitimation*: This requires switching the sequence of the mixed methodology to see whether the same meta-inferences would be achieved. This was nearly impossible to achieve because the action research did not use a very repeatable research design.

The context therefore has to change in the second implementation of the action research. In addition, the survey took considerable time and conducting this twice would add very little value. Furthermore, the survey hypotheses and constructs were developed from the findings of the action research, which makes it even harder to separate them from each other.

5. *Conversion legitimation*: In this research, the quantitative or qualitative methods are not converted in order to be used in he opposing methodology.
6. *Paradigmatic mixing legitimation*: The study uses subjective epistemology in the action research. The findings of this subjective research are used in the objective research. Ontological, axiological and rhetorical mixed points were also used within this research.
7. *Commensurability legitimation*: This is achieved through the discussion of the findings at the end of the survey and within this chapter. The managerial decision-making procedure explained above includes attempts to achieve Gestalt switches between qualitative and quantitative perspectives.
8. *Multiple validities legitimation*: The action research and survey methodology used within this thesis have their own validation and reliability sections within their own chapters. Both quantitative and qualitative methods achieved high validity and reliability.
9. *Political legitimation*: The value of the meta-inferences were judged by asking the views of the managing director, and the technical manager of Sturge Industries Ltd, as well as their Turkish partner's owners.

3.8.2 Triangulation

Triangulation increases confidence, theory integration, innovative ways to research and detailed exploration of phenomenon (Jick, 1979). There are four types of triangulation that can be used within a thesis: data, investigator, theory and methodological (Denzin, 1978).

The mixed methodology design within this thesis provides methodological triangulation that provides a higher convergent validity and holistic view. This was complemented by using multiple theories in the design and discussion stages of the qualitative and quantitative research. The methodological and theoretical triangulation helps the convergent validity, and provides a holistic view of the phenomenon.

The qualitative research was conducted using data triangulation. The data was collected in multiple methods from multiple people. The action research participants provided the data for the analysis. This equates to within-method triangulation, which provides higher reliability to the findings (for more discussion on the reliability and data triangulation in action research, refer to the validity and reliability in action research section above).

3.8.3 Validation of action research

The validity of the action research will be considered with reference to two different set of rules proposed by two different groups of scholars.

Winter (1989) proposed six standards of validation in action research, as follows:

1. There is a need for reflective critique in action research and this should be observed as a generation of new research questions.

   How this is achieved: reflections have been shown within the evidence, and were discussed in detail with reference to the available literature; in addition, their relationships have been displayed. The findings revealed many research questions that can be considered for future studies.

2. There is a need for a discussion that will critique every part of the research and should be aware of the changing nature of the research over time.

   How this is achieved: discussion has been applied in many parts of the study. The changing roles have been explained within the case explanation. The discussion regarding the literature was conducted in the literature review section. The reflections obtained from these discussions are then again discussed against the evidence, and the relationships between different variables are presented. This is done to explain the changes over time in terms of the people involved, and the action research project itself.

3. Participation is critical as there is a need to collect data from multiple sources.

   How this is achieved: The action researcher collected data through interviews with all participants, observation in work and meetings, as well as written correspondence between these companies. The interviews were conducted formally and informally. The observation element was important, and carried out by working with people in both cycles, as well as sitting in on the participants' meetings. Emails were sent through the action researcher because of language problems between Turkish and British company. Quality monitor sheets and order forms were all collected as documentary evidence at the time of the research.

4. Risk is part of the process and should be accepted within the research.

   How this was achieved: risk was accepted in the research as the failure of the first cycle was a risk to one of the stakeholders of the project; however, this provided a great learning opportunity for the action researcher. This risk was accepted and then used in a positive way to overcome the problems and learn from them.

5. The participants in the research should also contribute their own points of view to the end result.

   How this was achieved: all participants contributed to the end result of the project. The managing director contributed his views on the decision-making process, the technical manager contributed technical information, and the academic supervisor in the TCS project contributed theory about internationalization decision-making, such as sensitivity analysis and the importance of exchange rates. The action researcher contributed internationalization theory and explained to the managing director the options available in the transfer process. This was achieved jointly, but all participants contributed at different levels and times.

6. There is a need to show a conversion and coordination with the accepted theory.

   How this was achieved: This was achieved via the tables presented above as part of the theoretical background to the research.

Reason and Bradbury (2001) listed five standards for validation in action research. These are:

1. The research should show evidence of cooperation between the participants of the research.

   How this was achieved: cooperation between action researcher and the managing director, with some contribution from the academic supervisor and accounting manager, helped make decisions regarding internationalization in the first cycle. The cooperation between the technical manager, the action researcher, and the owners who are the managing directors of Pirinci helped to solve the quality and knowledge-transfer problems. This was complemented by the managing director. See also Winter's (1989) list of five validation criteria.

2. There is a need for constant and iterative reflection within the research. This should result in a change or improvement in the

practice.

How this was achieved: reflections are presented for both cycles. The change in reflections from one cycle to another, and within the cycles, can be observed from the report and discussion provided with the reflections.

3. The results of the research should advance the current theoretical background, or create a new one.

   How this was achieved: The two models presented in the findings section expand and refine the theoretical background of the research. Another advantage of this is the use of multiple theories and models. The model discussed above addresses the lacking parts of each theory, and combines them in a way that explains the need for internationalization and SMEs' internationalization decisions.

4. The significance of the research to the collaborating company, general academic world and the public are crucial.

   How this was achieved: the significance to the collaborating company was clear, as they are now manufacturing in a lower-cost country and using this cost advantage against their competitors. They have learned from this experience to make internationalization decisions and transfer technology and knowledge. The academic knowledge has also been improved, as there was very little research on equity-based internationalization prior to this study – most extant research focused on the export nature of internationalization. Equity-based internationalization was researched for multinationals and large companies. This study has therefore improved the knowledge on the decision process for internationalization of SMEs. The public domain benefits because 99% of companies in the UK economy are SMEs (Departmet of Business Innovation and Skills, 2010), who can now use this decision model to make successful internationalization decisions. The UK economy will not lose any power from this, but in fact will gain power because, even if SMEs begin to operate in foreign countries, they will continue to pay taxes in Britain. The issue of unemployment can be solved by directing the workforce to growing industries, and possibly providing training.

5. The results of the project should lead to new and sustainable infrastructure.

   How this was achieved: a new infrastructure was achieved in the form of the network between Sturge Industries Ltd and Pirinci AS. This network is working and giving competitive advantage to both companies.

Westbrook (1995) and Coughlan and Coghlan (2002) advocate a self- and multiple validation. Multiple validation is achieved by the stakeholders of the research. The academic supervisor and the managing director checked the results of the project by reading and commenting on the relevant parts of the action research.

Coughlan and Coghlan (2002) propose that following the action research cycles will also increase the validation of the research. From the above report, it can be observed that the action research cycles have indeed been followed.

Ebbutt (1985), Bourdieu (1990), Elliott (1991), McKernan (1991), Higgins (2000) and Coughlan and Coghlan (2002) also predict that action research will be an iterative process with many obstacles. These iterations and obstacles should be explained within the report. This has been achieved in the second cycle. The technical manager and the action researcher could not solve the problem in one planning and acting. The number of iterations to implement the solution without any problems was about 6 or 7. There has been many meetings between partners and stakeholders were numerous. The problems have been listed within the action research findings chapter.

3.9 Chapter summary

This chapter aimed to present the sequential mixed methodology used with action research followed by survey. The mixed methodology was used to increase the generalizability of the findings from action research. The action research has been carried out within two cycles (Carr and Kemmins, 1986). Each cycle provided own reflections. The participation in this research was done through being an implementer rather than a consultant. The data collection was done through interviews, discussions and reports. The good practice advised by Westbroom (1995) was followed through reporting the problems discussions and failures. The last section in action research discussed the validity and reliability of action research. The action research provided rich insights but the results lacked generalizability so a survey was developed from action research findings, which helped to generalise the results. This survey combined deductive and inductive processes under holistic construal (Bagozzi and Phillips, 1982). The content and face validity of the survey has been achieved while designing the constructs. There are 8 constructs that are used within this research, which are: psychic distance, innovation advantage, operations advantage, network relationships, absorptive capacity and three levels of internationalisation. The later until levels of internationalisation are all measured with similar constructs for host and recipient environment while levels of internationalisation is measured by entry mode, role of factory and level of internationalisation. These constructs created three models that have been tested by the structural equation modelling. The three models have 30 hypotheses. The sampling has been done in six stages and stratified systematic random sampling method has been used. The response rate was 32%. The pilot study has been done in three stages, which ensured that all questions are understood, as they are intended to be and the wording, sequence of questions are all in order. The execution of the survey has been done in several stages with several telephone calls to companies as well as one to three mail postings. The structural equation modelling methods used in this thesis was partial least squares based modelling, which is a variance-based method. All constructs have been measured as reflective measurements with their internal consistency, indicator loadings, convergent validity and discriminant validity were used to evaluate them. The structural model was evaluated with their r squares, path coefficients through their t values and finally their predictive relevance. The chapter ends with justification of the research method and validity and reliability of mixed methodology, action research and survey.

4 Action Research Analysis

4.1 Introduction

This chapter aims to present a structured analysis of the action research. There are two cycles of analysis, each of which are built around four major headings: context, action research question, participants and analysis. These provide a structured way of learning from the participative research. The context in each cycle will explain the circumstances of the research. The second cycle will explain the changes to the context from the first cycle. The action research question in each cycle differs, but is complementary in terms of solving a common problem. The participants of the action research are the stakeholders of the problem solved; they are important contributors and also confirm the validity and reliability of the studies. The analysis section presents the learning from each cycle. The reflections and discussion of the action research will be presented under the discussion chapter.

4.2 Cycle 1

The action research design requires progress through different cycles in order to create learning, which forms the basis of the reflections. The first cycle of the action research will look at the SME internationalization decision.

4.2.1 Context for Cycle 1

The researcher began as a Teaching Company Scheme Associate in February 2002 at Sturge Industries Ltd and Aston Business School (the Teaching Company Scheme changed its name to the Knowledge Transfer

Partnership in 2005). The aim of the project was to transfer multi-swaging pin production technology from US-based parent company Bead Industries Ltd. The first few months of this appointment were dedicated to obtaining several electronic pin customers in Europe. The researcher therefore had the chance to call many companies within European Union countries and travel to the US parent company to see and understand the manufacturing and design of electronic pins. This was another important part of the project to transfer of this knowledge. It was expected that the orders were designed within Sturge Industries.The knowledge about production and process capabilities as well as the design process were planned to be transferred. The design requirement for the product was restrictive because of the limitations of multi-swaging, which includes the size, shape, and number of products that can be produced, the seam behind the product (which affects the soldering of the pin into motherboards), the thickness of the product, and the fact that most companies required a barb to secure the pin. All of these limitations reduce the number of industries and companies in which this product can be sold.

The market research done through calling these companies revealed that the product needs to be promoted and sold during the product design stage, which could last between two and four years. During the design stage, numerous problems are likely to arise, including soldering problems. There are also lengthy quality-assurance requirements from the final customers that need to be adhered to. These problems, and a lack of resources, meant that, after nine months of appointment, Sturge

Industries decided to discontinue the project. The last part of project was to attend to an electronics exhibition in Munich, which also confirms the duration needed to sell these products. This exhibition provided a conclusion to the first initiatiove of Teaching Company Scheme Project in which we have understood that to take an order new product development cycle of the proposed companies should be coincided and all design process may take up to 2-3 years. The managing director of Sturge Industries decided that this was too long.

The Teaching Company Scheme Project continued in a new direction after Sturge Industries abandoned electronic production project. The managing director of Sturge Industries, the researcher's university contact, and a manager of the Teaching Company Scheme agreed to conduct three smaller projects. These were to include:

1. Internationalizing Sturge Industries' manufacturing to another country.
2. Planning to apply lean management principles within Sturge Industries' production. These were to be introduced within the next 15 months.
3. Measuring the innovation capability of the company, and identifying possible ways in which to improve the innovation capability.

The Teaching Company Scheme was a government initiative that aimed to help companies obtain for a project. This funding would be divided between the government and company shares, with the government providing 70-80% of the funding. The internationalization project in this instance was to have a team of four people. These include:

1. Teaching Company Scheme Manager
2. Teaching Company Scheme Associate
3. Academic Representative
4. Company Representative.

These people were to meet every three months to discuss the progression of the project. There are two important documents for these meetings. The first is the project financial statement, and the second is a list of activities and the expected result of the project. Both of these documents were prepared before the appointment of the associate. There were four training modules and an opportunity to obtain a Level 4 NVQ in Management.

4.2.2 Case company: Sturge Industries Ltd

Sturge industries Ltd is a manufacturer of metal bead chains. They have been manufacturing this product since the early 1970s. The key manufacturing capability of this company is the process of multi-swaging, which is used to give shape to small items through progressive forming, without any chips. Bead Industries Inc. in the US were the first to use this process to manufacture bead chains. In the 1970s, the manufacturing of metal bead chains was transferred from the US to the UK. Sturge Industries Ltd was formed as a subsidiary of Bead Industries Inc. in the late 1990s, when the company owner sold Sturge Industries Ltd to Paul Cox and retired. There was an agreement on profit sharing and share of ownership between the parent company and the subsidiary but this information was not available to the researcher or the other people employed by Sturge Industries Ltd, other than the finance manager and the managing director. Bead Industries Inc. lost its manufacturing advantage against Far Eastern competitors by the start of the new millennium, and all production of metal bead chains were then transferred from the USA to Sturge Industries Ltd. The machines used by the parent company were transferred, and were being set up at the time the researcher began his appointment there.

Bead chains are a commodity product that can be used in many different applications. The main customers are from sanitary and blind industries, but Sturge Industries have customers including jewellery-making and textiles companies. The product has competition from substitute products such as plastic chains and cloth-based systems for blinds. A metal bead chain is more expensive than these alternatives, but has a better perception of quality from customers. The competition between metal bead chain manufacturers is based on cost. They are expected to have good delivery and quality capabilities, but at the end of the day the company with the best cost advantage wins. As mentioned above, Bead Industries Inc find it hard to produce bead chains that can compete against producers in China and Korea. There are also manufacturers in Turkey. In a study conducted by Bead Industries Inc. and Sturge Industries Ltd, the cost of manufacturing in the UK was lower than in the US, and this formed the motive for the transfer of technology from the US to the UK. There was only one other manufacturer in the US and none in

UK; the other US-based manufacturer had already agreed to produce their products in Korea with another manufacturer of metal bead chains. Meanwhile, Bead Industries Inc. moved from their previous location to another for tax purposes. Both companies were trying to improve their processes and introduce management practices such as lean manufacturing and six sigma so that they could increase their productivity, lower their waste and achieve better quality, resulting in reduced costs and better competitiveness.

4.2.3 Strategy of Sturge Industries Ltd

The managing director of Sturge Industries has a background in marketing and sales. This is reflected in their strategy, and thus in the developments and progression of the company. Sales have grown rapidly, and Sturge Industries have entered many different and distant markets such as Japan, Australia and New Zealand. All of these internationalization steps were export based, and achieved thanks to the international experience of the managing director. To provide some idea of how much Sturge Industries have expanded: they increased their sales twofold during the first three years following the change of ownership. In addition, the transfer of production from the US to the UK meant that their production also increased twofold, since the machines they own were able to produce twice the previous amount. The capacity increase was achieved by doubling the number shifts, which in turn increased the number of hours each machine was working to 16 hours a day.

The company's product market strategy is based on providing better quality and service than their competitors. The quality of the chain is defined according to its uniformity and the weight it can carry. As outlined above, Sturge Industries serve two major customer groups: the blind industry and the sanitary industry. The two quality criteria – uniformity and strength – are vital for the blind industry, while the sanitary industry requires only uniformity, with a specific focus on the look of the product. This differs to the blind industry, wherein the chain goes through a sprocket and uniformity is important for achieving a smooth-running mechanism. There are three reasons why a chain may not be uniform. The first relates to the fact that the chain should have a perfect seam. The chain is made out of slit aluminium or steel, which is bent into a tube and then pressed several times to form the beads of the chain. The seam is made when the slit material is transformed into a tube. When the tube is shaped into beads, the seam should stay as it is, rather than opening. There are two problems that can occur at this stage: the seam can open, or overlap. The next quality problem that can arise relates to the shape of the bead, which should be a perfect round ball, and not elliptical. An elliptical shape can arise from seam problems, or from a problem with the way in which the chain was shaped from the die. The latter can happen because of die wear or the excessive pressure applied from the machines. The last quality problem that can influence uniformity is the shape of the dumbbells that hold the bead chain together. The dumbbells are produced in a similar way. There are two types of material that can be used, depending on the size of the chain: smaller sizes use wire, while larger sizes use slit metal. A separate set of dies shape the dumbbells. There are four different problems relating to dumbbells that can affect the uniformity of the bead chain. First, the dumbbells can be formed too short or long. Short dumbbells will result in the beads touching each other not turning and increasing the number of dumbbells in a meter of chain, which will create jamming in the sprocket; long dumbbells will reduce the number of beads in a meter of chain. Another problem that can arise with dumbbells is the shape of the dumbbell. If one of the ends is not formed correctly then the dumbbell will not hold the beads. The final problem is that the dumbbell may not be straight, but rather is "kinky". This will also create a problem of jamming within the sprocket.

All of the above problems are present during production. To avoid them, an extensive quality check is performed on the uniformity of the product. This includes three specific examinations, two of which relate to uniformity. First, a check is conducted of how many beads there are within a certain distance of one another. This will ensure that the chain has enough beads to fit into the sprockets and not jam. Second, a visual check is conducted to ensure that the chain does not have any uniformity problems. The last check is a weight check, which is necessary for the blind industry as the product must be able to cope with different levels of weight applied when people pull the product. Sturge Industries' stringent checks on quality ensure that the faulty products are not sent to the customer.

One other quality problem applies to both the sanitary and the blind industry – this is scoring marks on the beads. This can occur when the product is not plated, as in the blind industry (the sanitary industry uses stainless steel, without plating). Plating requires a unique process, which is in line with the barrel plating used by competitors. Line plating is faster and uses less material, and, compared to barrel plating, the products do not need any additional treatment following plating. This was one of the most important advantages of Sturge Industries.

The second most important competitive advantage of Sturge Industries Ltd is the service provided by the company. There are two key elements to their service. First, they provide a wide range of products including different sizes, metals and plating (i.e. of different metals and thicknesses). This allows them to serve to wide variety of customers. Second, they provide reliable and prompt delivery to customers. This is possible owing of their current location in West Midlands, UK.

The main competition for Sturge Industries Ltd comes from companies in China and Korea. Companies in these countries offer certain cost advantages compared to Sturge Industries Ltd. Despite the cost advantages, however Sturge Industries has managed to increase their sales in Japan. This has been possible because of their high and consistent quality. Their manufacturing cost is slightly higher than China and Korea, but they provide better quality which compensates for their higher prices. This is a very important issue, as the cost of manufacturing in the UK is similar to that in China, plus transportation to UK market must be covered when manufacturing abroad. The quality of Chinese and Korean products is lower in terms of their uniformity. This problem may not be seen in initial orders given to Far Eastern manufacturers by European customers, however quality and delivery problems often arise later on. Another important problem is specific to sanitary industry customers: products sold by Chinese and Korean manufacturers are usually subject to visual checks after plating, however once they reach the customers the products often face problems with corrosion and rusting. This problem is more common in nickel-plated products.

Other competitors are based in countries such as Spain, Italy and Turkey. Italian and Spanish manufacturers are very small, and primarily serve their local market. Their costs are even higher than Sturge Industries Ltd. Turkish manufacturers, on the other hand, have lower costs but also face some quality problems. The largest of these Turkish manufacturers has also supplied the parent company of the Sturge Industries Ltd., Bead Industries Inc., in the past, because the production volumes were unstable in Sturge Industries ltd.

The manufacturing strategy of Sturge Industries Ltd is another important part of the company. Sturge Industries Ltd has faced many quality problems over the years. These problems can be categorized under two important headings: product problems, as outlined above, and machine breakdowns. Sturge Industry’s machines were not maintained regularly before the change in ownership, and thus were not able to cope with the high volumes of manufacturing required by the new management. The same was true for the machines transferred from the US parent company.

Production could have stopped in the machines for any of the following reasons:

1. Problems in the quality of the product.
2. Problems in the machines.
3. A requirement for material changes when the machine's material supply was depleted.
4. Regular quality checks.

For all problems except the fourth, a setter is required to restart production. Setters work on the machines for a long time, and they know how to set up them based on their tacit knowledge. Their training is informal, and is not written down; it is only possible to learn the techniques from another setter. It may take some time before a setter learns how to set up a machine. There are also problems relating to the unpredictability of parameters in every machine. The wear and tear in each machine is so high that the setup for two similar machines may have small, but important, differences, and this information is only known by the setters. This was a big problem for Sturge Industries Ltd. They had 20 machines originally, with four setters serving them. The parent company transferred 20 more machines and they increased the number of shifts from one to two. This reduced the number of setters from four to two in each shift. However, the set-up times required for the machines were long; setters often had to change material for six machines simultaneously, with each change taking twenty minutes (therefore leaving machines standing for up to an hour), and decreasing the number of setters meant that each machine was getting less attention. All of these factors increased the variability of what was produced from week to week.

To solve these problems, the technical manager began working on two important production initiatives. These are:

1. Implementing total productive maintenance and solving problems before the machines broke down.
2. Improving the design of the dies, using better oil and controlling pressure in the machines. These parameters helped to control product-related problems.

Production planning in the company was conducted on an ad hoc basis. The production manager was using Material Requirements Planning (MRP) software to do this; under this system, the orders were fed into the system through the front office. The production manager then aggregated the demand and conducted a visual check of the finished inventory to assess how much the company had on hand. Then he talked with the technical manager about the availability of the machines. There was another restriction here: machines can produce certain sizes and metal choices. If the company wanted to manufacture stainless steel chains, which was a requirement for the US market, then they had to use heavy-duty machines, of which only four were available. The rest of the machines were assigned depending on the sizes of chains required. The production and technical manager worked on the basis of a capacity calculation of 80% efficiency, however this was ambitious, since they achieved 65% most of the time.

Once the chains were manufactured they were treated in the plating area. This was considered to be the bottleneck of the production, as there was a limited capacity for plating. The chains were then either cut to certain lengths and then packaged, or packaging without cutting. Most of the time the company was unable to manufacture the amount of chains required by the customer; thus, they often had to sacrifice the parent company's orders, and the parent company then had to be supplied by companies in Turkey and Korea.

Sturge Industries was under pressure for three important reasons.

1. The exported products from its Far Eastern competitors were 25% cheaper than Sturge Industries. This was a big problem as they were losing customers to these companies, though once the customer understood that the companies from China and Korea could not provide the same quality they were returning to Sturge Industries. The managing directors worries that eventually these manufacturers would increase their quality and meet the requirements of their customers, thereby increasing their competitive edge.
2. Plastic bead chains and string-based systems were a cheap substitute for metal bead chains, and the blind industry was increasingly using this alternative. However, customers came to place higher value on metal bead chains over plastic alternatives. The offices that do not have much customer contact were the main customers for plastic products.

3. The managing director believed that Sturge Industries needed to control its costs so that metal bead chains did not become even more expensive than the plastic alternative. This was an important issue for the business.

4.2.4 Action research question

The managing director of Sturge Industries Ltd. had several reasons to cut costs and increase production capacity. These can be summarized as follows:

- They needed to cut costs for the products required by their two main customer segments. This would help them to compete against cheaper exports from Far Eastern countries, and prevent plastic chains from being considered by customers.
- The company was facing too many production problems, so that the amount of production was not stable. They wanted low-cost production from another country, and large-volume sales. However, the chains that sold in smaller volumes but required specialized treatment would still be manufactured within the UK.

These were the motivations of the managing director to set up an international manufacturing site or network node.

The motivation for the researcher, and for the academic supervisor for the Teaching Company Scheme, was to obtain a PhD; however, in this subject, few research was available. The company required government funding to transfer some of its production to another country. The manager from the Teaching Company Scheme proposed that production in another country would eventually lead to profits in the UK, and avoid losing valuable taxation from the UK economy, since the eventual failure of Sturge Industries Ltd would mean loss of employment and taxation, and probably a loss of industrial heritage. Thus, Sturge Industries' internationalization seemed to fit the project well.

Hence, the research questions were shaped through the needs and requirements of collaborating organizations, and all participants and stakeholders of the research:

- How is an internationalization decision made in a small and medium-sized manufacturing enterprise?
- How can the internationalization decision-making process be improved by studying a small and medium-sized manufacturing enterprise?

This was agreed by all parties to be part of the Teaching Company Scheme objectives.

4.2.5 Participants of the cycle 1

The main participant in the first cycle was the managing director of the company, who was responsible for the decision-making process. The researcher aimed not only to help him make a decision, but also to study his understanding about how to make a decision in a project like this. As explained above, the managing director's background was sales and marketing, and he was heavily influenced by these traditions. This can easily be seen from his decisions to increase sales without considering how he could manufacture what was required. The managing director saw internationalization as an opportunity to increase his options for satisfying demand. He was also cautious, however, as he did not want to commit soon or commit too many resources, as he saw this as a risk.

Another person related to the first cycle of research was the finance manager, a secretive and careful employee, whose main role in the research was to collect information about certain issues. He was a trusted adviser of the managing director, and was assumed to support the project. His main concern was the financial wellbeing of the organization, and increased sales seemed to excite him, since he assured the researcher that increased sales were more important than uncertainties about the manufacturing. Both of these managers joined the company after its acquisition, while the production and technical managers had been working there for a while. The new members of the company were active in supporting the efforts of the managing director. The company has to manage and improve its production as quickly as possible. He was seeing the roles of production and technical manager as providers of this. He was not wrong but what managing director and the finance director did not consider was the duration needed to achieve all these changes within production. The increase in the orders and future anticipation of further increases meant that they needed to increase capacity of the production. These participants of the research will have the same motivation to achieve this result through introducing new production capacity in another location. The location will provide them other advantages such as low cost manufacturing.

The academic supervisor of the TCS project served to check the outcome of the project during this cycle. Every month, the managing director and the TCS associate met with the academic supervisor and discussed the developments of the project.

4.2.6 Process of decision making

The decision-making process was discussed with the managing director in a formal meeting. He was asked how would he like to start the project, and what his main concerns were. He stated that his aim was for production to be carried in another country, and his main worry was the justification of this. He saw a cost analysis as the most suitable way in which to select the country that would be most suitable for production, since the cheapest country would make the best choice. The researcher also asked whether the managing director had any countries in mind that should be considered in the analysis. He explained that because Sturge Industries did not have enough resources to open a new factory in the new location, they needed to find a partner in a country that could produce for them, with the help of some technology transferred from Sturge Industries. The managing director described several companies from their network that may have been able to manufacture the products required. When asked how he saw the future of Sturge Industries, he explained that the company sells certain sizes of the chain more than others. He wanted to move high-volume production to this new location, while keeping some machines in the UK to manufacture low-volume items. This strategy would allow them to achieve low cost for high volumes, and flexibility for low volumes. The future of the cost of manufacturing in that location also had to be considered. The managing director had experience in moving US manufacturing to the UK, and was particularly concerned about the future costs of manufacturing and possible movements in the exchange rate. It was particularly important to ensure that the decision made was sustainable over a medium to long term. Another important decision criteria related to the manufacturing capability of the company that Sturge Industries was to build its partnership with. The managing director was well aware of the fact that if the local partner had experience in manufacturing similar products, or at least used similar processes, it would help them to achieve better results sooner, and also help them to transfer the technology easily. Cohen and Levinthal (1990) explain the prior knowledge of an organization with reference to absorptive capacity: prior knowledge allows the recipient organization to absorb new knowledge more efficiently. This was one of the key parts of the decision.

The managing director chose countries that they could internationalize to with reference to companies Sturge Industries had good relations with. This reduced the need to build new relationships with unknown companies. This is explained by the aspects of trust, commitment and control inherent in network theories (Welch and Wiedersheim-Paul, 1980; Axin, 1990). These items reduce risk and uncertainty, and network management is used to achieve them. Scherer (2003) explained network management competence as trust, commitment, selection choice, information technology and intermediary support of conduciveness of external environment. From these academic contributions to network theories of internationalization, trust and commitment seemed to be the main reasons for the managing director of Sturge Industries Ltd to choose companies from within its network. Network and other theories of internationalization do not explain his decision to select from companies that have some level of capability in producing similar products, or have similar production technologies.

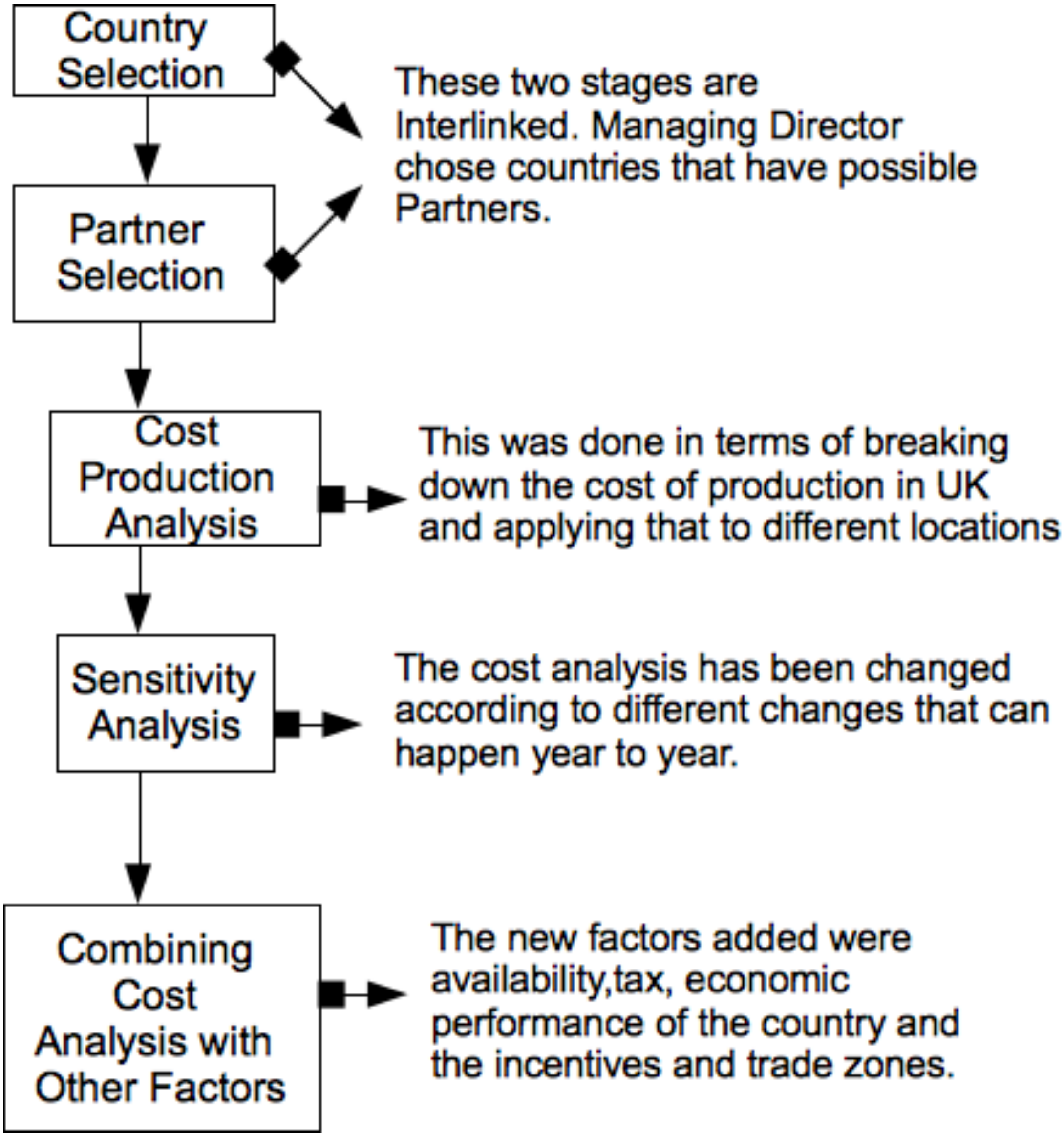
The decision-making process the managing director used is shown in Figure 4.1:

The managing director assessed that production in the selected partners would not, at that moment, need to be of equal quality to that of Sturge Industries Ltd, since he expected that the quality levels would increase in the foreign partner with the transfer of technology. The managing director stated uniformity as the quality criteria that the foreign partner should prioritize.

A production cost analysis was conducted according to the cost breakdown structure of Sturge Industries Ltd. In addition, a sensitivity analysis was conducted regarding the factors of the cost breakdown structure. Cost was the most important part of the decision, but factors such as availability, economic performance of the country, tax system and incentives and trade zones were also considered.

The finance manager agreed on the use of a breakdown structure for the analysis of the cost, since he rated the importance of cost as being higher than the other factors. He believed that this would ensure that the cost items could be reduced.

Figure 4.1 Managing director’s decision-making process



The academic advisor for the TCS project had different ideas about decision making. These were more complex and holistic compared to the managing director’s thoughts about the decision making process.

4.2.6.1 Country selection

The managing director selected countries and possible partners in those countries simultaneously. The first choice was a company in Turkey. This company had been working with Sturge Industries Ltd for a long time, since whenever Sturge Industries Ltd and Bead Industries Inc. needed extra bead chains, this company acted as their subcontractor to provide them with the products required. They used similar manufacturing technology, though it was relatively slower than the technology used in the UK and US. The Turkish company was interested in building a partnership which would increase their revenue from bead chains. They were also manufacturing other products for industries such as textiles and the sanitary industry. They had two manufacturing plants, both of which were in Istanbul. As a whole, the company could be considered larger than both Sturge Industries Ltd and Bead Industries Inc. Another advantage of this company was their manufacturing equipment, since they manufactured most of their capacity in-house. The managing director knew the two brothers who owned and ran the company.

The second company selected was an Indian company which had been manufacturing bead chains on a smaller scale compared to Sturge Industries Ltd. The managing director had met the corresponding managing director at an exhibition. This company, like the Turkish company, had been manufacturing other products, and bead chains were a small part of what they were doing. This company did not have the same production capability, but they knew companies which could manufacture for them. Sturge Industries Ltd and Bead Industries Inc. did not have any relations with this company other than knowing the owner-manager. They had never bought bead chains from this company, so the quality of their production was unknown to the managing director.

Bead Industries Inc. had also been working with another company in Thailand for a long period. This company was producing another product with similar technology used in bead chains, though they had never manufactured bead chains. The managing director of Sturge Industries believed that, with enough assistance from Sturge Industries, the Thai company would have the necessary capabilities to manufacture bead chains. The managing director’s impressions of the Thai company was they supplied products of a required quality, on time. Nevertheless, the initial contact made between the manager and this company revealed that they had no interest in manufacturing bead chains. Therefore, this company was removed from the list.

The managing director had a good and productive relationship with West Midlands Advantage. He had run many different projects, including the TCS, with the help and advice of the consultants in West Midlands Advantage. These consultants advised the managing director to consider Lithuania and Estonia as possible destinations. The managing director wanted to include these countries in the study with the consideration of finding a suitable partner if the production of bead chains proved to be lower in cost, compared to the other options. Another advantage of these countries was their candidacy for the European Union, with a possible joining date of March 2004.

4.2.6.2 Production cost analysis

A cost breakdown structure of Sturge Industries Ltd was used to conduct the analysis. The cost factors listed by the finance manager included: cost of brass, cost of ferrous metals such as steel and stainless steel, labour cost per month (minimum), labour cost per month (maximum), cost of machine setter per month, cost of factory rental in rural and urban areas, cost of utilities (electricity, water and gas), depreciation of the equipment, overheads and insurance, plant maintenance and consumables, and other plant costs. Some other costs would also be incurred from operating in more than one country, including cost of delivery from the relocated factory to the UK, set-up costs, taxes (corporate, individual, social and VAT), and customs and excise costs. Another important cost the finance manager was concerned about was the increase in overheads from operating in two different locations.

The finance manager was also concerned about the stability of cost in these countries. The managing director and finance director recognized that labour would be the main source of cost reduction. This was partly related to the cost of machine setters in the UK, which was an important cost for Sturge Industries Ltd. The managing director knew that he relyied heavily on the knowledge of machine setters, and could not afford to lose any of these employees. However, their wages were higher than industry levels. The cost of machine setters would be lower in other countries, because of a lower reliance on the machine setters and lower costs in general in those countries.

4.2.6.2.1 Data collection for production cost analysis

The data collection was done through many different channels. The possible partners were interviewed to gather information about the costs in their countries. These interviews were conducted with the managing directors of these companies. The managing director for Sturge Indsutries Ltd had explained the intentions to the corresponding managing directors. The Turkish company was visited by the TCS associate, and its management team was interviewed at their manufacturing plant. The managing director of the Indian company was interviewed in Copthorne Hotel in central Birmingham, as he was visiting Birmingham for an exhibition. This provided an opportunity to meet with him and collect the necessary information as quickly as possible. The information about Estonia and Lithuania was collected through different Internet sources. The information about Lithuania was confirmed through a visit to the Lithuanian consulate in London by the TCS associate and the managing director, who met with the consulate officials responsible from the development of trade. The Internet was used for two purposes:

1. To collect information about Estonia and Lithuania.
2. To check some of the information collected about the different companies.

There were two distinctive sources of information available within each country under consideration. First, the researcher could visit the Investment Promotion Agencies (IPA) of each country. These provide relevant information about these countries. The most specific information such as cost of certain type of material was hard to find but there were really useful information that was used for the decision making. The second source, the Internet, was used to collect date from the websites of UNIDO, the World Fact Book, UNCTAD and OECD. The information from these sources was mainly economic in nature.

One particular piece of information was harder to collect compared to others. Sturge Industries Ltd used traverse round metals that last longer than non-traverse round reels of metal. The managing director was extremely concerned about the availability of this material. Information on this was collected through interviews; however, it was not available for Estonia. It was also discovered that Lithuania did not have the material in question, and the closest place that could supply it was a German supplier that Sturge Industries were supplying by when first they first started using this type of slit metal. The same company was likely to be supplying Estonia as well.

4.2.6.2.2 Analysis of production cost

The chain cost was calculated for 100 meters of chain. The research conducted via the IPAs revealed that they promote their countries according to 174 factors. In this research, 32 factors were used to compare the possible locations, and the cost analysis used 10 factors. These 10 factors included:

1. Cost of brass
2. Cost of iron-based materials such as steel and stainless steel
3. Labour cost/month (basic labour with no qualifications, minimum wage)

4. Cost of machine setting level engineering (qualified labour)
5. Factory rent as a cost per month (rural and urban)
6. Cost of electricity (Kw/Hrs)
7. Cost of water (meters cubed)
8. Cost of gas (meters cubed)
9. Cost of transportation

The factors listed above were obtained directly from the investment promotion agencies. The cost of 100 meters of chain was calculated to include material, manufacturing labour, packing and carriage, electric, gas and water, plant maintenance, rates and building costs, consumables and other plant costs, and finally transportation. The total was then depreciated for equipment, and overheads and insurance were added as fixed costs. These were tabulated according to the cost of each for each country. The cost of depreciation of the equipment, overheads and insurance, and finally packing and carriage were constant whichever country was analysed. Overheads and insurance may have increased because there would be a need to communicate between the network manufacturing plants. The company's management team saw this as the cost of operating internationally. Packing and carriage was planned to be conducted in the UK, and distributed was to be done from the UK site. The chains were planned to be sent from the new site in bulk, and cut and spooled in the UK plant. If there was a need to plate the chain, this would be done within the UK if line plating was required, or in the foreign operation if plating in containers was needed.

Tax information was collected for corporate tax, personal tax, social tax and value added tax (VAT). The economy of the each country was assessed using 10 factors, which were used to compare the countries. These were then used in the sensitivity calculations to reveal what could happen in the future. The final set of data that was collected focused on how to set up a business in each country, and the legal issues regarding the ownership of a business. The data was tabulated for each country (Appendix 8).

Table 4.1 shows the cost of manufacturing in Turkey.

Table 4.1 Cost of manufacturing in Turkey

Turkey	2003	2004	2005	2006	2007	2008
Materials	3.01	3.04	3.08	3.1	3.14	3.17
Manufacturing labour	0.47	0.47	0.48	0.49	0.49	0.50
Packing and carriage	0.37	0.37	0.38	0.38	0.39	0.39
Electric/gas and water	0.13	0.13	0.12	0.12	0.11	0.10
Plant maintenance	0.14	0.15	0.16	0.16	0.17	0.18
Rates and building costs	0.18	0.18	0.18	0.18	0.19	0.19
Consumable & other plant costs	0.38	0.38	0.39	0.39	0.39	0.40
Transportation	0.19	0.20	0.20	0.20	0.20	0.20
Total	4.87	4.92	4.97	5.02	5.07	5.13
Depreciation of equipment	0.51	0.51	0.51	0.51	0.51	0.51
Overheads and insurance	2.33	2.33	2.33	2.33	2.33	2.33
Overall total	7.72	7.77	7.82	7.87	7.92	7.96

Calculations for each country, such as those shown in Table 4.1, were conducted so that changes that would occur in the future could be accounted for. The managing director wanted this to be done for the next five years. Two approaches could have been taken towards this. The first was to use forecasting-based methods, which calculates possible changes using past data. A difficulty with this, however, is that previous data may not be available for some of the items, such as rates and building costs. The other method is scenario-based planning of the location decision. There is still a need for forecasts for the future here, but these are put into, and calculated within, the scenarios. The managing director and the TCS associate selected the latter approach, which allowed a sensitivity analysis to be conducted. The five-year changes were calculated based on change tables, and thus a rough forecast of the future was provided. Table 4.2 shows the adjustment table for Turkey.

Table 4.2 Adjustment table for Turkey

Turkey	Adjustments		Annual Change
Materials	0.0038	10%	1%
Manufacturing labour	0.00098	0%	NA
Packing and carriage	0.06	0%	1%
Electric/gas & water	0.28	0%	-5%
Depreciation of equipment	0.28	0%	1%
Overheads and insurance	0.36	0%	NA
Plant maintenance	0.041	0%	5%
Rates and building costs	0.05	0%	1%
Consumable & other plant costs	0.11	0%	1%

This adjustments table was repeated for every country, and shows the annual change for each cost item as a percentage. At the time these calculations were made, traverse round material for production was only available in Germany. This changed shortly after, as production of this material began by a manufacturer in Turkey. This provided some advantages. The cost of transportation from India and Turkey was higher than Estonia and Lithuania. In addition, India was exporting brass from Turkey because it was cheaper. This affected the cost of material in India. The company managers in India explained that material costs within the country were increasing quickly. The scenarios and the sensitivity analysis were conducted using Microsoft Excel. The users could change the adjustments to test what would happen if there was a sudden increase in any of the costs.

The calculations were made in Great British Pounds (GBP). The minimum adjustment for each country was set as the current and expected inflation rate of the UK. This method was chosen so that the inflation rate effects from each country would not affect the calculations, while the effects of exchange rate changes could be discounted. There are many other ways in which these risks can be hedged against, but this method was considered to be one of the most effective, and the easiest to apply, as there is a correlation between the inflation rate and the exchange rate has a correlation; once the currency has been selected, the exchange rate will change according to the relative economic performance of each country. If the British economy was to outperform one of the chosen countries for internationalization, the exchange rate would change in favour of GBP. It is very hard to predict possible changes in exchange rates, however, as they will fluctuate over time.

The exchange rate changes were added to the sensitivity analysis by adjusting the expected movement (increase or decrease) of the exchange rate. This was achieved by looking at the change as a multiplying factor that would adjust the currency of today. Table 4.3 shows the original calculations for the exchange rate changes, along with the exchange rates for various currencies at the time of analysis.

Table 4.3 Exchange rate adjustment

	Exchange Rate				Change in Rate (%)		
	GBP	*USD*	*Euro*		*GBP*	*USD*	*Euro*
GBP	1.00	0.613	0.70	GBP	1		0
USD	1.63	1.00	1.14	USD	0	1	0
Euro	1.44	0.88	1.00	Euro	0	0	1

as @ 09/07/2003

Currency	*USD*	*Yen*	*Euro*	*Canadian Dollars*	*GBP*	*Aus. Dollars*	*Swiss Franc*
USD	1.00	0.0085	1.14	0.73	1.63	0.66	0.74
Yen	118.11	1.0000	134.09	86.59	192.72	78.01	86.85
Euro	0.88	0.0075	1.00	0.65	1.44	0.58	0.65
Canadian Dollars	1.36	0.0115	1.55	1.00	2.22	0.90	1.00
GBP	0.61	0.0052	0.70	0.45	1.00	0.40	0.45
Aus Dollars	1.51	0.0128	1.72	1.11	2.47	1.00	1.11
Swiss Francs	1.36	0.0115	1.54	1.00	2.22	0.90	1.00

The meta table for all data contains three different types of currencies. The data for India and UK were collected in GBP, while the data for Turkey were collected in two different currencies. United States Dollars (USD) was used for most of the items, but some, which were actually based on the export into Turkey, were calculated in Euros. The Lithuanian and Estonian data were collected in Euros, since these countries were expected to switch to the Euro (and did indeed to so) by May 2004.

The third sensitivity tool that was used after inflation rate and exchange rate changes related to the productivity changes in these countries. These were considered to be positive for the internationalizing company. The difference in productivity between the UK economy and the chosen countries was considered to be a negative impact of the total cost of production. The UK economy, with its trained workforce, has better productivity than any of the other chosen countries. The cost of producing, and especially the cost of labour, is dependent on productivity, and this was accounted for within the calculations. The cost of labour in one single country could be advantageous, but this the production costs could be expected to be higher because of the lower productivity of that country. Any expected improvement in the coming years would be a benefit for that country and the internationalizing companies. This was also added into the calculations through calculating the negative affect of the productivity in the final cost calculations, where UK productivity was taken as a 0% change, and Turkish productivity was calculated as a 10% change when compared against the UK economy. This change was added to the cost of labour in Turkey when calculating the overall cost of 100 meters of chain. The percentages of change were obtained through two methods: the first used the current productivity measures of each country, where the differences were rounded; the second used the judgement of the decision makers. This was an important tool as decision makers unintentionally collect information about these situations, which are then used to make decisions. The managing director of Sturge Industries Ltd was the decision maker in this case, and was constantly collecting information about these sorts of issues through his networks. The Indian and the Turkish company were asked about this during their interviews, as was the Lithuanian consulate in London. Table 4.4 displays the relative productivity rates for each country. These are a combination of the real productivity figures, and the perceptions about productivity in those countries.

Table 4.4 Relative productivity rates

Country	Rate (%)
Turkey	10
Estonia	5
Lithuania	5
India	20
UK	0

Here the UK is set to 0%, so the other countries under consideration will be less productive than the UK. This means that Estonia is 6% less productive than the UK and India is 2%0 less productive than the UK.

A productivity increase in each country would equate to a certain amount of change in the metal manufacturing industry. This is even more true for the more developed countries, as they are improving their productivity not only in manufacturing, but also in service sectors including information technology. The productivity improvements of each country could not be taken directly into the calculations, however, as compensation needed to be made to account for how much of the improvement in productivity would be realized in the metal manufacturing sector. In 2003, for instance, most of the expected productivity improvement was achieved through improvements in information technology. Compensation for the rate of realization in productivity increases was set as 10% for each country, because the manager expected information communication technologies to account for most of the productivity increases, and the real increases in manufacturing would be lower. Table 4.5 displays the rate of realization of productivity increases for each country.

Table 4.5 Effect of productivity on labour cost; rate of realization of productivity increase

Country	Rate (%)
Turkey	10
Estonia	10
Lithuania	10
India	10

The rate of realization of productivity increase is an expectation of how well the productivity increase would translate to output and manufacturing benefits. A productivity increase of 10% may only be seen as 10% of manufacturing output; this means that there will be a 1% real benefit in manufacturing. This expectation is determined by the inflation rate, GDP growth, real investment increases and the unemployment rate. This economic data can be found from the comparison table (see appendix 8)

The last important calculation for productivity in the sensitivity analysis used the productivity figures for all countries for 2002, with the expected change over the years. The productivity increases for each year used the date from the previous two tables about productivity (Tables 4.4 and 4.5).

The improvement in the UK was not counted directly to the labour cost but rather it has been accepted that 10% of the improvement has been abd can be realised by the UK metal manufacturing industry. The labour cost has already been compensated to difference of productivity in all countries in consideration but also the improvements have been applied to the compensated labour costs. Table 4.6 displays the productivity of all countries for 2002, along with their expected rate of change in future years.

Table 4.6 Manufacturing labour productivity

	Rate in 2002 (%)	Rate of Change (%)			
Turkey	8.5	10			
Estonia	4.9	0.2			
Lithuania	4.3	2.0			
India	4.7	1.0			
UK	2.1	-5.0			
Estimates for manufacturing labour productivity improvements					
	2003%	*2004%*	*2005%*	*2006%*	*2007%*	*2008%*
Turkey	8.5	9.35	10.3	11.31	12.44	13.69
Estonia	4.9	4.9	4.92	4.93	4.94	4.95
Lithuania	4.3	4.47	4.47	4.56	4.65	4.75
India	4.7	4.8	4.79	4.84	4.89	4.94
UK	2.1	2.0	1.9	1.8	1.71	1.62

The upper part of the table demonstrates the 2002 productivity improvements for each country. The rate of change next to the 2002 productivity gains is the change predicted for each year. The lower section of the table provides information on the yearly productivity improvements for each country. The productivity gains for each country were obtained from the managerial perceptions, as well as the actual changes obtained from the productivity scores of the countries.

The productivity changes for the chosen countries were simulated into the sensitivity analysis through the three methods mentioned above. These capture the ever-changing nature of productivity from one year to another. Nevertheless, one element of productivity that still needed to be captured was the importance of qualifications of the labour. These calculations were made for a mixture of qualified and non-qualified labour. The official figures for productivity were separated for these two different labour types, but a general figure was used for the calculation. The managerial perceptions about productivity are actually more accurate then these official figures, because they are based on the productivity of setters for similar organizations. These data cannot be standardized, as managers do not hold all the knowledge about how setters do their job, and differences between machines in terms of wear and tear contribute to variations in setting them. This creates a path-dependent learning experience from one setter to another, and the know-how of their peers is only transferred through on-the-job training. The job entails technical knowledge as well as practical knowledge; this can be considered engineering knowledge and is more technical than unskilled positions. The calculations are not exactly for the skilled labour that the official calculations are based on. The skilled labour definition in official statistics is different than the setters job which takes many different forms of skill. This makes the official skilled labour productivity a general calculation for the managerial perception. Through incorporating managerial perception this problem has been partially solved.

The next element of change in the sensitivity analysis is transportation, and overheads and insurance costs. These were changed according to a certain constant percentage for every country. The accounting manager of Sturge Industries Ltd advised changing transportation costs by 1%, and overheads and insurance costs by 5% for each year. His explanation for these changes was based on the previous years' performances for these costs. He used the same prediction for the internal budgeting of the company. The overheads and insurance costs were expected to rise quicker than those of transportation because of the added complexities of operating internationally. He budgets 1% for the company in this category, however 4% was used for the international calculation to account for the added communication needs, factory visits and other unexpected costs. The researcher also pointed out that these additional costs would be higher during the early stages of the internationalization, and would decrease as there more experience was gained in operating internationally; however, this was not accepted by the accounting manager, as he believed that there would still be unexpected costs and more communication, despite the expected improvements. The costs would increase every year, and these had to be accounted for. The above reasons made it clear that a constant increase should be incorporated for these cost items over the years. The constant nature of the increases would compensate if the change turned out to be higher or lower. Over a certain period of time the change was expected to be around 5%.

The sensitivity analysis also looked at changes in wages from one country to another, using data about the wage levels for skilled and unskilled labour. These data were collected from the websites of the United Nations (2003), UNCTAD (2003), OECD (2003), and other international institutions, as well as interviews with the company owners in Turkey and India and consulate officials in Lithuania. Changes in wages were therefore captured in a similar manner to the data on productivity. The wage levels for unskilled labour in 2002 were used for the calculations. These were then changed for future years through a % rate of change. The economic data from OECD (2003) were the real wage growths for each country. These were then translated into how the wages changed from one country to another (Table 4.7).

Table 4.7 Wage growth for each country

Real Wage Growth	Rate 2002 (%)	Rate of Change
Turkey	3.0	-7.0
Estonia	12.8	0.2
Lithuania	11.0	0.3
India	2.0	0.1
UK	1.9	0.4

Estimates real wage growth improvements						
	2003	*2004*	*2005*	*2006*	*2007*	*2008*
Turkey	3.0	2.79	2.6	2.41	2.24	2.09
Estonia	12.8	12.83	12.85	12.88	12.09	12.00
Lithuania	11.0	11.03	11.07	11.10	11.13	11.17
India	2.0	2.00	2.00	2.00	2.00	2.01

As can be seen from Table 4.7, in terms of wage growth there is an anomaly in the case of Turkey. At the time when these calculations were made the Turkish economy was facing a deep recession. The effects of the recession had devalued the local currency, Turkish Liras, which meant that it had lost value against the GBP, and this contributed to an overall decrease in labour cost. Another important development caused the cost of labour to decrease as well: unemployment had reached a level at which people started to accept underemployment, rather than being unemployed. Employers used these factors to reduce the cost of labour over the years. The labour laws of the country also allowed companies to exploit these economic difficulties.

The rest of the countries, especially India, showed a slow growth in their real wages. It was expected at the times that the cost of labour in Turkey would drop to a level that would be similar to India in five years' time.

The stakeholders in the project used the sensitivity analysis to outlined what they expected from the future. It should be borne in mind that the sensitivity analysis only considered the cost of manufacturing in each country – this was not enough to judge the attractiveness of each location. Other information, such as taxation, the availability of certain items such as traverse round material, economic stability, and incentives and trade zones were also very important to the managing director of the company. He prioritized the cost of manufacturing, availability of skilled labour, and the availability of traverse round material.

The next step under consideration was to use a comparison tool that would rate different factors, and then make it possible to compare different countries. The managing director, accounting manager, TCS associate and academic supervisor of the project all entered their relative levels of importance for each category of information under consideration. These evaluations were based on the raw data for each country. The perceptions of the decision makers were also important in this case, as they provided different judgements. Table 4.8 displays the relative importance the managing director placed on each decision criteria.

Table 4.8 Relative importance of categories

2003	
Cost	45
Availability	20
Tax	20
Economic stability	10
Incentives & trade zones	5

2008	
Cost	45
Availability	20
Tax	20
Economic stability	10
Incentives & trade zones	5

The relative importance of each decision category can change over time. This has also been simulated in the decision process. However, the managing director decided that he would give equal importance to the categories over the years.

The highest importance was given to cost of manufacturing, followed by availability and tax. Availability was driven by the ease of access to skilled labour and traverse round material. Economic stability and incentives and trade zones followed the first three important categories. The values in Table 4.8 were used as multiplying factors to rank the countries in each category. The categories were selected as important clusters used by decision makers when making decisions. The data were collected for 2002, and changes were simulated for the cost of manufacturing using a sensitivity analysis. This sensitivity analysis was extended to the rest of the categories by collecting informal information through meetings and factory visits. This information was not available for Estonia; hence, Estonia waas accepted as a constant as this was the least attractive location to internationalize to in 2002. This was not expected to change due to high cost of manufacturing, which was dependent on the high cost of labour. The attractiveness of all selected countries in 2003 is displayed in table 4.9.

Table 4.9 Category Evaluation for 2003

Leadership cofactors	Turkey	India	Estonia	Lithuania
Cost	3	4	1	2
Availability	3	2	1	1
Tax	2	2	3	3
Economic stability	1	2	3	4
Incentives & trade zones	4	2	2	1
Cofactor importance				
Cost	135	180	45	90
Availability	60	40	20	20
Tax	40	40	60	60
Economic stability	10	20	30	40
Incentives & trade zones	20	10	10	5
Total	265	290	165	215

Table 4.9 reveals that in 2003 it was expected that the benefits of internationalization to India would outperform all other countries. Turkey follows India, and Lithuania and Estonia take the last two places. The major advantage of India, according to this data, is cost of labour. This is lowest in India and the managing director rated this item as having the highest importance. India was lower in terms of economic stability, however, it was not as low as Turkey. Turkey was highest in terms of availability of material; it did not have direct access to traverse round material in 2003 (though this did change later on), but the cost of brass (60/40 and 70/30[1]) was cheapest in Turkey. Table 4.10 shows the expected attractiveness of each country in 2008. This provided a way to assess the differences between them, and what the managing director expected to see by that year.

Table 4.10 Category evaluation for 2008

Leadership cofactors	Turkey	India	Estonia	Lithuania
Cost	4	4	1	2
Availability	4	2	1	1
Tax	2	2	3	3
Economic stability	2	2	3	4
Incentives & trade zones	4	3	2	2
Cofactor importance				
Cost	180	180	45	90
Availability	80	40	20	20
Tax	40	40	60	60
Economic stability	20	20	30	40
Incentives & trade zones	20	15	10	10
Total	340	295	165	220

From Table 4.10, it is clear that Turkey is expected to be a better place to internationalize to for this company because of positive changes in the cost of labour and availability. At the time of the study, it was expected

[1] These are type of brass explaining the form of the alloy.

that the cost of labour would be similar or even drop over the next four years (i.e. up to 2008). The average of the expected decrease was about -7%. The next big improvement was expected to be the introduction of traverse round material production in Turkey. It was also expected that the country would reach relative economic stability that would be on a par with India. Another advantage of Turkey compared to India was that it is closer to the UK, which would decrease the transportation costs.

The cost of manufacturing in each country over the five-year period are displayed in Table 4.11.

Table 4.11 Comparison of costs in 2003

2003	UK	TURKEY	INDIA	ESTONIA	LITHUANIA
Materials	3.71	3.01	3.17	3.81	3.81
Manufacturing Labour	2.47	0.47	0.23	0.85	1.02
Packing and Carriage	0.37	0.37	0.37	0.37	0.37
Electric/Gas and Water	0.20	0.13	0.17	0.72	0.19
Plant Maintenance	0.25	0.14	0.14	0.19	0.20
Rates and Building Costs	0.32	0.18	0.17	0.24	0.25
Consumable & Other Plant Costs	0.67	0.38	0.37	0.51	0.52
Transportation	0.00	0.19	0.23	0.26	0.23
Depreciation of the Equipment	0.51	0.51	0.51	0.51	0.51
Overhead and Insurance	2.33	2.33	2.33	2.33	2.33
Overall Total	10.72	7.71	7.69	9.78	9.43

In Table 4.11, it can be see that India is the cheapest location in which to manufacture 100 meters of chain, when compared to the UK, Turkey, Estonia and Lithuania. The cost of manufacturing was highest in the UK.

There was little advantage to internationalizing to Estonia or Lithuania, as the cost of manufacturing would decrease very little in these locations. The sensitivity analysis applied to these calculations showed changes in the ranking by 2008. Table 4.12 compares the costs of manufacturing 100 meters of chain in 2008 across the relative cost headings.

Table 4.12 Comparison of cost 2008

	TURKEY	INDIA	ESTONIA	LITHUANIA
Materials	3.17	3.33	4.00	4.00
Manufacturing labour	0.50	0.25	1.52	1.69
Packing and carriage	0.39	0.39	0.39	0.39
Electric/gas and water	0.10	0.22	0.75	0.20
Plant maintenance	0.18	0.18	0.24	0.25
Rates and building costs	0.19	0.18	0.25	0.26
Consumables & other Plant costs	0.40	0.39	0.53	0.55
Transportation	0.20	0.24	0.28	0.25
Depreciation of equipment	0.51	0.51	0.51	0.51
Overheads and insurance	2.33	2.33	2.33	2.33
Overall total	7.97	8.01	10.80	10.43

By 2008, the cheapest country to produce 100 meters of chain was expected to be Turkey. The following factors are expected to decrease the cost of manufacturing in Turkey. First of all, the cost of labour was expected to remain similar for the next five years. Secondly, there would be a saving in terms of the materials cost due to the availability of traverse round material, which runs longer and needs less machine set-up.

The cost of transportation would also be low from Turkey. Furthermore, a large investment in electricity in Turkey had been made since 1995 in order to decrease the cost of energy for the manufacturing sector, and this also reduced the cost of electricity, gas and water – this also equated to a saving. Overall, these developments would enable Turkey to become as viable an option as India, although the changes achieved via the decreases in cost in these categories may not have lasted in Turkey after 2008.

The cost comparison in terms of manufacturing in each country is listed in Table 4.13, wherein the development of price over the years and a comparison of these with other countries can be seen in detail.

Table 4.13 Comparison of annual costs

Country	2003	2004	2005	2006	2007	2008
Turkey	7.72	7.77	7.82	7.87	7.92	7.97
India	7.69	7.75	7.81	7.88	7.94	8.01
Estonia	9.78	9.95	10.14	10.34	10.56	10.80
Lithuania	9.43	9.60	9.79	9.99	10.20	10.43

In fact, as can be seen above, it was estimated that Turkey would become a cheaper location for manufacturing as early as 2006. This is an important result, as the managing director gave the most importance to cost of manufacturing.

4.3 Cycle 2

The second cycle of the action research provides and opportunity to revisit the problems and difficulties seen in cycle 1. The problem that needs to be solved in this cycle is the implementation of the internationalization decision.

4.3.1 Context

The researcher concluded his appointment as a TCS associate in 2004, and continued as a PhD student at Aston Business School, Aston University. During this time Sturge Industries Ltd began to implement their internationalization. The technical manager was responsible from the implementation of the project, and the researcher was invited to return to the company after their implementation to help solve problems that occurred from the implementation of the decision. This was in 2006, and the second cycle continued until 2008.

4.3.2 Action research question for cycle 2

The action research question in cycle 2 is:

How can we improve the decision-making process of internationalization by observing and solving problems faced after the implementation stage?

The decision-making process involved the managing director and the TCS associate, and was based on the needs and requirements of the managing director. The problems faced after the implementation were partially a result of the decision-making process. This provided a very good opportunity to understand the following potential issues:

- The assumptions made in the decision-making process created problems later in, and after, implementation.

- The analysis may have been too simplistic, and some factors that had not been considered before may have gained importance in, and after, implementation.
- The decision-making process may have been faulty as it was based on scenarios built on rough forecasts.

All of the above problems that can be seen in the implementation stage are opportunities for the action researcher to learn and reflect upon.

The second cycle provided a good explanation of how the decision process for internationalization of UK manufacturing SMEs could be improved.

4.3.3 Participants of cycle 2

The same participants from the first cycle continued the second cycle. This provided opportunities for discussion on the reflections of the first cycle, as well as a joint evaluation of the second cycle. The roles of the participants from cycle 1 changed for cycle 2: the TCS associate completed his TCS project with cycle 1, and had continued as a PhD student in an academic institution contributing to the TCS project; the managing director of Struge Industries Ltd had moved from an active project management role to taking advice from an institution (Aston Business School); the academic advisor of the TCS project became the academic supervisor of the action researcher. The changes in roles did not affect the action research process, but rather shifted the power balance between different stakeholders.

Sturge Industries Ltd introduced another group of stakeholders into the action research at this point. Their decision to internationalize materialized as a partnership with Pirinci Endustri AS in Istanbul. The management team of two brothers from this organization were also contributing during the pre- and post-implementation stages.
Another important stakeholder was the technical manager of Sturge Industries Ltd, who was given the duty of transferring production knowledge to the Turkish partner.

Zeki Pirinci, one of the owners of Pirinci Endustri AS, looked after the daily business. His responsibilities included looking after the sales, international development, customer relations, accounting, marketing and human resources. His office was at the Gungoren production site of his company. He appeared to be very enthusiastic about the project, and keen to solve any problems without creating resistance to change. He was responsible for building the business relationship with Sturge Industries Ltd. He also he had some knowledge of German, but no English language skills.

Mahir Pirinci was the other brother responsible for the engineering side of the business. He looked after new product development, process improvement, production management and the general maintenance of the machines. He was situated at the Hadimkoy production site. He was responsible from the production of the chains for Sturge Industries Ltd. He seemed to have a high resistance to change; he did not like to be told how to change production to increase quality, and was a very acute cost controller. He valued change from the cost perspective, and if he believed that change would increase cost he rejected it or built barriers against its implementation. He has had no foreign language skills. He had been trained as a lawyer, but take up the role of engineer in the family business.

The technical manager of Sturge Industries Ltd, began working with the company 13 years before the end of the TCS project. His role began as a trainee in die manufacturing. He learned from the previous technical manager and took over the role when the previous technical manager retired. His main responsibility was to provide dies for the machines. He also continued to provide machine parts and maintenance to ensure that the machines ran continuously. He was a very straight-talking man, with very little consideration for cultural differences. This was not a bad trait in the job he was doing in the UK.

4.3.4 Implementation period

The implementation period took place without the presence of the action researcher and academic supervisor. The managing director invited Zeki and Mahir Pirinci for a meeting to discuss the possible production of chains for Sturge Industries in Turkey. During this meeting, the main discussion focused on the financial arrangements of the relationship. The arrangement was that Sturge Industries Ltd would buy certain large quantities of chains from Pirinci at an agreed price. This price was open to negotiations later if the conditions changed over time. In addition, Pirinci's production machines would be used for the chains. Pirinci agreed to increase the number of machines over time from 15 to 40. Although this appears to be a very large increase, there were several differences between Sturge Industries' and Pirinci's machines. Sturge Industries' were eight times faster than Pirinci's machines, and therefore Pirinci would need a lot more machines to achieve the quantities required by Sturge Industries. Another difference related to the plating process. Sturge Industries used line plating, whereas Pirinci used barrel plating. The final conclusion for the production arrangements was to use Pirinci's machines, but increase capacity. Barrel plating would continue to be used by Pirinci.

After this first visit, Pirinci sent some samples to Sturge Industries for inspection. The technical manager identified different levels of quality within the samples. The pitch of the chain (i.e. how many balls were located within a certain length of the chain) was also considered, and the initial checks revealed that the pitch in Pirinci and Sturge Industries Ltd were calculated in different ways, and also that the die design differed between the two companies. Therefore, the UK standards were adopted in Pirinci, and the die design was changed.

A second meeting was arranged between the managing director of Sturge Industries Ltd and Zeki and Mahir Pirinci in Istanbul. The managing director took the technical manager with him to Istanbul to discuss the production issues outlined above. The pitch problem was the main concern for Sturge Industries, since their customers expected certain quality standards to be met. Another issue that was brought up by Mahir Pirinci related to the machines used for die manufacturing in Sturge Industries Ltd. The technical manager of Sturge Industries explained that

Sturge Industries had acquired a high-speed computer numerical control (CNC) lathe that helped them to improve the die design. Mahir promised to acquire one of these machines to improve the quality of the die manufacturing. In order to correct the problem with the pitch, the technical manager provided five measurement tools to Pirinci, and provided training to the shop floor workers, as well as Mahir, on how to use these. The managing director and Jon Kendrick hoped that this would overcome the main problems, and placed an order for a small quantity, to be delivered at an agreed time. The chain was to be reeled on spools, and then delivered in boxes to Sturge Industries Ltd. The reels were expected to be large because Sturge Industries was planning to cut and assemble the chains according to the needs and requirements of the customer.

The following problems occurred during the delivery stage:

- The pitch was still wrong.
- There was some scoring in the chain.
- There were kinky sections within the chain.
- The tensile strength of the chain was not high enough for some samples.
- The plating was inconsistent between different chains.

Thus, there were still many quality problems. The products sent to Sturge Industries were returned to Pirinci. All the defectives were cut from the chain and put into plastic bags for the producer to examine. Sturge Industries requested that the order be re-produced. During the production period, Pirinci was asked to send samples at certain points of the production. These arrived regularly. Problems were spotted, and corrections were requested within the production. The next delivery still contained problems, but these were fewer than in the previous delivery. The technical manager visited Pirinci in order to explain the problems in detail, however the quality problems did not improve.

4.3.5 After the implementation period

At this stage, the managing director called the action researcher and asked him to continue the project after the implementation stage. The action researcher had a meeting with the technical manager to discuss the quality problems, and the following decisions were made to improve certain issues.

1. The same quality check methods that Sturge Industries Ltd used would be introduced to Pirinci.
2. The shop floor would be supervised to ascertain that quality standards were being adhered to.
3. Further training would be given to some of the employees, as well as Mahir Pirinci, who still did not understand the quality problems.
4. Posters would be created explaining the quality monitoring systems.
5. Additional posters using pictures to explain the different types of quality problems faced would be produced.
6. Once the quality problems had been identified, the reasons for the problems needed to be understood.
7. The actions to correct the quality problems would be explained to the workshop and engineering personnel within the organization.

8. The problems with die production were prioritized to be solved so that, in turn, some of the key problems could be overcome.

The quality problems were also listed as:

1. Pitch: This could arise because of die production, as well die wear.
2. Scoring: This could arise because of inaccurate die drawings, as well as multi-swaging dies. The material that the dies were produced from was key reason for these problems, and the multi-swaging die design could also be changed.
3. Tensile strength: This could be partly related to the pitch problems, and also arose in the kinky chains that had been produced.
4. Kinky chains: These arose because either:
    a. The holes in the ball of chain were too small because the ball was very narrow.
    b. The chain had not been broken very well and was still stiff.
    c. The dumbbells that connected the balls were either too short or had not been formed properly.
5. Ball formed badly: The balls can be either over-formed or under-formed. Over-formed chains result in overlapping seams, while under-formed chains result in seams that do not close properly.

All of these problems needed to be addressed so that the production could run without any quality problems. Other important factors, such as delivery dependability and cost, were acceptable at this stage.

The action researcher and the technical manager visited Pirinci to explain the action required. Both of the partners accepted the changes proposed.

The technical manager of Sturge Industries spent two days overseeing the production area, and pinpointed some of the problems and why they were happening. At this time, the Turkish company acquired the CNC machine, and increased their number of chain production machines. The technical manager and the action researcher realized at this point that the brothers had a problem regarding the money lost because of the poor quality: Zeki Pirinci, who looked after the business side of their company, was blaming Mahir Pirinci for the quality problems. This was partly because of how they had structured their work. The cost of all returned chains was paid by Mahir Pirinci, and this served to increase his resistance even further. He did not accept all of the quality problems, and questioned the quality standards on the basis of their internal and international sales. He felt that some of the quality standards set by Sturge Industries Ltd were excessive, and unnecessary for international sales. The technical manager tried to explain that Sturge Industries' customers expect these standards because they are used to them, and also because they benefit from them. Zeki Pirinci convinced his brother that Pirinci should also learn to improve their production, which would make them more competitive.

The technical manager of Sturge Industries implemented certain changes to ensure better production. The first was the implementation of quality monitoring procedures used in Sturge Industries Ltd, which included using data collection sheets and having every setter go through the production to check the quality and enter the results into the data sheets. This ensured that there would be records about the production process. The entry sheets were to be sent with the samples to Sturge Industries every

15 days. This would allow both organizations to check the quality regularly. While these data sheets were introduced to the shop floor, it became obvious that the tools to measure pitch were not being used by the employees of Pirinci; in fact, some of them had been lost and finding them took over an hour. The technical manager spent a day showing the employees of Pirinci how to ensure that the quality standards data were collected properly.

Improvements to the die production were harder to achieve. The die production in the new CNC machine was reviewed, and the die production technician demonstrated how he programmed and manufactured one die. The programmes differed from those used by the technical manager at Sturge Industries Ltd. During the implementation stage, a set of dies from a single chain size had been sent to Pirinci to compare with their own and ensure they could change their pitch to meet Sturge Industries' requirements. One of the difficulties faced by Sturge Industries was that they were using imperial measurements, while the Turkish company used metric system. The difference could be seen as negligible, as a simple conversion could be sufficient to solve the problem; however the problem could not be resolved as simply as that. The equivalent numbers arising from the conversion were very hard to programme with; therefore, the technician used another service to ensure he used similar designs as those of Sturge Industries Ltd. When Pirinci bought the CNC machine, the seller provided support on the design and manufacture of dies. The dies sent from Sturge Industries Ltd were measured extensively and translated into a design which was more user-friendly to programme. This was then used to manufacture the die in the CNC machine. The way the measurements were taken meant that it took considerable time to identify whether two dies differed in any way. The proportions were used to design dies for larger sizes of chain, and these contained some problems which were addressed and corrected. The problems here were not based on the programmes that Sturge Industries were using, but rather the way that Pirinci was using the programmes. The technician developed a good understanding about the design parameters to overcome this. Another problem faced with all die designs and manufacturing related to the height of the dies. One millimeter (mm) was taken off of all dies, which allowed better production and a partial solution to the problems relating to scoring, incorrect forming of balls, and pitch differences. Another important aspect of the die design and manufacture was the material used for the dies. A certain grade of graphite was needed to manufacture the dies, and this was not available from the Turkish market. Sturge Industries was buying this material from Germany; although Mahir Pirinci spent half a day trying to find an alternative from the Turkish market, he ended up ordering the same material from the distributors Sturge Industries was using. This was also necessary to minimize scoring problems. After the material was delivered to Pirinci's production site, a new set of dies were produced, and these resulted in a better quality chain with minimal scoring, mis-formed balls or kinking.

Only problem left for the kinky chain was the breaking of the chain that did not happen, as it should be. This was solved by simple mechanism in Sturge Indutries Ltd. The chain is going through a set of rollers (8) to break them. If a chain is not broken properly then the rollers get stuck and stop the machines. This was a Poke Yoke solution that ensures 100% quality with detection process. The technical manager decided to produce these and send them to Pirinci to be used in their own machines. There was a considerable amount of machinery, and it was decided that the cost of this would be shared between Sturge Industries and Pirinci. Installing these took about six days of intensive work at Pirinci's production site .

An order was placed with Pirinci, and another visit was scheduled to take place six weeks later.

The quality monitor datasheets and the samples arrived regularly over the next six weeks. The quality for half of that period was acceptable, and many of the problems were solved from the first visit. During the second half of six-week period, however, the quality started to deteriorate. The technical manager emailed the company several times to check the reasons for this, however he was not given a proper explanation. During this period, two posters were produced. The first poster explained the quality checks required, and the second showed pictures of possible quality problems and explained how these could be solved by following certain procedures. The plating of the samples was also sent examined, and the results showed that Pirinci was using four times the material used by Sturge Industries to coat the chain, and there was no consistency in the plating – some parts of the chain were coated more than others. This was a minor problem in terms of the appearance of the chain. A bigger problem that could arise from it, however, was excessive deformation which would lead to the coating sticking in the sprockets of blinds. This was tested and found that found not to be a problem. At this point, the second visit was made to Pirinci. The production had not yet been sent to Sturge Industries, and the stocks were expected to be checked. The posters were also to be introduced at this time, and the work on the shop floor would be monitored again.

The second visit was conducted at the production site of the Pirinci. The posters were framed and covered with glass to protect them from the oil and dirt of the production area. This also gave provided an opportunity to observe the production and check the stock produced up to that point. The quality monitor data for the last 10 days was examined, and this showed that the procedures set in the previous visit had not been observed for long. The chains that had been produced were stocked behind the machines, and had not yet been reeled. The production was continuing as they were short of the quantity required. Die problems were again being experienced, and fixing these took a long time. The initial checks on the stock showed that there some faulty chains had been produced, but it was nearly impossible to check the quality of all chains in stock.

The reason for the chains not yet being reeled was that Pirinci's barrel-based plating system had caused several problems, as once the chain was in the barrels it became knotted. After plating, a lot of manual labour was required to open the chain and then reel it. This was an unexpected drawback. The next question was why the rollers had not yet been fixed to the machines. Mahir Pirinci explained that Pirinci had not been sure how the mechanism worked, and had been waiting to be shown this by Sturge Industries. The technical manager showed them how the mechanism worked and asked them to fit the rollers to the machine while we were there. Once this was done an unbroken chain was instantly detected, and the machines were stopped. From here, problems were detected in 60% of the machines.

The next step was to check the die designs. Since the previous visit, Pirinci had begun using the die material that had been ordered from Germany. However, Mahir Pirinci had decided that the cost of the material was too high (it was three times higher than local material) compared to what they had been using before. He did not revert immediately back to what he had been using before, but instead decided to experiment to find the closest local substitute to the material required. The technical manager examined the experiments and material specifications. He checked the wear of the dies, as well the specifications of the material, and selected two possible substitutes. Mahir Pirinci told us that the dies produced from the German material did not last as long as some of the material they tested from local suppliers. The technical manager tried to explain that the material he recommended solved one of the production problems – i.e. scoring, which was particularly hard to see. Usually it manifests as small lines that continue along the ball chain because of the residue building up in the die. During the forming process, little chips will be magnetized and become stuck at certain parts of the die. Once a bulk of these chips is built up, they will form irregularities in the die and this can be seen on the surface of the chain in the form of very small scratch marks that continue without any break around the ball of the chain. This is a particular problem in the blinds industry, who cannot use plated chains that have irregularities in terms of surface markings. Mahir Pirinci found it hard to see the marks, so the posters, which showed magnified versions of the ball chains, were utilized. Mahir Pirinci then took a magnifying glass and examined some of the samples collected that have scoring problem. He was able to see most of the problems, and therefore accepted using the German-based material to produce the dies. The next step for the technical manager was to check the die designs again. He found out that the changes implemented during the previous visit had been adhered to. The requirements at this point were as followed:

1. Quality should be monitored continually and any faulty chains recognized as early as possible. Correction should be applied to return to the normal production parameters.
2. The dies for the machines should be manufactured from the specified material. The cost and life of the dies may not be ideal, but quality was as important as cost of production.
3. The plating process was a bottleneck for Pirinci. The cost and the time spent on producing the plated chain was higher than expected, and there was also a problem relating to using too much manual labour in one process. The plated chain had four times more material on top the chain compared to the plating in Sturge Industries. This also increased the cost of production for Pirinci AS.

The action researcher and the technical manager requested a meeting with both brothers to explain that the causes of all problems had been identified. The actions to overcome these were all set in motion, and, if adhered to, the chains produced should have come up to acceptable quality levels. Mahir Pirinci raised the issue of the increasing cost of production because of these changes, however the technical manager explained that Sturge Industries could not sell inferior chains, and therefore would not continue to ask Pirinci produce the product for them. Zeki Pirinci stated that he would speak with the managing director of Sturge Industries and explain the difficulties faced with reference to renegotiating the pricing of the chain. Mahir Pirinci asked about the line plating process that was used in Sturge Industries. The technical manager explained the benefits of it and explained that he would speak with the managing director of Sturge Industries about transferring some of the technology from the UK to Pirinci. In a private conversations between the technical manager and the action researcher, the technical manger stated that Sturge Industries have already helped Pirinci by teaching them how to produce higher quality products, and the only advantage left to Sturge Industries compared to Pirinci was the plating process. Thus, he disliked the idea of transferring that technology or helping Pirinci to build such technology in their production plant. This was a major issue for the managing director of Sturge Industries to think about. Before returning to the UK, another order was placed with Pirinci .

The action researcher and technical manager returned to the UK waited for further samples to arrive. Pirinci stopped sending samples, however, and only sent quality monitor sheets for the first 15 days. The action researcher called the company several times to request them, and learned that they had been facing many production difficulties, particularly with the dies, since they could not source enough German material to produce them. They had therefore switched from one material to another, and the quality again decreased. The chains they had produced were waiting to be reeled after the plating process, but Pirinci were short of staff to open the knotted chains and then reel them. At this time, Zeki Pirinci and the managing director of Sturge Industries Ltd were re-negotiating on price. After hearing that Pirinci were still facing quality problems and could not complete the order because of reeling and plating problems, he decided that negotiations should continue face-to-face instead of via emails. Zeki Pirinci agreed that this was the best option. Thus, a third visit to Pirinci was arranged shortly after this.

The action researcher, technical manager and managing director visited Pirinci. The first visit was to the offices of Zeki Pirinci. It became immediately obvious that the relationship between two brothers had deteriorated because of the problems they were facing. Zeki Pirinci seemed to distance himself totally from the Sturge Industries relationship, and left everything to Mahir Pirinci to deal with. Before the visit, the action researcher had a chance to go over the negotiation strategy with the managing director in an informal meeting. He told the action researcher that the plating technology was an advantage to Sturge Industries, and if Pirinci wanted to utilize this advantage they would have to reciprocate in some way. The managing director was not prepared to part with any further technological knowledge without Pirinci showing any commitment to the relationship. The commitment he wanted to see was an acceptable price, as well as adherence to quality monitoring on their side. He would then consider building an even tighter relationship, and perhaps invest in their production and even transfer some of Sturge Industries' machines to Pirinci. This meant that the managing director of Sturge Industries was ready to increase the internationalization mode to a level where he could have some control over the relationship, and what technology he was transferring there.

The negotiation meeting started with both parties explaining their situation. The managing director explained that Sturge Industries have customers in the US, and because of their agreement with Pirinci they have given them promises based on quantity and price. The changes in exchange rates were unfavourable to Sturge Industries, but they still had to sell at the agreed price. This left them with little profit margin, but they were willing to sacrifice this to keep their customers. Mahir Pirinci told the managing director of Sturge Industries that they had encountered some extra costs during the production of the products. He listed these as:

1. The cost of the material to produce the dies.
2. The shorter life of the dies compared to what was expected, which made them even more expensive.
3. The exchange rates, which had changed unfavourably for Pirinci as well.

4. The plating process, which was causing a lot of problems for which Pirinci needed manual workers that had not been accounted for previously.

The managing director of Sturge Industries Ltd told Mahir Pirinci that the cost of dies was directly related to the quality of the product, and therefore could not be compromised. He added that the exchange rates are always changing, and that dips will be compensated for in the long run. Regarding the plating process, the managing director was ready to negotiate a deal wherein Sturge Industries would help Pirinci to build the plating process, in return for a closer partnership than before. In return for the plating line, he expected the cost of dies to be borne by Pirinci. Mahir Pirinci accepted this, but wanted to sell unplated products to Sturge Industries. The managing director and the technical manager discussed this, and the technical manager warned the managing director about the capacity constraints on their plating line. They discussed the possibility of outsourcing the plating to another company within their region, but this was ruled out because of the higher costs involved. The managing director of Sturge Industries wanted to reach an agreement on the plated price, but only an agreement for an unplated product could be reached.

The action researcher, managing director and technical manager moved over to the chain production site in Hadimkoy, Istanbul. The quality monitoring sheets that had not been sent on to the UK were located there. The information on them had not been completed properly, and there were several gaps. The technical manager told Pirinci's employees that they needed to fill in the sheets properly. In addition, some of the pitch measuring tools were still missing, and took half an hour to find. The die material was not what had been specified, as the correct material could not be sourced at that time and another material was being tested.

The rollers were still installed, and were working well. Mahir Pirinci gave a factory tour showing their new, fully automated plating line for products that they sell to the textiles and apparel industry. There was an empty area next to this plating line, and this area had been earmarked for an area that was to be built for the chain line plating. The discussion moved to how Sturge Industries and Pirinci could work together to solve the plating line problem. Mahir Pirinci stated that Pirinci still needed planning permission for the new building, and also had to wait the summer period to commence construction. The rest of building was examined for a possible location in which to implement the line plating machinery. Although the top floor contained an empty area in which this process could built, Mahir Pirinci explained that the process needed to be on ground floor because of the chemicals involved. He stated that, with or without Sturge Industries Ltd, Pirinci planned to invest into this technology and build it over the summer. They had already started to collect information from different companies that claimed to be able to produce line plating machines. The managing director of Sturge Industries Ltd was unconcerned about this, however; Pirinci needed experiential knowledge that these other companies would not be able to provide, but which was available to Sturge Industries because they had invested and perfected the process over the last 30 years, and were also expanding their line plating process.

After the factory tour the negotiations over the price continued in Mahir Pirinci's office. The results were not satisfactory, as a price could not be agreed upon. It was decided that once the capacity was available in Sturge Industries, Sturge Industries could begin to buy chains that had not yet been plated. Furthermore, after the summer, they would start to buy plated chains from Pirinci. Thus meant that the relationship would freeze for six months, and start up again once the new plating line was available.

Six months later, the new plating line in Sturge Industries was available and they began to buy chains from Pirinci. The quality problems were solved, as Pirinci were following all the quality monitoring procedures and producing the dies using the right materials. The relationship at this stage was the same as before.

Pirinci built their own plating line one year later. As the managing director of Sturge Industries expected, they faced problems with this, and approached Sturge Industries for help in the process. Through this, the two companies tightened their partnership and started to work more closely with one another.

4.4 Chapter summary

The action research has been carried out in two cycles. These cycles are both explained through their context, action research question, participants and finally the implementation of the cycle. The context for the both cycles changes very little. The first cycle was set in the case company Sturge Industries Ltd. And the researcher was employed as a teaching company scheme associate within the company. The company decided to internationalize to avoid adverse effects of Far East competition. The order winning and qualifying criteria for the case company was quality, delivery and flexibility and they were cautious that one day the Far Eastern competition will catch up in quality while they can dominate the market with cheaper products. The first cycle question was decided as where to internationalize for the case company. The implementation explains the logic of the manager to give an internationalization decision. The decision is comparing several different markets in terms of producing 100 meters of chain. The next cycle starts once this decision was implemented and the problems were identified. The second cycle context changed slightly because the foreign partner of the case company was included. There were new participants to the cycle such as stakeholders in the new partner. The cycle question was to solve the problems of technology and knowledge transfer and achieve higher quality within production. There were iterations and many problems faced between partners. Regardless of these formal implementation of technology and knowledge transfer was achieved and this improved quality.

Aston University

Volume II

INTERNATIONALIZATION OF SMALL AND MEDIUM SIZED UK MANUFACTURING ENTERPRISES: TECHNOLOGY AND KNOWLEDGE TRANSFER PERSPECTIVE

OKTAY OZDENLI

Doctor of Philosophy

ASTON UNVERSITY

May 2013

Aston University

Title:	Internationalisation of Small and Mediums Sized UK Manufacturing Enterprises: Technology and Knowledge Transfer Perspective
Submitted by:	Oktay Ozdenli
Degree:	Doctor of Philosophy
Year of Submission:	2012

Abstract

This dissertation examines internationalisation of small and medium sized enterprises. There has been a journey to achieve this. The research has started as an action research as Teaching Company Scheme Associate. This has been done in two research cycles, which investigated factors for successful internationalisation of a small and medium sized UK manufacturing enterprise. This has revealed that successful internationalisation requires good technology and knowledge transfer to the new operations. The action research is followed by a survey that has been conducted within UK manufacturing companies. The data collected was analysed under three models: entry mode selection, role of factory and level of internationalisation. The first two models explain two major aspects of internationalisation decision. The last is showing what makes successful internationalising small and medium sized companies. These models provided several important results. The small and medium sized enterprise internationalisation is harder to achieve because most of these organisations do not have experience in technology and knowledge transfer. The success of internationalisation depends on the success of the transfer. This is achieved through employee ownership of the new knowledge. There are many factors affecting this result such as the network relationships such as trust, control and commitment and cognitive distance between two organisations. The last is a product of the difference between prior knowledge and the required level of knowledge. The entry mode and role of factory are decided through these factors while the level of internationalisation can only be explained by absorptive capacity of the recipient organisation and the technology transfer ability of the host organisation.

Keywords: SME Internationalisation, Absorptive Capacity, Technology Transfer Ability, Institutionalisation of New Knowledge, Network Relationships

Dedication

I dedicate this thesis to my parents who dedicated their life to provide me a good education. To my wife’s late mother and my wife who helped and supported me in my hardest days when without her support I would never have completed this thesis and all those beloved relatives that are not with us but have shaped generations of people that provide us who we are now.

Acknowledgements

I wish to pay gratitude to those people, without their continual support, invaluable advice and their patience, this thesis will never be brought to a successful completion.

1. My foremost gratefulness is for my supervisors Dr. Breno Nunes and Prof. David Bennett without their expertise, assistance, support and commitment it would be impossible to complete this thesis.
2. The owner and managing director of Sturge Industries Ltd, Paul Cox, and his employees have great patience with me day after day with my never-ending intriguing questions. Their support, encouragement and valuable knowledge helped me to complete this thesis.
3. Prof. Stephen Roper who has given me advises on questionnaire design and execution.
4. The doctoral office in Aston Business School as well as my colleagues and friends who have created an excellent environment for research.
5. My wife, Banu Bozkurt Ozdenli, for her patience with my stress and support in my hardest days within a very long period of time.
6. My parents who have continually put positive pressure on me to complete this thesis.
7. Jinny Hayman whose proof read this thesis for her hard work in a very short period of time.

Volume 2

Table of Contents Page

List of Figures | Page

5 Survey Analyses

5.1 Introduction

This chapter aims to present the analyses of the survey research. Three models are analyzed within this chapter. The first is the entry mode selection, which is one of the most important decision-making areas for internationalization. The second is the role of the factory model, which provides an explanation of how companies should internationalize, based on the relationship between capabilities and motivations. The last model is the level of internationalization, which provides analyses on the internationalization decisions of highly successful SMEs.

The first section following this one provides information on the coding of the variables. The discussions and findings are presented in Chapter 6.

5.2 Indicator coding

The indicators for the measurement model have been codified, which allows them to be used more easily in the analysis. The codes for operations-advantage-related variables are listed below in Table 5.1. The sources of these indicators were presented above in Table 3.8.

Table 5.1 Indicator codes for cost, quality, flexibility and delivery latent variables

Indicator	Code	Indicator	Code
Direct production cost	O-DPC	Short product lead time	O-SPC
Labour productivity	O-LP	Promptness in solving complaints	O-PS
Capacity utilization	O-CU	Conformance to functional specifications	O-CFS
Reducing inventory	O-RI	Ease of service product	O-ES
Overall factory cost	O-FC	Short order to delivery time	O-DT
Productivity	O-P	On-time delivery	O-OTD
High quality conformance	O-QC	Perceived quality	O-PQ
High product durability	O-PD	Appearance (Aesthetics)	O-A
High product reliability	O-PR	Material handling flexibility	O-MH
Flexibility to alternate routes in a production system	O-AR	Flexibility of the process to produce many products	O-PMP
Flexibility to produce different volumes	O-DV	Flexibility to produce many parts without setups	O-NS
Flexibility to change product design for customer requirements	O-C	Flexibility in planning operations	O-PO
Flexibility to run processes unattended	O-PUA	Flexibility to increase capacity	O-IC
Flexibility to change process design	O-CPD	Flexibility to serve changing markets	O-SCM

In Table 5.2, the codes for the indicators innovation advantage and psychic distance are presented. The sources of these indicators were presented above in Tables 3.7 and 3.10.

Table 5.2 Indicator codes for innovation and psychic distance latent variables

Innovation indicator	Code	Psychic distance indicator	Code
New customers are acquired through innovative products (increase market share)	*InCus*	Knowledge on foreign market: i.e. demand, supply, customer tastes, market concentration	*PDFM*
Innovation activity of the company results in repeating purchases by customers	*InPur*	Knowledge on cultural differences: i.e. time-keeping/punctuality, working hours, body language	*PDCD*
Profit earned and potential from innovation activity	*InPro*	Knowledge on business practice differences: i.e. aggressiveness, optimism, money transfer, ethics	*PDBPO*
Balanced portfolio of innovative projects	*InBal*	Knowledge on communication differences: i.e. general and business language	*PDCom*
Effective and productive execution of innovative projects	*InProj*	Knowledge on differences in economic environment: i.e. economic development, stability, currency risk, labour productivity and cost	*PDEE*
Time, budget, incentives, commitment and focus on innovation	*InCom*	Knowledge on differences in legal and political environment: i.e. bureaucracy, labour law	*PDLP*
Level of knowledge exchange within organization and between the organization and its environment	*InKnow*	Geographic distance	*PDGD*
Coherent and aligned innovation strategy executed by the organiation	*InStra*		
Appropriate management infrastructure for effective innovation implementation	*InInf*		

Table 5.3 shows the indicator codes for absorptive capacity and network relationships (trust and commitment). The sources for these indicators were presented in Tables 3.6 and 3.12.

Table 5.3 Indicator codes for absorptive capacity and trust and commitment latent variables

Absorptive capacity indicator	Code	Trust and commitment indicator	Code
Strong belief in and acceptance of the value of technology by employees	*TTVal*	Organization makes, in good faith, efforts to behave in accordance with commitments	*TCGf*
Successful implementation of technology transfer through following formal rules	*TTImp*	Organization was honest in whatever discussion preceded such commitments	*TCHon*
Cultural differences in understanding and evaluating regulatory frameworks and shared values	*TTCul*	Organization does not take advantage of the other partner, even when the opportunity is available	*TCAdv*
Organizational similarities in structure, common problems and compensation practices	*TTOrg*	Similarities in procedures for control influences across many purposes	*TCProc*
Prior similar technological and scientific knowledge base	*TTPri*	Similarities in reward and incentive systems have a positive effect on inter-company relations	*TCRew*
Knowledge and communication competence of knowledge sharing employees	*TTKnow*	Each organization can meet its objectives without affecting the other	*TCObj*
Commitment, trust and interdependence of organizations and their employees	*TTCom*	Goals of the organizations are consistent and compatible	*TCGoal*
Ease of codifying (in blueprints, instructions, formulas, etc.) and teaching technological knowledge	*TTCod*		
Complexity (interdependent techniques, routines, individuals and resources) of technological knowledge	*TTCox*		
Ability to choose tacit technological knowledge to maintain	*TTTac*		
Ability to maintain tacit technological knowledge	*TTMain*		
Ability to recreate maintained tacit technological knowledge	*TTRec*		

The next table (Table 5.4) shows the entry mode choices of the host companies. Their answers were based on the different years in which they were in one of these entry modes. A single respondent could have several of these, depending on their level of internationalization.

Table 5.4 Entry mode latent variable indicator coding

Entry mode choice indicator	Code
Outsourcing production to a foreign company	*StgOuts*
Licensing technology for production in a foreign company	*StgLT*
Acquiring or merging with a foreign company	*StgAcq*
Establishing partnerships with a foreign company for production	*StgPart*
Investing in production with a foreign partner to form a joint-venture	*StgJ-V*
Investing in a wholly-owned foreign production facility	*StgW-O*

The role of internationalization has been discussed in Table 3.9. These variables were coded as one item – Role – because the company was asked to indicate the most important role they gave to a foreign operation.

The level of internationalization was discussed in Table 3.11 in section 4.5.6.Five questions were asked here, which were codified as follows:

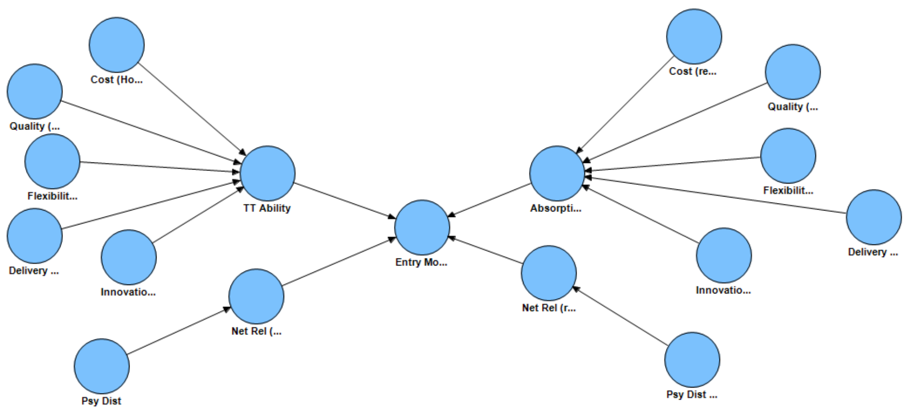
- What is the percentage of foreign sales to total sales? Codified as Lint- FS/TS.

- What is the percentage of the value of foreign assets to the value of the total assets? Codified as Lint- FA/TA.
- What is the percentage of foreign employees to total employees? Codified as Lint- FE/TE.
- What percentage of the total range of products is made in the foreign operation? Codified as Lint- FRP/TRP.
- What is the number of foreign factories? Codified as Lint- # of FF.

5.3 Entry mode model

The model for the entry mode was shown in Figure 5.1 below. The model describes how a company should make an entry-mode decision based on the network relationships of both the host and receiver organization, and the technology transfer of the host and the absorptive capacity of the receiver. Figure 5.1 shows a relationship diagram for the entry mode model.

Figure 5.1 Entry mode model relationship diagram



The operations advantage has been divided into separate components, which are cost, quality, flexibility and delivery advantages. The first set of evaluations will be made for the measurement models.

5.3.1 Measurement model evaluation for entry mode model

First, the loadings of the individual manifest variables will be evaluated to be removed from the reflective measurement model. All latent variable composite reliabilities are above 0.75, which makes it easier to prioritize the content validity and leave any loadings above 0.4 in the measurement model (Hair, Ringle and Sartedt, 2011).

In Table 5.5, the loadings of the indicators absorptive capacity, technology transfer ability, network relationship of the host and receiver and entry mode selection are presented. All items above 0.4 were kept to enhance the content validity of the latent variables. The elimination of indicators that are above 0.4 but below 0.7 would not add any composite reliability to the latent variables, because they are already high enough for internal consistency reliability.

Table 5.5 Technology transfer, network relationships and entry mode measurement model loadings

	Absorptive capacity	TT ability	Net. rel. (host)	Net. rel. (receiver)	Entry mode
TTVal2	*0.2521*	0	0	0	0
TTMain2	0.5174	0	0	0	0
TTOrg2	0.5862	0	0	0	0
TTKnow2	0.5977	0	0	0	0
TTImp2	0.6081	0	0	0	0
TTTac2	0.6452	0	0	0	0
TTRec2	0.6712	0	0	0	0
TTPri2	0.7389	0	0	0	0
TTCox2	0.7473	0	0	0	0
TTCul2	0.7538	0	0	0	0
TTCom2	0.7668	0	0	0	0
TTCod2	0.792	0	0	0	0
TTVal1	0	*-0.1104*	0	0	0
TTRec1	0	0.4002	0	0	0
TTTac1	0	0.4527	0	0	0
TTMain1	0	0.4651	0	0	0
TTImp1	0	0.4692	0	0	0
TTOrg1	0	0.5211	0	0	0
TTKnow1	0	0.6693	0	0	0
TTCox1	0	0.7203	0	0	0
TTCod1	0	0.7259	0	0	0
TTCom1	0	0.7786	0	0	0
TTCul1	0	0.8052	0	0	0
TTPri1	0	0.8054	0	0	0
TCRew1	0	0	*0.0989*	0	0
TCProc1	0	0	*0.2702*	0	0
TCObj1	0	0	0.4673	0	0
TCAdv1	0	0	0.5135	0	0
TCGoal1	0	0	0.725	0	0
TCGF1	0	0	0.7808	0	0
TCHon1	0	0	0.8387	0	0
TCRew2	0	0	0	*0.2113*	0
TCProc2	0	0	0	*0.3508*	0
TCObj2	0	0	0	0.449	0
TCAdv2	0	0	0	0.665	0
TCGoal2	0	0	0	0.7761	0
TCGF2	0	0	0	0.8797	0
TCHon2	0	0	0	0.9138	0
Stg J-V	0	0	0	0	*-0.2146*
Stg L T	0	0	0	0	*0.0358*
Stg W-O	0	0	0	0	*0.1247*
Stg Ind Ag	0	0	0	0	*0.2873*
Stg Part	0	0	0	0	0.3598
Stg OutS	0	0	0	0	0.37
Stg Acq	0	0	0	0	0.3807
Stg- Exp Ac	0	0	0	0	0.5973
Stg Ov S Sub	0	0	0	0	0.6079

Absorptive capacity has only one manifest variable, and this is eliminated because its loading was below 0.4, indicating a strong belief in and acceptance of the value of technology by employees. The most important manifest variables for absorptive capacity are ease of codifying the knowledge, commitment, trust and interdependence of organizations, and cultural differences and prior similar knowledge. The rest of the indicators are kept to help the content validity. Technology transfer ability has only one manifest variable, which was eliminated. This is the same as absorptive capacity: strong belief in and acceptance of the value of the technology by employees. The most important element for technology transfer ability is prior knowledge. This is very similar to the definition of absorptive capacity given by Cohen and Levinthal (1990). The next most important contributors to the ability to transfer technology are the cultural differences in understanding, evaluating regulatory frameworks and shared values.

Network relationships have two values, which were eliminated from the host perspective. These are reward systems, and similarities in procedures for control. The most important factors for the host were that the organization makes, in good faith, efforts to behave in accordance with commitments, and were honest in whatever discussion preceded such commitments. The same manifest variables are eliminated for the receiver.

Table 5.6 Cost and flexibility latent variable loadings before elimination

	Cost (host)	Cost (receiver)	Flexibility (host)	Flexibility (receiver)
O-DPC 1	*0.057*	0	0	0
O-RI 1	*0.3076*	0	0	0
O-FC 1	*0.3202*	0	0	0
O-CU 1	0.8367	0	0	0
O-LP 1	0.8784	0	0	0
O-P 1	0.9037	0	0	0
O-DPC 2	0	0.4798	0	0
O-RI 2	0	0.5157	0	0
O-FC 2	0	0.6815	0	0
O-CU 2	0	0.7152	0	0
O-P2	0	0.8381	0	0
O-LP 2	0	0.9001	0	0
O-PS 1	*0*	*0*	*0.0404*	0
O-SPC 1	*0*	*0*	*0.1409*	0
O-SCM 1	*0*	*0*	*0.1663*	0
O-C 1	*0*	*0*	*0.2195*	0
O-IC 1	*0*	*0*	0.4648	0
O-PO1	*0*	*0*	0.6074	0
O-PMP 1	*0*	*0*	0.6104	0
O-MH1	*0*	*0*	0.6156	0
O-NS1	*0*	*0*	0.6746	0
O-DV 1	*0*	*0*	0.6981	0
O-PUA 1	*0*	*0*	0.7292	0
O-AR 1	*0*	*0*	0.7877	0
O-CPD 1	*0*	*0*	0.8524	0
O-MH2	*0*	*0*	*0*	*0.2206*
O-PS 2	*0*	*0*	*0*	*0.3119*
O-C 2	*0*	*0*	*0*	*0.3283*
O-SPC 2	*0*	*0*	*0*	*0.3541*
O-SCM 2	*0*	*0*	*0*	*0.3764*
O-IC2	*0*	*0*	*0*	*0.3788*
O-PO2	*0*	*0*	0	0.4004
O-NS2	*0*	*0*	0	0.4051
O-PUA 2	*0*	*0*	0	0.497
O-DV 2	*0*	*0*	0	0.5426
O-PMP 2	*0*	*0*	0	0.5747
O-CPD 2	*0*	*0*	0	0.6782
O-AR 2	*0*	*0*	0	0.693

The highest indicators for network relationships for the host are the same as for the receiver.

Entry mode (Table 5.5) has many manifest variables that are below the 0.4 threshold. In the data collected, there were few companies who have high levels of internationalization. This has contributed negatively to higher degrees of internationalization. The first four indicators from Table 5.5 are therefore eliminated, while the rest are kept because their scores are very close to 0.4. The four indicators that are eliminated are joint ventures, licensing, exporting with independent agents and wholly owned.

Table 5.6 explains the loadings of the cost and flexibility latent variables for both host and receiver. Three items are eliminated for cost for the host; these are direct production cost, return in investment and overall factory cost. The cost-related manifest variables that explain the host cost advantage are capacity utilization, labour productivity and productivity. The host cost advantages are all manifest variables, and no indicators are eliminated.

The flexibility advantage for the host and receiver has 13 manifest variables. These indicators are listed in Table 5.1, and their loadings are presented in Table 5.6 Four indicators are eliminated from the host: flexibility to serve changing markets, flexibility to change product design for customer requirements, short lead times and promptness in solving complaints. The top three indicators for the host flexibility advantage are flexibility to change process design, flexibility to run processes unattended and flexibility to alternate routes in a production system. More manifest variables are eliminated from the flexibility advantage of the receiver side. These are material handling flexibility, promptness in solving problems, flexibility to change product design for customer requirements, short product lead times, flexibility to serve changing markets and flexibility to increase capacity. The top three flexibility advantages for the receiver side are flexibility of the process to produce many parts, flexibility to change process design and flexibility to alternate routes in a production system.

Table 5.7 Innovation and quality latent variable loadings without elimination

	Innovation (host)	Innovation (receiver)	Quality (host)	Quality (receiver)
InPro1	-0.9182	0	0	0
InPur1	-0.8783	0	0	0
InCus1	-0.859	0	0	0
InInf1	-0.8556	0	0	0
InProj1	-0.8135	0	0	0
InStr1	-0.8118	0	0	0
InBal1	-0.805	0	0	0
InCom1	-0.7528	0	0	0
InKnow1	-0.7086	0	0	0
InPur2	0	0.6706	0	0
InCus2	0	0.7502	0	0
InPro2	0	0.7685	0	0
InBal2	0	0.8119	0	0
InInf2	0	0.8226	0	0
InProj2	0	0.8574	0	0
InKnow2	0	0.8611	0	0
InCom2	0	0.8634	0	0
InStr2	0	0.8782	0	0
O-PD 1	*0*	*0*	*-0.0056*	0
O-QC 1	*0*	*0*	*0.2583*	0
O-PQ1	*0*	*0*	*0.2605*	0
O-PR 1	*0*	*0*	*0.357*	0
O-ES 1	0	0	0.48	0
O-CFS 1	0	0	0.9037	0
O-A1	0	0	0.9138	0
O-PD 2	*0*	*0*	*0*	*0.3872*
O-PQ2	0	0	0	0.4342
O-QC 2	0	0	0	0.6076
O-PR 2	0	0	0	0.6429
O-ES 2	0	0	0	0.6953
O-A2	0	0	0	0.7356
O-CFS 2	0	0	0	0.8519

Table 5.7 shows the innovation and quality latent variables for the host and receiver environments. The innovation latent variable has not eliminated manifest variables for the host and receiver. All indicators loaded positively for the receiver innovation environment. The host environment innovation loaded negatively.

The quality latent variable for the host has four indicators that are eliminated. These are: high product durability, conformance quality, perceived quality and product reliability. The manifest variables that scored higher than 0.4 include ease of service of product, conformance to functional specifications and appearance. The receiver environment quality advantage has only one indicator that has been eliminated, which is high product durability. The rest of the manifest variables have loadings that are higher than 0.4 for the receiver’s quality advantage latent variable.

Table 5.8 Psychic distance and delivery latent variable loading without elimination

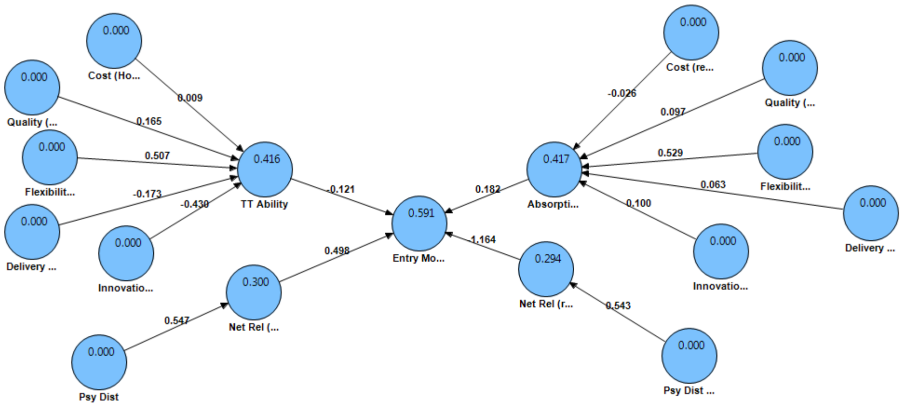
	Psy. dist.	Psy. dist. (receiver)	Delivery (host)	Delivery (receiver)
PDGD1	-0.0131	0	0	0
PDEE1	0.5089	0	0	0
PDCD1	0.6898	0	0	0
PDFM1	0.7355	0	0	0
PDLP1	0.8159	0	0	0
PDCom1	0.8309	0	0	0
PDBPO1	0.8607	0	0	0
PDGD2	0	0.1733	0	0
PDCD2	0	0.7842	0	0
PDLP2	0	0.7981	0	0
PDEE2	0	0.8365	0	0
PDFM2	0	0.8721	0	0
PDBPO2	0	0.9199	0	0
PDCom2	0	0.9215	0	0
O-OTD 1	0	0	-0.0325	0
O-DT 1	0	0	0.9359	0
O-DT 2	0	0	0	0.894
O-OTD-2	0	0	0	0.9255

Table 5.8 presents the loadings for the latent variables psychic distance and delivery for host and receiver environments. The psychic distance for the host environment or the company has only one manifest variable that is eliminated. This is

geographical distance. The receiver psychic distance has the same indicator eliminated as well. The delivery for the receiver environment as an advantage has one manifest variable that has been eliminated, which is on-time delivery. The receiver's delivery advantage has no indicators eliminated.

The PLS algorithm is applied after the variables are eliminated. Figure 5.2 shows the results illustrated in the relationship diagram.

Figure 5.2 PLS Results for Entry Mode



The structural model will be discussed following an explanation of the validity and reliability of the model.

The average variance extracted (AVE) shows convergent validity, and should be above 0.5 (Hair, Ringle and Sarstedt, 2011). The results show that all latent variables have a high enough AVE, and thus convergent validity is achieved within this model. The composite reliability is exceptionally high, and thus internal consistency reliability has also been achieved. All composite reliability values are above 0.7, as recommended by Nunnally and Bernstein (1994). The Cronbach's alphas are expected to be above 0.7, as recommended by Nunnally (1978), who also advised that any Cronbach's alpha values above 0.8 should be considered extremely reliable. Most of the latent variables in this model perform above 0.8. This shows that internal consistency within the constructs is very high (Table 5.9).

Table 5.9 Reliability and validity of the measurement models for entry mode model

	AVE	Composite reliability	R-squared	Cronbach's alpha	Communality	Redundancy
Absorptive capacity	0.5663	0.904	0.4168	0.8854	0.4663	-0.0092
Cost (host)	0.7634	0.9063	0	0.846	0.7634	0
Cost (receiver)	0.5988	0.8502	0	0.7839	0.4988	0
Delivery (host)	1	1	0	1	1	0
Delivery (receiver)	0.8279	0.9058	0	0.7935	0.8279	0
Entry mode	0.7382	0.9033	0.5906	0.8235	0.1283	-0.0074
Flexibility (host)	0.5967	0.8968	0	0.8809	0.4967	0
Flexibility (receiver)	0.6002	0.9182	0	0.9023	0.4633	0
Innovation (host)	0.5402	0.911	0	0.9519	0.5402	0
Innovation (receiver)	0.6585	0.9452	0	0.9398	0.6585	0
Net. rel. (host)	0.5201	0.8029	0.2997	0.7296	0.4201	0.1135
Net. rel. (receiver)	0.571	0.8627	0.2944	0.8033	0.571	0.1553
Psy. dist.	0.623	0.9527	0	0.769	0.5129	0
Psy. dist. (receiver)	0.7396	0.9443	0	0.93	0.7396	0
Quality (host)	0.7181	0.8814	0	0.8188	0.7181	0
Quality (receiver)	0.5473	0.8222	0	0.7968	0.4473	0
TT ability	0.502	0.8726	0.4158	0.8593	0.402	0.0016

The next validity that is of interest is the discriminatory validity, which examines the differences in measurement of different constructs. In PLS-SEM this is achieved through Fornell and Larcker's (1981) criterion. It is calculated through the AVE, which should be higher than the square of the latent construct's correlation with the other latent constructs. This can also be shown as the correlations compared to the square root of the AVE. Table 5.10 shows the square root of the AVE against the correlation matrix of the latent variables. The results show that the square root of the AVE of each latent variable is higher than its correlations with the other latent variables. The measurement models differ from each other enough to claim that there is discriminant validity.

The measurement model evaluation is achieved through checking four types of validity and reliability of the measurement model:

- *Internal consistency reliability:* achieved through high composite reliability and Cronbach's alpha.
- *Indicator reliability*: indicators that had loadings of less than 0.4 were eliminated from the model. The manifest variables that had loadings ranging from 0.4 to 0.7 were kept, in order to enhance the content validity.
- *Convergent validity*: the AVE should be higher than 0.5. This was achieved in all latent variables.
- *Discriminant validity*: this is measured through Fornell and Larcker's (1981) criterion, and all latent variables have acceptable discriminant validity.

After careful evaluation of the measurement models, it can be said that these measurement models have high reliability and validity.

Absorptive capacity	**0.75**	0	0	0	0	0	0	0	0	0	0	0
Cost (host)	0.3129	**0.87**	0	0	0	0	0	0	0	0	0	0
Cost (receiver)	0.3676	0.6769	**0.77**	0	0	0	0	0	0	0	0	0
Delivery (host)	0.0534	0.0742	0.0843	**1**	0	0	0	0	0	0	0	0
Delivery (receiver)	0.3062	0.3308	0.2035	0.3899	**0.91**	0	0	0	0	0	0	0
Entry mode	-0.2055	-0.4374	-0.3054	0.0716	-0.368	**0.86**	0	0	0	0	0	0
Flexibility (host)	0.4737	0.3119	0.3605	0.2501	0.0938	-0.1354	**0.77**	0	0	0	0	0
Flexibility (receiver)	0.6269	0.3411	0.5662	0.1106	0.3477	-0.2672	0.7089	**0.77**	0	0	0	0
Innovation (host)	-0.2072	-0.1753	-0.1383	0.0859	0.0011	0.0394	0.2355	-0.1284	**0.73**	0	0	0
Innovation (receiver)	0.4278	0.1715	0.4889	0.3601	0.4078	-0.234	0.3453	0.5383	-0.0005	**0.81**	0	0
Net. rel. (host)	0.5992	0.3702	0.369	0.1043	0.317	-0.4097	0.4006	0.5337	-0.1047	0.4241	**0.72**	0
Net. rel. (receiver)	0.5035	0.2692	0.3475	0.1003	0.3383	-0.7032	0.2309	0.4611	-0.0754	0.3762	0.622	**0.76**
Psy. dist.	0.3463	0.5248	0.3038	0.0722	0.4508	-0.3277	0.3686	0.5063	0.0446	0.27	0.5475	0.4431
Psy. dist. (receiver)	0.2383	0.218	0.3097	0.059	0.2416	-0.3431	0.2736	0.5341	-0.0539	0.4475	0.4596	0.5426
Quality (host)	0.3575	0.3081	0.2818	-0.0037	0.1019	-0.1649	0.3644	0.3105	0.1092	0.155	0.3231	0.2402
Quality (receiver)	0.3334	0.2797	0.329	0.0117	0.2436	-0.3149	0.2973	0.3756	0.0747	0.3051	0.328	0.3557
TT ability	0.7239	0.28	0.2384	-0.0832	0.1454	-0.112	0.4254	0.4893	-0.3089	0.2367	0.4939	0.3322

5.3.2 Structural model assessment of entry mode model

There are four areas that need to be given attention within the structural model assessment (evaluation). The first is the R^2 test.

Table 5.11 Structural model evaluation for entry mode model

	Path coefficients	T-statistics	f^2	q^2	Q^2
Absorptive capacity -> Entry mode	0.182	2.01**	0.254	0.19	*0.267*
Cost (host) -> TT ability	0.009	0.0728	0.002	0.105	
Cost (receiver) -> absorptive capacity	-0.026	0.2076	0.045	0.165	
Delivery (host) -> TT ability	-0.173	1.899*	0.051	0.122	
Delivery (receiver) -> absorptive capacity	0.063	1.1157	0.043	0.231	
Flexibility (host) -> TT ability	0.507	3.2802***	0.289	0.135	
Flexibility (receiver) -> absorptive capacity	0.529	5.2734***	0.266	0.22	
Innovation (host) -> TT ability	-0.43	4.682***	0.447	0.148	
Innovation (receiver) -> absorptive capacity	0.1	1.527	0.11	0.17	
Net. rel. (host) -> Entry mode	0.498	4.391***	0.31	0.177	
Net. rel. (receiver) -> entry mode	1.164	1.652*	0.386	0.212	
Psy. dist, -> Net. rel. (host)	0.547	9.8024***	-	-	
Psy. dist. (receiver) -> net. rel. (receiver)	0.543	10.2833***	-	-	
Quality (host) -> TT ability	0.165	1.983**	0.154	0.113	
Quality (receiver) -> absorptive capacity	0.097	0.8677	0.051	0.157	
TT ability -> entry mode	-0.121	1.641*	0.247	0.221	

* p<0.1 **p<0.05 ***p<0.01

Constructs	R^2
Entry mode	0.591
Absorptive capacity	0.417
TT ability	0.416
Net. rel. (host)	0.3
Net. rel. (receiver)	0.294
Goodness of fit	0.48

Hair, Ringle and Sarstedt (2011) reported that R^2 values in marketing-based research should be 0.75, 0.5 and 0.25, which are substantial, moderate and weak respectively. However, Cohen (1988) stated that behavioural research such as that relating to decision making should have values of 0.26, 0.13 and 0.02, which are substantial, moderate and weak respectively. Since this research relates to decision making, according to Cohen (1988) the R^2 values for all latent constructs are substantial. Another example of this context dependency has been given by Hair, Ringle and Sasrtedt (2011), who state that the R^2 values within the marketing discipline may vary as well. In consumer behaviour research, an R^2 value of 0.2 is considered substantial.

The next important evaluation is done through the path coefficients and their t-statistics. The absorptive capacity is only explained by flexibility within the model. The cost, delivery, quality and innovation advantages cannot explain the absorptive capacity, and the technology transfer ability is not explained by cost advantage. The rest of the path coefficients are significant according to the t-statistics. These results are discussed done in the following section. Nevertheless, the model has largely be proven.

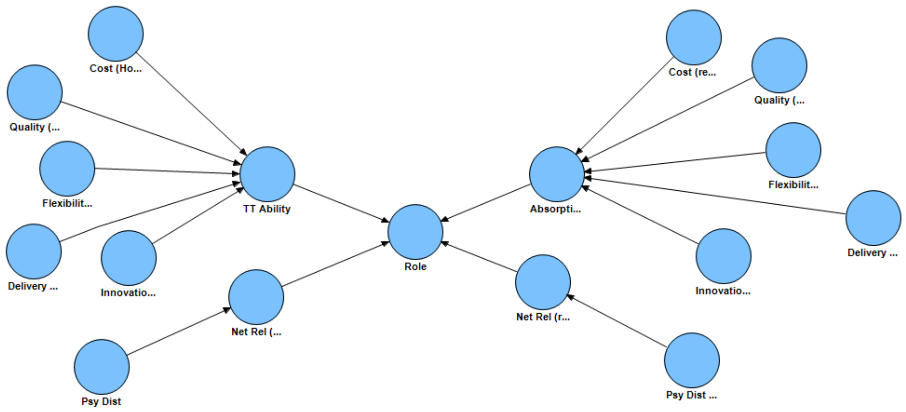
The Q^2 values show the predictive relevance of the model, and are obtained through the omission of each latent construct. These values also show the predictive relevance of each latent construct. Psychic distance for the host and receiving environment cannot be assigned a q^2 figure, because omission of these latent constructs means that the R^2 for the next latent construct becomes 0. From Table 5.11, it can be seen that all latent constructs and the overall model have predictive relevance, because all q^2 and Q^2 values are more than 0. These are generated through blindfolding.

The last information in Table 5.11 shows the goodness of fit (GoF) for the model. The Smart-PLS discussion boards explain that values of 0.36, 0.25 and 0.1 represent large, medium and small model fits, respectively. According to these, therefore, the entry mode selection model has a high model fit. The GoF for PLS-SEM is calculated by taking the geometric mean of the AVE and the average communality. This involves taking the inner and outer models together, and using them to explain the model's ability to determine variability.

5.4 Role of factory model

The model for the role of the factory explores the relationship between technology and knowledge transfer with the network relationships. These are used to predict the role that the factory is given by headquarters. The model was presented in Figure 5.3. Ferdows (1989) first studied the role of the factory; his model explained the role of the factory through the motivation of internationalization, the level of technical ability, and the markets that are served. The model presented in Figure 5.3 does not refuting Ferdows' (1989) model, but rather is a development of that model, with new variables defining the choice of role given to a foreign factory. Any internationalization decision will need to make this decision.

Figure 5.3 Role of Factory PLS Path Model



The operations advantage from Figure 5.3 has been divided into its components, which are cost, quality, flexibility and delivery advantages. First, the measurement model will be evaluated and the structural model will be assessed.

5.4.1 Measurement model evaluation for role of factory model

Table 5.12 Technology transfer and network relationship loadings for role of factory model

	Absorptive capacity	TT ability	Net. rel. (host)	Net. rel. (receiver)	Role
TTVal2	*0.2765*	0	0	0	0
TTMain2	0.5036	0	0	0	0
TTImp2	0.5669	0	0	0	0
TTKnow2	0.589	0	0	0	0
TTOrg2	0.6059	0	0	0	0
TTTac2	0.6131	0	0	0	0
TTRec2	0.6633	0	0	0	0
TTPri2	0.7464	0	0	0	0
TTCul2	0.7689	0	0	0	0
TTCox2	0.7697	0	0	0	0
TTCod2	0.7749	0	0	0	0
TTCom2	0.7931	0	0	0	0
TTVal1	0	*-0.0876*	0	0	0
TTRec1	0	*0.3718*	0	0	0
TTMain1	0	0.4365	0	0	0
TTTac1	0	0.4395	0	0	0
TTImp1	0	0.4837	0	0	0
TTOrg1	0	0.5504	0	0	0
TTKnow1	0	0.6632	0	0	0
TTCox1	0	0.698	0	0	0
TTCod1	0	0.7245	0	0	0
TTCom1	0	0.7783	0	0	0
TTPri1	0	0.8148	0	0	0
TTCul1	0	0.8224	0	0	0
TCRew1	0	0	*0.2885*	0	0
TCProc1	0	0	0.4106	0	0
TCObj1	0	0	0.4511	0	0
TCAdv1	0	0	0.5725	0	0
TCGF1	0	0	0.7524	0	0
TCGoal1	0	0	0.7528	0	0
TCHon1	0	0	0.8193	0	0
TCRew2	0	0	0	*0.3068*	0
TCProc2	0	0	0	*0.3908*	0
TCObj2	0	0	0	0.4332	0
TCAdv2	0	0	0	0.6407	0
TCGoal2	0	0	0	0.7992	0
TCGF2	0	0	0	0.8742	0
TCHon2	0	0	0	0.8952	0
Role	0	0	0	0	1

Table 5.12 displays the loadings for the five latent variables. The first latent variable presented is the absorptive capacity of the receiver

environment. This construct is made of 12 manifest variables. Hair, Ringle and Sarstedt (2011) advise eliminating all manifest variables that have scored less than 0.4. Only one indicator has a loading of less than 0.4 – strong belief in and acceptance of the value of technology by employees – and this was eliminated from the model. Hair, Ringle and Sarstedt (2011) also explain that indicators with loadings from 0.4 to 0.7 should be eliminated if the composite reliability improves by elimination. The composite reliability of all the manifest variables is above 0.78; this is acceptable, and elimination of indicators that scored between 0.4 and 0.7 does not add value, but rather decreases the content validity. Six indicators scored within this range, and to improve the content validity all of these manifest variables were kept in the measurement model. The next latent variable is closely related to the absorptive capacity. While the absorptive capacity is situated within the receiver environment, technology transfer ability is contextualized within the host environment. There are again 12 manifest variables that measure the technology transfer ability. Two indicators scored less than 0.4: strong belief in and acceptance of the value of technology by employees and ability to recreate maintained tacit technological knowledge. These were eliminated from the measurement model to improve the validity and reliability. There are also six manifest variables that scored between 0.4 and 0.7. These variables were not eliminated, to improve the content validity of the measurement model. The highest-scoring indicator for this measurement model was cultural differences in understanding, evaluating regulatory frameworks and shared values.

The next measurement model evaluated was the network relationship latent construct, which is contextualized within the host and receiver environment separately. This construct has seven manifest variables. The network relationship latent variable for the host environment has only one manifest variable, which scored less than 0.4. This is similarities in reward and incentive systems have a positive effect on inter-company relations. The highest-scoring indicator is organization is the organization was honest in whatever discussion preceded such commitments.
The rest of the manifest variables for the network relationship latent construct for the host environment were kept in the measurement model to increase the content validity. The receiver environment has a similar latent variable, which has six indicators. There are two manifest variables that scored less than 0.4. These are: similarities in reward and incentive systems have a positive effect on inter-company relations and similarities in procedures for control influences across many purposes.

The next latent variable is the role of the factory, denoted as Role. This latent construct is a single-item measurement model. The measurement models with single items have loadings of 1, and therefore cannot be eliminated. The question is intended to identify the role given at the time of the decision making to a foreign operation. The question asked which of the roles they selected within their decision-making process.

Table 5.13 Cost and flexibility latent variable loadings for role of factory model

	Cost (host)	Cost (receiver)	Flexibility (host)	Flexibility (receiver)
O-DPC 1	*0.0403*	0	0	0
O-RI 1	*0.2912*	0	0	0
O-FC 1	*0.3149*	0	0	0
O-CU 1	0.8338	0	0	0
O-LP 1	0.8766	0	0	0
O-P 1	0.9074	0	0	0
O-DPC 2	0	0.4708	0	0
O-RI 2	0	0.5127	0	0
O-FC 2	0	0.6747	0	0
O-CU 2	0	0.7208	0	0
O-P2	0	0.8423	0	0
O-LP 2	0	0.9017	0	0
O-PS 1	0	0	*0.0312*	0
O-SPC 1	0	0	*0.1265*	0
O-SCM 1	0	0	*0.1784*	0
O-C 1	0	0	*0.2184*	0
O-IC 1	0	0	0.4511	0
O-PO1	0	0	0.6007	0
O-PMP 1	0	0	0.6115	0
O-MH1	0	0	0.6205	0
O-NS1	0	0	0.6721	0
O-DV 1	0	0	0.6962	0
O-PUA 1	0	0	0.7313	0
O-AR 1	0	0	0.7913	0
O-CPD 1	0	0	0.8508	0
O-MH2	0	0	0	*0.2272*
O-C 2	0	0	0	*0.3288*
O-SPC 2	0	0	0	*0.3467*
O-PS 2	0	0	0	*0.3501*
O-IC2	0	0	0	*0.3739*
O-NS2	0	0	0	*0.3891*
O-PO2	0	0	0	0.4068
O-SCM 2	0	0	0	0.4188
O-PUA 2	0	0	0	0.4655
O-DV 2	0	0	0	0.5246
O-PMP 2	0	0	0	0.5612
O-CPD 2	0	0	0	0.6759
O-AR 2	0	0	0	0.6858

Table 5.13 illustrates the next four latent variables. These are cost and flexibility for the host and receiver environment. Cost for the host and the

receiver environment has six indicators each. For the host environment, cost has three manifest variables with loadings below 0.4. These are: direct production cost, reducing inventory and overall factory cost. The rest of the indicators (capacity utilization, productivity and labor productivity), have high loadings. The manifest variables in cost for the receiver environment have higher loadings than 0.4. There are no eliminated indicators for this construct, and its composite reliability is above 0.84. Its AVE is above 0.59, which is good for convergent validity.

The next set of latent variables from Table 5.14 is flexibility for the host and receiver environment. These are measured via 13 manifest variables. Flexibility for the host environment has four indicators with loadings of less than 0.4. These are: promptness in solving problems, short product lead times, flexibility to serve changing markets and flexibility to change product design for customer requirements. The rest of the indicators are kept to protect the content validity. The composite reliability for this indicator was high enough, and elimination of any other variable does not significantly improve the composite reliability.

Table 5.14 Innovation and quality latent variable loadings for role of factory model

	Innovation (host)	Innovation (receiver)	Quality (host)	Quality (receiver)
InPro1	-0.9212	0	0	0
InPur1	-0.8814	0	0	0
InCus1	-0.8598	0	0	0
InInf1	-0.8513	0	0	0
InProj1	-0.8084	0	0	0
InStr1	-0.8048	0	0	0
InBal1	-0.7997	0	0	0
InCom1	-0.7436	0	0	0
InKnow1	-0.6957	0	0	0
InPur2	0	0.6733	0	0
InCus2	0	0.7533	0	0
InPro2	0	0.7712	0	0
InBal2	0	0.8135	0	0
InInf2	0	0.8214	0	0
InProj2	0	0.8564	0	0
InKnow2	0	0.8603	0	0
InCom2	0	0.8621	0	0
InStr2	0	0.8785	0	0
O-PD 1	0	0	*-0.0974*	0
O-QC 1	0	0	*0.1512*	0
O-PQ1	0	0	*0.2279*	0
O-PQ1	0	0	*0.2279*	0
O-ES 1	0	0	0.4198	0
O-CFS 1	0	0	0.8593	0
O-A1	0	0	0.9106	0
O-PD 2	0	0	0	*0.3832*
O-PQ2	0	0	0	0.4477
O-QC 2	0	0	0	0.6104
O-PR 2	0	0	0	0.6448
O-ES 2	0	0	0	0.7086
O-A2	0	0	0	0.7228
O-CFS 2	0	0	0	0.8528

The highest-scoring manifest variable for flexibility in the host environment is flexibility to change process design. Flexibility for the receiver environment has six indicators with loadings below 0.4. These are material handling flexibility, flexibility to change product design for customer requirements, short product lead time, flexibility to serve changing markets, promptness in solving complaints, flexibility to increase capacity and flexibility to produce many parts without setups.

For the host and receiver environments for latent innovation, no manifest variables need to be eliminated because all of them are above 0.4, and their composite reliabilities are high.

The quality latent variables for host and receiver environment from Table 5.14 have seven indicators. The host environment has four manifest variables with loadings of less than 0.4. These are: high product durability, high conformance quality, perceived quality and high product reliability. This latent construct has two important indicators with high loadings. These are appearance and conformance to functional specifications.

Table 5.15 Psychic distance and delivery latent variable loadings for role of factory model

	Psy. dist.	Psy. dist. (receiver)	Delivery (host)	Delivery (receiver)
PDGD1	*-0.0249*	0	0	0
PDEE1	0.5224	0	0	0
PDCD1	0.6508	0	0	0
PDLP1	0.7198	0	0	0
PDFM1	0.7215	0	0	0
PDCom1	0.8452	0	0	0
PDBPO1	0.8536	0	0	0
PDGD2	0	*0.1617*	0	0
PDCD2	0	0.787	0	0
PDLP2	0	0.791	0	0
PDEE2	0	0.8294	0	0
PDFM2	0	0.8793	0	0
PDBPO2	0	0.9255	0	0
PDCom2	0	0.9258	0	0
O-OTD 1	0	0	*0.0288*	0
O-DT 1	0	0	0.9557	0
O-DT 2	0	0	0	0.8911
O-OTD-2	0	0	0	0.9279

For the receiver environment for the quality latent variable, only one variable needs to be eliminated because it has a loading of below 0.4. That is high product durability. The rest of the variables have higher loadings, with conformance to quality specifications the highest of all.

Table 5.15 demonstrates the last four latent variables from the role of factory model for the host and receiver environment. The psychic distance latent variables for the host and receiver environment have been measured via seven manifest variables. The psychic distance for the host and receiver environment has only indicator in common that loads below 0.4. This is geographical distance. The next latent variable, delivery, for the host and receiver environment has two-item measurement models. For the host environment, delivery has one indicator with a loading of less than 0.4. This is on-time delivery. The rest of the indicators for the host and receiver environment have high loadings, with acceptable composite reliability.

When these indicators are eliminated, the model is measured again and the following validity and reliability results were obtained from the analysis. Table 5.16, below, shows the composite reliability and Cronbach's alphas for the internal consistency reliability. The composite reliability was considered a better measure of the internal consistency reliability (Hair, Ringle and Sartedt, 2011). The Cronbach's alpha treats all indicators as equally important, while the composite reliability treats the manifest variables according to their importance. This is a better measure for the PLS-SEM studies. Nunnally and Bernstein (1994) identified that composite reliability figures above 0.7 are acceptable. Table 5.16 presents all composite reliability values for the latent constructs as being above 0.8, which shows a high internal consistency reliability. The Cronbach's alphas for these latent variables are above the 0.7 value suggested by Nunnally (1978). This proves that through two methods of assessing internal consistency reliability, the results show a high degree of measurement capability.

Elimination of the indicators that scored less than 0.4 loading ensures that the measurement models have indicator reliability.

The next assessment is done to achieve convergent validity. This provides indicators to explain half of the variance in the latent constructs (Hair, Ringle and Sarstedt, 2011).

Table 5.16 Measurement model assessment for role of factory model

	AVE	Composite reliability	R-squared	Cronbach's alpha	Communality	Redundancy
Absorptive capacity	0.5678	0.9042	0.4369	0.8854	0.4678	-0.0375
Cost (host)	0.7632	0.9062	0	0.846	0.7632	0
Cost (receiver)	0.5964	0.8491	0	0.7839	0.4964	0
Delivery (host)	1	1	0	1	1	0
Delivery (receiver)	0.8279	0.9058	0	0.7935	0.8279	0
Flexibility (host)	0.5979	0.8973	0	0.8809	0.4979	0
Flexibility (receiver)	0.6172	0.9002	0	0.8934	0.4122	0
Innovation (host)	0.6372	0.91	0	0.9519	0.5372	0
Innovation (receiver)	0.6599	0.9455	0	0.9398	0.6599	0
Net. rel. (host)	0.5205	0.8029	0.3059	0.7296	0.4205	0.1127
Net. rel. (receiver)	0.5697	0.8626	0.3013	0.8033	0.5697	0.1557
Psy. dist.	0.7452	0.9467	0	0.8231	0.5343	0
Psy. dist. (receiver)	0.7398	0.9444	0	0.93	0.7398	0
Quality (host)	0.6307	0.8684	0	0.8283	0.6307	0
Quality (receiver)	0.5538	0.827	0	0.7968	0.4538	0
Role	1	1	0.2909	1	1	0.1113
TT ability	0.535	0.8796	0.4006	0.8525	0.435	0.0002

Absorptive capacity	**0.75**	0	0	0	0	0	0	0	0	0	0	0	
Cost (host)	0.2974	**0.87**	0	0	0	0	0	0	0	0	0	0	
Cost (receiver)	0.3541	0.6825	**0.77**	0	0	0	0	0	0	0	0	0	
Delivery (host)	0.0582	0.0744	0.0854	**1**	0	0	0	0	0	0	0	0	
Delivery (receiver)	0.3102	0.3305	0.2127	0.3894	**0.91**	0	0	0	0	0	0	0	
Flexibility (host)	0.4648	0.3127	0.3609	0.2492	0.0926	**0.77**	0	0	0	0	0	0	
Flexibility (receiver)	0.6525	0.3869	0.6232	0.1273	0.3949	0.6467	**0.79**	0	0	0	0	0	
Innovation (host)	-0.2179	-0.1737	-0.1353	0.085	0.0019	0.2356	-0.1176	**0.8**	0	0	0	0	
Innovation (receiver)	0.4406	0.1694	0.4896	0.362	0.4076	0.3424	0.6351	0.0011	**0.81**	0	0	0	
Net. rel. (host)	0.5835	0.3587	0.3693	0.1126	0.3296	0.3896	0.6842	-0.1061	0.4339	**0.72**	0	0	
Net. rel. (receiver)	0.4785	0.274	0.3558	0.0952	0.3405	0.2315	0.5994	-0.073	0.3778	0.6196	**0.75**	0	
Psy. dist.	0.3274	0.5085	0.3145	0.0924	0.464	0.3687	0.5423	0.0517	0.2856	0.5531	0.44	**0.86**	
Psy. dist. (receiver)	0.2276	0.2178	0.3171	0.0596	0.2422	0.2742	0.5643	-0.0525	0.4496	0.4723	0.5489	0.6509	
Quality (host)	0.3418	0.359	0.3107	-0.0046	0.1188	0.3913	0.3865	0.1098	0.1556	0.3471	0.2376	0.4872	0
Quality (receiver)	0.3385	0.2898	0.3483	0.0145	0.252	0.3063	0.452	0.0822	0.315	0.3417	0.3628	0.5144	
Role	0.3397	0.2206	0.1773	0.0071	0.318	0.175	0.4871	-0.0995	0.4354	0.465	0.4749	0.4538	
TT ability	0.6213	0.2726	0.2285	-0.0772	0.1491	0.4207	0.4717	-0.3082	0.232	0.4767	0.3131	0.0972	0

The AVE measures the convergent validity. This should be above 0.5, which is equivalent to 50% of the variance of the latent variable. Table 5.17 demonstrates that the AVE values for all latent variables are above 0.5, which confirms a high degree of convergent validity.

The next step in the assessment of the measurement models is to confirm the discriminant validity. This can be done through two methods:

- Fornell and Larcker's (1981) criterion: the AVE should be more than the square of the correlation values of the latent constructs.
- An indicator should be higher than all of its cross-loadings.

Discriminant validity ensures that the latent variable has more variance shared with its indicators than the other latent variables (Hair, Ringle and Sarstedt, 2011). The method of choice for discriminant validity is Fornell and Larcker's (1981) criterion (Fornell and Larcker, 1981). The reason for choosing this method is its straightforward capability to demonstrate discriminant validity without the need for lengthy tables. Table 5.16 illustrates the correlations of the latent variables with the square root of the AVE. Instead of calculating the square of each correlation coefficient, it is easier to take the square root of a single variable. According to Fornell and Larcker (1981), the square root of the AVE should be higher than the correlation of the latent variables. Table 5.17 confirms that the square root of the AVE values are higher than the correlation of the latent variables, which proves that the latent variables have discriminant validity.

The measurement model evaluation is achieved through checking four categories of validity and reliability of the measurement model:

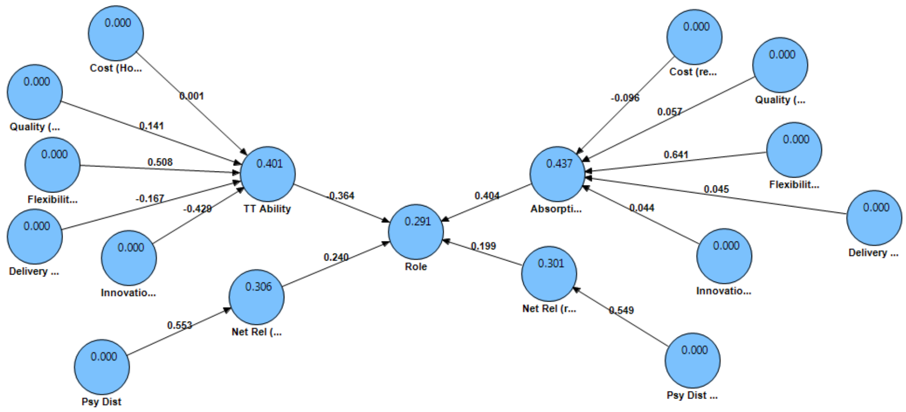
- *Internal consistency reliability*: achieved through high composite reliability and Cronbach's alpha.
- *Indicator reliability*: those indicators that have loadings of less than 0.4 are eliminated from the model. Indicators that have loadings from 0.4 to 0.7 are kept within the measurement model to improve the content validity.
- *Convergent validity*: The AVE of each latent variable was higher than 0.5.
- *Discriminant validity*: This is measured through Fornell and Larcker's (1981) criterion, and all square-root AVE values were higher than the correlation coefficients.

This assessment proves that the measurement models for these latent constructs have high validity and reliability.

5.4.2 Assessment of structural model for the role of factory model

The structural model assessment was conducted through three categories. These are: evaluating the R^2, t-values obtained from bootstrapping, and the predictive validity of the model.

Figure 5.4 PLS estimated path coefficient for the role of factory model



As shown in Figure 5.4, the PLS algorithm generated path coefficients, and the R^2 values are demonstrated.

The first evaluation of the structural model is done by exploring the R^2 of the latent variables. Hair, Ringle and Sarstedt (2011) reported that 0.75, 0.5 and 0.25 are considered as substantial, moderate and weak in marketing research, with the provision that every field of research has their own values when evaluating the R^2. Cohen (1988) stated that 0.26, 0.13 and 0.02 are considered substantial, moderate and weak in behavioural research. Cohen's (1988) values are used to evaluate the R^2 in this model, since the model is about the decision-making of SME managers and this is behavioural research. Table 5.18, above, confirms that the R^2 values for this model are substantial.

Table 5.18 Structural model evaluation for the role of factory model

	Path coefficients	T-statistics	f^2	q^2	Q^2
Absorptive capacity -> Role	0.404	2.8011***	0.203	0.157	*0.33*
Cost (host) -> TT ability	0.001	0.009	-0.02	0.11	
Cost (receiver) -> Absorptive capacity	-0.096	0.8331	0.08	0.152	
Delivery (host) -> TT ability	-0.167	2.4183**	0.03	0.118	
Delivery (receiver) -> Absorptive capacity	0.045	0.7582	0.08	-0.01	
Flexibility (host) -> TT ability	0.508	3.7378***	0.26	0.14	
Flexibility (receiver) -> Absorptive capacity	0.641	6.3457***	0.31	0.18	
Innovation (host) -> TT ability	-0.429	2.2501**	0.41	0.15	
Innovation (receiver) -> Absorptive capacity	0.044	0.5428	0.15	0.13	
Net. rel. (host) -> Role	0.24	1.9788**	0.16	0.33	
Net. rel. (receiver) -> Role	0.199	2.0381**	0.16	0.18	
Psy. dist. -> Net. rel. (host)	0.553	11.4949***	-	-	
Psy. dist. (receiver) -> Net. rel. (receiver)	0.549	10.8893***	-	-	
Quality (host) -> TT ability	0.141	1.9182*	0.13	0.13	
Quality (receiver) -> Absorptive capacity	0.057	0.5072	0.09	0.12	
TT ability -> Role	-0.364	2.5613**	0.2	0.21	
	* p<0.1 **p<0.05 ***p<0.01				
Constructs	**R^2**				
Role	0.291				
Absorptive capacity	0.437				
TT ability	0.401				
Net. rel. (host)	0.306				
Net. rel. (receiver)	0.301				
Goodness of Fit	0.46				

The next assessment is done through looking at the t-values obtained from bootstrapping. These values should be over 1.65, 1.96 and 2.58 for

10%, 5% and 1% significance levels respectively. These are demonstrated in Table 5.18 as stars next to the t-values. In this model, 16 hypotheses are illustrated as paths. The path coefficients should be treated as ordinary least square equivalents of regression coefficients. The t-values show their significance. There are 11 significant hypothesis. The latent variable cost for the host and receiver environment is insignificant to predict technology transfer and absorptive capacity respectively. The delivery, quality and innovation latent constructs for receiver environment were not able to predict absorptive capacity. The rest of the path coefficients are significant to varying degrees, which can be confirmed from Table 5.18

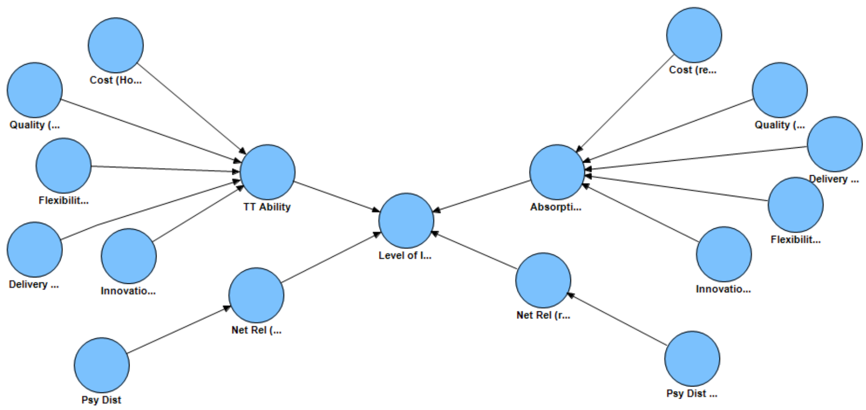
The last category of assessment for the structural model ensures its predictive power. This is obtained through blindfolding. Stone-Geisser's Q^2 (Stone, 1974; Geisser, 1974) shows the predictive power of the model. The Q^2 for this model is 0.33 (Table 5.18), which shows that the model has a predictive power. The Q^2 is expected to be over 0. The q^2 values act in a similar manner to the Q^2 value by showing the predictive power of different latent variables. All the latent variables have a q^2 value of higher than 0, which confirms that they have predictive power.

PLS-SEM studies have an inherent problem regarding a global GoF index. The GoF for PLS models is calculated using the average of the R^2 values and average of the communality scores to obtain a geographical average (multiplied and square rooted). The GoF for this model is 0.46. The Smart-PLS discussion boards discuss that 0.36, 0.25 and 0.1 are substantial, moderate and weak GoFs, respectively. Therefore, this model has a high GoF.

5.5 Level of internationalization

The level of internationalization examines the effect of technology and knowledge transfer and network relationships with respect to the degree of internationalization of the company. The level of internationalization of the company has been measured through the multinationality index proposed by UNCTAD (2004). The indicators that relate to multinationality are listed with their academic references in Table 3.11 The model is based on the Figure 5.5 where the role of factory and mode of internationalization has been replaced by level of internationalization.

Figure 5.5 Level of internationalization PLS-SEM path model



The model presented in Figure 5.5 includes the components of the operations advantage, so that cost, quality, flexibility and delivery are used instead of operations advantage. The rectangles that represent the latent variables are replaced with circles. Evaluation of the PLS-SEM will be done to the measurement model first, followed by the structural model.

5.5.1 Measurement model evaluation for level of internationalization

Table 5.19 shows the loadings for five different latent variables. The first latent variable is the absorptive capacity for the receiver environment. There are 12 indicators used in the measurement model, and only one variable that scored less than 0.4 – strong belief in acceptance of the value of technology by employees. The rest of the variables have loadings that are higher than 0.4. The manifest variables that have loadings from 0.4 to 0.7 have been kept to strengthen the content validity. Hair, Ringle and Sarstedt (2011) recommended eliminating all latent variables that score below 0.4. The latent variables that have loading below 0.7 should also be removed if the composite reliability will improve. The composite reliability is 0.87 without eliminating any indicators. There is a minimal improvement in the composite reliability; hence, removing those indicators would not add value to the measurement model. The highest manifest variables are ease of codifying and teaching technological knowledge and cultural differences in understanding, evaluating regulatory frameworks and shared values.

Table 5.19 Technology transfer and network relationship loadings for level of internationalization

	Absorptive capacity	TT ability	Net. rel. (host)	Net. rel. (receiver)	Level of int.
TTVal2	*0.277*	0	0	0	0
TTMain2	0.5025	0	0	0	0
TTKnow2	0.5879	0	0	0	0
TTOrg2	0.6073	0	0	0	0
TTImp2	0.6153	0	0	0	0
TTTac2	0.6311	0	0	0	0
TTRec2	0.6643	0	0	0	0
TTCox2	0.74	0	0	0	0
TTPri2	0.7416	0	0	0	0
TTCom2	0.7575	0	0	0	0
TTCul2	0.7596	0	0	0	0
TTCod2	0.7851	0	0	0	0
TTVal1	0	*-0.059*	0	0	0
TTRec1	0	*0.3733*	0	0	0
TTMain1	0	0.4355	0	0	0
TTTac1	0	0.4477	0	0	0
TTImp1	0	0.5103	0	0	0
TTOrg1	0	0.5587	0	0	0
TTKnow1	0	0.6586	0	0	0
TTCox1	0	0.6951	0	0	0
TTCod1	0	0.7203	0	0	0
TTCom1	0	0.7723	0	0	0
TTPri1	0	0.8173	0	0	0
TTCul1	0	0.8252	0	0	0
TCRew1	0	0	*0.1112*	0	0
TCProc1	0	0	*0.317*	0	0
TCObj1	0	0	0.4765	0	0
TCAdv1	0	0	0.5596	0	0
TCGoal1	0	0	0.7258	0	0
TCGF1	0	0	0.7745	0	0
TCHon1	0	0	0.8264	0	0
TCRew2	0	0	0	*0.1567*	0
TCProc2	0	0	0	*0.36*	0
TCObj2	0	0	0	0.487	0
TCAdv2	0	0	0	0.6738	0
TCGoal2	0	0	0	0.788	0
TCGF2	0	0	0	0.8696	0
TCHon2	0	0	0	0.8937	0
Lint- FS/TS	0	0	0	0	-0.4496
Lint- # of FF	0	0	0	0	0.4151
Lint- FE/TE	0	0	0	0	0.7888
Lint- FA/TA	0	0	0	0	0.8023
Lint- FRP/TRP	0	0	0	0	0.8264

The next latent construct is technology transfer ability in the host environment. This latent variable has 12 indicators that are similar to the absorptive capacity of the receiver environment. There are two manifest variables that have loadings of less than 0.4. These are: strong belief in and acceptance of the value of technology by employees, and ability to recreate maintained tacit technological knowledge. The rest of the manifest variables are kept in the measurement model because the composite reliability is 0.83 and eliminating any indicator that scored from 0.4 to 0,7 does not add value. Keeping strong content validity is considered highly important. The highest-scoring manifest variables for technology transfer ability in the host environment are: cultural differences in understanding, evaluating regulatory frameworks and shared values and prior similar technological and scientific knowledge base.

The next set of variables from table 5.19 are the network relationship variables for the host and receiver environment. These latent variables are measured through seven indicators. The measurement model for the host and receiver environment for the network relationships have two indicators that scored less than 0.4 These are: similarities in reward and incentives systems have a positive effect on inter-company relations and similarities in procedures for control influences across many purposes.

Table 5.20 Cost and flexibility latent variable loadings for level of internationalization

	Cost (host)	Cost (receiver)	Flexibility (host)	Flexibility (receiver)
O-DPC 1	*0.0497*	0	0	0
O-RI 1	*0.29*	0	0	0
O-FC 1	*0.3264*	0	0	0
O-CU 1	0.8359	0	0	0
O-LP 1	0.8761	0	0	0
O-P 1	0.9048	0	0	0
O-DT 1	0	0	0	0
O-DPC 2	0	0.4804	0	0
O-RI 2	0	0.5098	0	0
O-FC 2	0	0.6842	0	0
O-CU 2	0	0.7136	0	0
O-P2	0	0.8411	0	0
O-LP 2	0	0.9025	0	0
O-PS 1	0	0	*0.0369*	0
O-SPC 1	0	0	*0.1308*	0
O-SCM 1	0	0	*0.1887*	0
O-C 1	0	0	*0.2233*	0
O-IC 1	0	0	0.4518	0
O-PO1	0	0	0.5993	0
O-PMP 1	0	0	0.6126	0
O-MH1	0	0	0.6202	0
O-NS1	0	0	0.6736	0
O-DV 1	0	0	0.7007	0
O-PUA 1	0	0	0.7327	0
O-AR 1	0	0	0.7923	0
O-CPD 1	0	0	0.8512	0
O-MH2	0	0	0	*0.224*
O-C 2	0	0	0	*0.3241*
O-PS 2	0	0	0	*0.329*
O-SPC 2	0	0	0	*0.3468*
O-IC2	0	0	0	*0.3674*
O-SCM 2	0	0	0	*0.3784*
O-PO2	0	0	0	*0.3855*
O-NS2	0	0	0	0.4109
O-PUA 2	0	0	0	0.4883
O-DV 2	0	0	0	0.539
O-PMP 2	0	0	0	0.5633
O-CPD 2	0	0	0	0.6733
O-AR 2	0	0	0	0.6918

The rest of the variables are kept in the measurement model to protect the content validity. The composite reliability for these latent constructs, without removing any indicators, was 0.782 for the host and 0.82 for the receiver environment. These are above 0.7, and eliminating any other indicator does not add value in terms of the model's composite reliability. The highest-scoring manifest variable for network relationship in host and receiver environment is the organization was honest in whatever discussion preceded such commitments.

The last latent variable in Table 5.19 is level of internationalization, which is measured by five indicators. These indicators are all above 0.4 and the composite reliability is 0.79. The removal of any indicator does not significantly increase the composite reliability, and therefore we have kept all the manifest variables for this latent construct. The highest manifest variable for this latent variable is the ratio of foreign product range produced to total product range produced.

In Table 5.20 two latent constructs – cost and flexibility for host and receiver environment are evaluated. The first latent variable evaluated is cost for the host environment. There are three manifest variables that have loadings of less than 0.4. These are direct production cost, reducing inventory and overall factory cost. The rest of the indicators scored higher than 0.8. These are capacity utilization, labour productivity and productivity. For the latent variable cost for the receiver environment, all indicators load above 0.4. The composite reliability for this latent variable is 0.85. The removal of any of the manifest variables that scored from 0.4 to 0.7 does not significantly increase the composite reliability, which is already high and acceptable.

The next latent variable, which is evaluated for the host and receiver environment, is flexibility. This has a measurement model with 13 indicators. Flexibility for the host environment is evaluated first. This latent variable has four manifest variables that have loadings below 0.4. These are: promptness in solving complaints, short product lead time, flexibility to serve changing markets and flexibility to change product design for customer requirements. The rest of the indicators were kept in the measurement model to preserve the content validity. The composite reliability for this variable is 0.85. The removal of any indicators with values from 0.4 to 0.7 does not significantly improve the composite reliability of the measurement model. The highest indicator for the flexibility latent variable in the host environment is flexibility to change process design.

The next latent variable in Table 5.20 looks at flexibility in the receiver environment. This is measured through 13 indicators, seven of which have loadings below 0.4. The composite reliability of this latent variable was 0.6, and, after eliminating seven indicators, it increased to 0.82. The seven indicators that are removed from the measurement model are:

1. Material handling flexibility
2. Flexibility to change product design for customer requirements
3. Promptness in solving problems
4. Short product lead times
5. Flexibility to increase capacity
6. Flexibility to serve changing markets
7. Flexibility in planning operations.

The rest of the indicators were kept within the measurement model because the composite reliability does not significantly improve through eliminating any more indicators. The highest manifest variable for this latent construct is flexibility to alternate routes in a production system, followed by flexibility to change process design.

Table 5.21 Innovation and quality latent construct loadings for level of internationalization

	Innovation (host)	Innovation (receiver)	Quality (host)	Quality (receiver)
InPro1	-0.9238	0	0	0
InPur1	-0.8882	0	0	0
InCus1	-0.8617	0	0	0
InInf1	-0.8411	0	0	0
InProj1	-0.7973	0	0	0
InBal1	-0.7889	0	0	0
InStr1	-0.787	0	0	0
InCom1	-0.7234	0	0	0
InKnow1	-0.6741	0	0	0
InPur2	0	0.6687	0	0
InCus2	0	0.7485	0	0
InPro2	0	0.7667	0	0
InBal2	0	0.8104	0	0
InInf2	0	0.824	0	0
InProj2	0	0.8582	0	0
InKnow2	0	0.8613	0	0
InCom2	0	0.864	0	0
InStr2	0	0.878	0	0
O-PD 1	0	0	*0.004*	0
O-QC 1	0	0	*0.2558*	0
O-PQ1	0	0	*0.2685*	0
O-PR 1	0	0	*0.355*	0
O-ES 1	0	0	0.4852	0
O-CFS 1	0	0	0.9015	0
O-A1	0	0	0.9209	0
O-PD 2	0	0	0	*0.3892*
O-PQ2	0	0	0	0.4392
O-QC 2	0	0	0	0.6045
O-PR 2	0	0	0	0.6412
O-ES 2	0	0	0	0.6995
O-A2	0	0	0	0.7339
O-CFS 2	0	0	0	0.8495

Table 5.21 presents the innovation and quality latent variables for host and receiver environments. The first latent variable to be evaluated is innovation for the host environment. This latent variable is measured through nine indicators. The next latent variable, innovation for the receiver environment has the same number of manifest variables. For both of these variables, all indicators loaded above 0.4. This means that none of the indicators are removed from the measurement model. The composite reliability for these latent variables is 0.91 for the host environment and 0.95 for the receiver environment. There is only one indicator [1]in both latent constructs that is below 0.7. The removal of this one indicator does not significantly improve the composite reliability, and to improve the content validity all indicators were kept within the measurement model.

The next latent variable in Table 5.20, is quality in the host environment. This latent construct is measured through seven manifest variables. Four indicators have loadings of below 0.4. These are: high product durability, high quality conformance, perceived quality and high product reliability. The rest of the variables are kept within the measurement model to improve the content validity. The composite reliability of the latent variable quality in the host environment is 0.81, and removing those indicators with loadings from 0.4 to 0.7 does not significantly change the composite reliability. The highest loading for the quality latent variable in

[1] For host the indicator is the level of knowledge exchange within organization and between the organization and its environment ,for the receiver the indicator is innovation activity of the company results in repeating purchases by customers.

the host environment is appearance, followed by conformance to functional specifications.

The latent variable quality in the receiver environment is the last measurement model to be evaluated in Table 5.21. This measurement model has seven indicators, and only the high product durability indicator scored less than 0.4. The composite reliability of the measurement model before removing this single construct was 0.79, and upon elimination of the construct it increased 0.82. The removal of the rest of the indicators with loadings from 0.4 to 0.7 does not significantly increase the composite reliability. They were therefore kept in order to preserve the content validity of the measurement model. The highest-scoring manifest variable for quality in the receiver environment is conformance to functional specifications.

Table 5.22 Psychic distance and delivery latent variable loadings for level of internationalization

	Psy. dist.	Psy. dist. (receiver)	Delivery (host)	Delivery (receiver)
PDGD1	*-0.0059*	0	0	0
PDEE1	0.504	0	0	0
PDCD1	0.6666	0	0	0
PDFM1	0.7195	0	0	0
PDLP1	0.8036	0	0	0
PDCom1	0.8232	0	0	0
PDBPO1	0.8491	0	0	0
PDGD2	0	*0.1721*	0	*0*
PDCD2	0	0.7836	0	0
PDLP2	0	0.8008	0	0
PDEE2	0	0.8366	0	0
PDFM2	0	0.8708	0	0
PDBPO2	0	0.9197	0	0
PDCom2	0	0.9206	0	0
O-OTD 1	0	0	*-0.0141*	0
O-DT 1	0	0	0.9422	0
O-DT 2	0	0	0	0.892
O-OTD-2	0	0	0	0.9272

In Table 5.22 there are four latent variables to be evaluated. The first is psychic distance for the host environment. This has seven indicators in its measurement model, and only one – geographical distance – scored less than 0.4. The composite reliability for this construct before removing any indicator was 0.93. This represents a very high composite reliability. The one indicator that scored less than 0.4 was eliminated from the measurement model, thereby increasing the composite reliability to 0.96. The removal of indicators with loadings from 0.4 to 0.7 does not significantly increase the composite reliability. Therefore, all indicators other than one that loads below 0.4 are kept within the measurement model. The next latent variable in Table 5.22 is psychic distance for the receiver environment. There is only one (geographic distance) manifest variable with a loading of below 0.4.

The rest of the manifest variables for the latent variable psychic distance in the receiver environment have loadings that are higher than 0.7. The next two latent variables to be evaluated from Table 5.22 are delivery in the host and receiver environment. The measurement models for these latent variables have two indicators. The only manifest variable with a loading of below 0.4 is on-time delivery. The rest of the indicators have high loadings, and do not need to be removed from their measurement models.

Table 5.23 Measurement model assessment for level of internationalization

	AVE	Composite reliability	R-square	Cronbach's alpha	Communality	Redundancy
Absorptive capacity	0.5684	0.9051	0.4179	0.8854	0.4684	-0.0084
Cost (host)	0.7627	0.906	0	0.846	0.7627	0
Cost (receiver)	0.5982	0.8502	0	0.7839	0.4982	0
Delivery (host)	1	1	0	1	1	0
Delivery (receiver)	0.8282	0.906	0	0.7935	0.8282	0
Flexibility (host)	0.5968	0.8969	0	0.8809	0.4968	0
Flexibility (receiver)	0.5714	0.8178	0	0.7912	0.5173	0
Innovation (host)	0.5358	0.9095	0	0.9519	0.5358	0
Innovation (receiver)	0.6578	0.945	0	0.9398	0.6578	0
Level of int.	0.5406	0.7967	0.2044	0.7273	0.4406	-0.0604
Net. rel. (host)	0.5735	0.813	0.324	0.7141	0.4735	0.144
Net. rel. (receiver)	0.5738	0.8664	0.2886	0.8033	0.5738	0.1553
Psy. dist.	0.7831	0.9682	0	0.9522	0.5736	0
Psy. dist. (receiver)	0.7393	0.9443	0	0.93	0.7393	0
Quality (host)	0.717	0.8808	0	0.8188	0.717	0
Quality (receiver)	0.5472	0.8221	0	0.7968	0.4472	0
TT ability	0.5367	0.8809	0.4038	0.8525	0.4367	0.0005

The next stage in the evaluation of the measurement model is to look at its validity and reliability. The indicators described above have been removed from their measurement models and the PLS algorithm applied again. The values in Table 5.23 are from this second run. The evaluation to this point has considered the reliability of the indicators, however the measurement model can also be evaluated on internal consistency reliability, and convergent and discriminant validities. The internal consistency reliability can be measured by two methods (Hair, Ringle and Sarstedt, 2011). The most common measurement method for internal consistency is Cronbach's alpha, for which Nunnally (1978) advises that the values should be above 0.7. All of the Cronbach's alphas from Table 5.23 are above 0.7. This shows that the overall measurement models of each latent variable have sufficiently high internal consistency. However, Hair, Ringle and Sarstedt (2011) advise the use of composite reliability as a measure of internal consistency reliability. They argue that, unlike Cronbach's alpha, composite reliability takes account of each indicator and is more reliable in PLS-SEM studies. The second column from Table 5.23 displays the composite reliability for each latent variable. Nunnally and Bernstein (1994) propose that composite reliability should be between 0.7 and 0.9. The values from Table 5.23 show that the measurement models have very high composite reliability values, which proves that there is high internal consistency reliability for the measurement models.

	e capacity	(host)	)	y (host)	)	y (host)	)	n (host)	(receiver)	of int.	(host)
Absorptive capacity	**0.75**	0	0	0	0	0	0	0	0	0	0
Cost (host)	0.3157	**0.87**	0	0	0	0	0	0	0	0	0
Cost (receiver)	0.3812	0.6745	**0.77**	0	0	0	0	0	0	0	0
Delivery (host)	0.0563	0.0747	0.0838	**1**	0	0	0	0	0	0	0
Delivery (receiver)	0.2888	0.3295	0.2057	0.3929	**0.91**	0	0	0	0	0	0
Flexibility (host)	0.4776	0.3137	0.3622	0.2505	0.0946	**0.77**	0	0	0	0	0
Flexibility (receiver)	0.6276	0.3373	0.583	0.0992	0.3151	0.7204	**0.76**	0	0	0	0
Innovation (host)	-0.2093	-0.1789	-0.1429	0.0836	0.0065	0.2334	-0.1054	**0.73**	0	0	0
Innovation (receiver)	0.4253	0.1721	0.4889	0.359	0.4082	0.3451	0.5278	-0.0007	**0.81**	0	0
Level of int.	0.3268	0.1364	0.4024	0.3543	0.2498	0.4004	0.4188	0.2341	0.3948	**0.74**	0
Net. rel. (host)	0.5807	0.3548	0.397	0.1181	0.3485	0.3697	0.5385	-0.1196	0.4537	0.2166	**0.76**
Net. rel. (receiver)	0.5152	0.2737	0.3757	0.0966	0.339	0.2249	0.4728	-0.0911	0.39	0.201	0.6245
Psy. dist.	0.3102	0.4893	0.3125	0.123	0.487	0.3581	0.498	0.0582	0.3105	0.1034	0.5692
Psy. dist. (receiver)	0.2309	0.2183	0.3142	0.059	0.2419	0.2732	0.5157	-0.0455	0.4452	0.0181	0.5017
Quality (host)	0.3581	0.3056	0.2812	-0.0039	0.1011	0.3624	0.3072	0.1116	0.1544	0.0098	0.3109
Quality (receiver)	0.3287	0.274	0.3336	0.0093	0.2327	0.2975	0.3693	0.0771	0.3043	0.0149	0.343
TT ability	0.6226	0.2746	0.2347	-0.0797	0.1459	0.4194	0.4778	-0.3012	0.2319	0.0937	0.457

The next assessment stage for any measurement model is to examine its convergent validity. If a manifest variable (via AVE) explains 50% of the variance of its latent variable, then the measurement model has convergent validity (Hair, Ringle and Sarstedt, 2011). Table 5.23 presents AVE values for all latent variables, which are above 50%. This proves that all latent variables have convergent validity.

The last assessment is done through looking at the discriminant validity of the latent variables. The discriminant validity explains that the indicator shares more variance with its assigned latent variables than with other latent variables (Hair, Ringle and Sarstedt, 2011). There are two assessments of discriminant validity. The first is that a manifest variable should have higher AVE than all its cross-loadings, and the second is that the squared correlation coefficients and the AVE extracted of the latent variables should be higher than these squared values (Fornell and Larcker, 1981). Table 5.24 presents the correlation coefficients of the latent variables, with the square roots of the AVE in bold. The reason why we take the square root of the AVE instead of the squared correlation coefficients is that it improves presentation and facilitates calculation. Table 5.24 shows that all square roots of the AVE are higher than the correlation coefficients of the latent variables, which proves that the measurement model has discriminant validity.

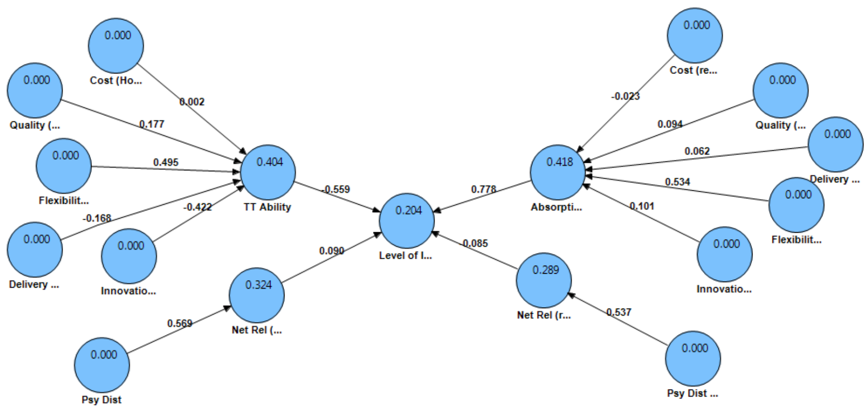
The measurement model is evaluated through checking four methods of validity and reliability of the measurement model:

- *Internal consistency reliability*: attained by means of high composite reliability and Cronbach's alpha.
- *Indicator reliability*: indicators that have loadings of less than 0.4 are removed from the model. Indicators that have loadings from 0.4 to 0.7 are kept within the measurement model to improve content validity based on their insignificant improvement of composite reliability.
- *Convergent validity*: The AVE from each latent variable was higher than 0.5.
- *Discriminant validity*: This is measured through Fornell and Larcker's (1981) criterion, and all square root AVE values were higher than the correlation coefficients.

This assessment confirms that the measurement models for these latent constructs have substantial validity and reliability.

5.5.2 Assessment of structural model for the level of internationalization

Figure 5.6 PLS estimated path coefficient for the level of internationalization



The structural model is assessed according to three different levels. These are the R^2, the path coefficients and their t-values, and Q^2.

Table 5.25 presents the results of the structural model evaluation.

The first evaluation is conducted using the R^2 values. Hair, Ringle and Sarstedt (2011) report that the marketing research accepts R^2 values of 0.75, 0.5 and 0.25 as substantial, moderate and weak, respectively. However, they also suggest that other research areas will have other parameters in evaluating R^2 values; for instance, in marketing research 0.2 is accepted as substantial. Cohen (1988) expressed 0.26, 0.13 and 0.02 to be substantial, moderate and weak R^2 values, respectively, in behavioural research. This analysis uses the Cohen (1988) values to evaluate the R^2, as it is behavioural research.

Table 5.25 Structural model evaluation for the role of factory model

	Path Coefficients	T-statistics	f^2	q^2	Q^2
Absorptive capacity -> Level of int.	0.778	2.973***	0.11	0.12	*0.276*
Cost (host) -> TT ability	0.002	0.0222	-0.018	0.11	
Cost (receiver) -> Absorptive capacity	-0.023	0.1832*	0.046	0.18	
Delivery (host) -> TT ability	-0.168	2.168**	0.03	0.128	
Delivery (receiver) -> Absorptive capacity	0.062	1.198	0.044	0.036	
Flexibility (host) -> TT ability	0.495	3.861***	0.263	0.141	
Flexibility (receiver) -> Absorptive capacity	0.534	5.613***	0.268	0.236	
Innovation (host) -> TT ability	-0.422	1.211	0.417	0.154	
Innovation (receiver) -> Absorptive capacity	0.101	1.21	0.112	0.184	
Net. rel. (host) -> Level of int.	0.09	0.288	0.099	0.192	
Net. rel. (receiver) -> Level of int.	0.085	0.4242	0.127	0.227	
Psy. dist. -> Net. rel. (host)	0.569	10.9872***	-	-	
Psy. dist. (receiver) -> Net. rel. (receiver)	0.537	10.997***	-	-	
Quality (host) -> TT ability	0.177	1.65*	0.131	0.118	
Quality (receiver) -> Absorptive capacity	0.094	0.98	0.053	0.171	
TT ability -> Level of int.	-0.559	2.595**	0.247	0.221	
	* p<0.1 **p<0.05 ***p<0.01				

Constructs	R^2
Level of int.	0.204
Absorptive capacity	0.418
TT ability	0.404
Net. rel. (host)	0.324
Net. rel. (receiver)	0.289
Goodness of fit	0.44

The level of internationalization model looks at the decisions made by SME managers. The R^2 values presented in Table 5.25 are substantial for all latent variables apart from level of internationalization, which is moderate.

The next stage in the evaluation of the structural model is related to the path coefficients and their t-values. The t-values are obtained from bootstrapping (Hair, Ringle and Sarstedt, 2011), and explain the significance of the path coefficients and the confidence levels of the values regarding the relationships. The values that are important in evaluating path coefficients are 1.65, 1.96 and 2.58 for 10%, 5% and 1% significance levels, respectively. The higher the t-value, the more reliable it is. In Table 5.25 demonstrates the path coefficients and their t-values; the stars next to the t-values explain the significance levels of the results. The more stars next to the t-value, the more significant it is. The level of internationalization is explained better by the absorptive capacity and technology transfer ability of the organization, than the network relationships of the host and receiver environments, while absorptive capacity is explained better through the cost and flexibility advantages of the receiver environment. Technology transfer is explained through flexibility, cost, quality and delivery, and delivery has a negative path coefficient, which means that it has a negative impact on technology transfer ability.

The last structural model assessment method relates to the predictive power of the model. This is achieved through examining Stone-Geisser's Q^2 (Geisser, 1974; Stone, 1974). The q^2 values look at the predictive power of the individual latent variables, while Q^2 looks ate the predictive power of the model on the latent variables (Hair, Ringle and Sarstedt, 2011). PLS-SEM achieves this calculation through the blindfolding process, which reveals cross-validated redundancy and communality. Cross-validated redundancy is used to calculate the Q^2 value, and any value above 0 is considered to be good for predictive power. Table 5.25 presents the Q^2 value as 0.276, which is above 0. This means that the model has the power to predict its latent variables. The q^2 values are also presented in Table 5.25. These values are also above 0, meaning that the latent variables have predictive power. The q^2 values are obtained through eliminating that latent variable from the model and calculating the difference in predictive power with and without that latent variable.

The last assessment of the model can be done through GoF criteria. The average of the R^2 values and the average of the communality scores are multiplied and square-rooted to find the GoF. The GoF for this model is 0.44. The Smart-PLS discussion boards express that 0.36, 0.25 and 0.1 are substantial, moderate and weak GoFs respectively. Therefore, the model has a high GoF.

5.6 Summary of Model Findings

Below in Table 5.26, 5.27 and 5.28, the findings from the model evaluation and their corresponding hypothesis are summarized.

Table 5.26 Entry Mode Selection Model Hypothesis Evaluation

	Path coefficient	**T-value**	**Sig.**
Hypothesis 1a: Technology transfer ability of the host organization will negatively affect the entry mode selection.	-0.121	1.641*	Yes
Hypothesis 2a: Network relationships (trust, control and commitment) negatively affect the entry mode decision.	0.498	4.391***	***Yes?***
Hypothesis 3a: Psychic distance negatively affects the network relationships (trust, control and commitment).	0.547	9.8***	***Yes?***
Hypothesis 4a (i): Operations advantage (cost advantage) positively affects the technology transfer ability.	0.009	0.073	No
Hypothesis 4a (ii): Operations advantage (flexibility advantage) positively affects the technology transfer ability.	0.51	3.3***	Yes
Hypothesis 4a (iii): Operations advantage (quality advantage) positively affects the technology transfer ability.	0.165	1.98**	Yes
Hypothesis 4a (iv): Operations advantage (delivery advantage) positively affects the technology transfer ability.	-0.173	1.899*	***Yes?***
Hypothesis 5a: Innovation advantage positively affects the technology transfer ability.	-0.43	4.682***	***Yes?***
Hypothesis 6a: Absorptive capacity of the receiver positively affects the entry mode decision.	0.182	2.01**	Yes
Hypothesis 7a: Network relationship (trust, control and commitment) of the receiver organization negatively affects the entry mode decision.	1.164	1.652*	***Yes?***
Hypothesis 8a: Psychic distance of the receiver organization negatively affects the network relationship of the receiver organization.	0.543	10.28***	***Yes?***
Hypothesis 9a (i): Operations advantage (cost advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	-0.026	0.207	No
Hypothesis 9a (ii): Operations advantage (flexibility advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.53	5.273***	Yes
Hypothesis 9a (iii): Operations advantage (quality advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.097	0.868	No
Hypothesis 9a (iv): Operations Advantage (Delivery Advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.063	1.12	No
Hypothesis 10a: Innovation advantage of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.1	1.53	No

Table 5.27 Role of factory model hypothesis evaluation

	Path coefficient	T-value	Sig.
Hypothesis 1b: Technology transfer ability of the host organization positively affects the role of factory decision.	-0.364	2.561***	***Yes?***
Hypothesis 2b: Network relationship (trust, commitment and control) of the host organization positively affects the role of factory decision.	0.24	1.98**	Yes
Hypothesis 3b: Psychic distance of the host organization negatively affects the network relationship characteristics of the host organization.	0.553	11.5***	***Yes?***
Hypothesis 4b(i): Operations advantage (cost advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	0.001	0.009	No
Hypothesis 4b(ii): Operations advantage (flexibility advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	0.508	3.74***	Yes
Hypothesis 4b(iii): Operations advantage (quality advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	0.141	1.92*	Yes
Hypothesis 4b(iv): Operations advantage (delivery advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	-0.167	2.42**	***Yes?***
Hypothesis 5b: Innovation advantage of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	-0.429	2.25**	***Yes?***
Hypothesis 6b: Absorptive capacity of the receiver organization will positively affect the role of factory decision.	0.404	2.8***	Yes
Hypothesis 7b: Network relationship characteristics of the receiver organization will positively affect the role of factory decision.	0.199	2.04**	Yes
Hypothesis 8b: Psychic distance of the receiver organization negatively affects the network relationship characteristics of the receiver organization.	0.549	10.88***	***Yes?***
Hypothesis 9b(i): Operations capability (cost advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	-0.096	0.83	No
Hypothesis 9b(ii): Operations capability (flexibility advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.641	6.35***	Yes
Hypothesis 9b(iii): Operations capability (quality advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.057	0.51	No
Hypothesis 9b(iv): Operations capability (delivery advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.045	0.76	No
Hypothesis 10b: Innovation capability of the receiver organization positively affects the absorptive capacity of the receiver organization.	0.044	0.543	No

Table 5.28 Level of internationalization model hypothesis evaluation

	Path coefficient	T-value	Sig.
Hypothesis 1c: Technology transfer ability of the host organization positively affects the level of internationalization.	-0.559	2.595**	***Yes?***
Hypothesis 2c: Network relationship characteristics of the host positively affect the level of internationalization.	0.09	0.288	No
Hypothesis 3c: Psychic distance of the host negatively affects their network relationship characteristics.	0.569	10.98***	***Yes?***
Hypothesis 4c(i): Operations advantage (cost advantage) of the host positively affects the technology transfer ability.	0.002	0.022	No
Hypothesis 4c(ii): Operations advantage (flexibility advantage) of the host positively affects the technology transfer ability.	0.495	3.861***	Yes
Hypothesis 4c(iii): Operations advantage (quality advantage) of the host positively affects the technology transfer ability.	0.177	1.65*	Yes
Hypothesis 4c(iv): Operations advantage (delivery advantage) of the host positively affects the technology transfer ability.	-0.168	2.168**	***Yes?***
Hypothesis 5c: Innovation advantage of the host positively affects the technology transfer ability.	-0.422	1.211	No
Hypothesis 6c: Absorptive capacity of the receiver organization positively affects the level of internationalization.	0.778	2.973***	Yes
Hypothesis 7c: Network relationship characteristics of the receiver positively affect the level of internationalization.	0.085	0.424	No
Hypothesis 8c: Psychic distance of the receiver organization negatively affects their network relationship characteristics.	0.537	10.997***	***Yes?***
Hypothesis 9c(i): Operations advantage (cost advantage) of the receiver positively affects their absorptive capacity.	-0.023	0.183*	***Yes?***
Hypothesis 9c(ii): Operations advantage (flexibility advantage) of the receiver positively affects their absorptive capacity.	0.534	5.613***	Yes
Hypothesis 9c(iii): Operations advantage (quality advantage) of the receiver positively affects their absorptive capacity.	0.094	0.98	No
Hypothesis 9c(iv): Operations advantage (delivery advantage) of the receiver positively affects their absorptive capacity.	0.062	1.198	No
Hypothesis 10c: Innovation advantage of the receiver positively affects their absorptive capacity.	0.101	1.21	No

Table 5.26 presents the entry mode selection model results. The operations advantage in the host and receiver environment (hypotheses 4 and 9), are divided into their components: cost, flexibility, quality and delivery. These are named 4a (i), (ii), (iii) and (iv), respectively. There are five hypotheses that are insignificant. Cost advantage does not explain the technology transfer ability of the host environment, and cost, quality, delivery and innovation advantages do not explain the absorptive capacity of the receiver environment. Absorptive capacity is only

explained by the flexibility advantage. Technology transfer ability and absorptive capacity positively explain entry mode selection. Network relationship management for the host and receiver environment are predicted to affect the entry mode selection positively, while this was hypothesized as negatively affecting the entry mode selection. The results are significant, but are opposite of the hypotheses since the network relationship ability increases and the entry mode increases. This means that companies will select higher levels of entry modes as they have more trust, commitment and control of the foreign environment.

The psychic distance of the host and receiver environment are both hypothesized as negatively impacting the network relationship management, however the findings show that they affect the network relationship management positively. This may appear to be surprising, but a closer look at the survey questions reveals that the question aims to see how much knowledge in certain areas – such as foreign markets, cultural differences, business practice differences, and legal and political environment – is important before an internationalization decision is made. The hypothesis predicts a negative relationship between psychic distance and network relationship. As psychic distance increases, trust, commitment and control will decrease.The questionnaire question asks for how little it is rather than how big it is. The positive results reflect the fact that the survey question asked how *little* psychic distance there must be, rather than how much, when they make the decision. The results are as predicted, and we can take the question mark from the result table 5.26.

The technology transfer ability from Table 5.26 was predicted to be negatively related to the entry mode decision. The manager making the decision on the selection of an entry mode will aim for higher entry modes if they have a lower technology transfer ability. Higher entry modes will help them to control and manage the new international operations, while lower forms of entry means that the company will have to deal with the added complexity of managing network relationships, which inhibits the transfer of knowledge from one location to another. Technology transfer ability is a product of the flexibility and quality advantages the operation has. This predicts that the flexibility and quality capabilities of an organization will determine their technology transfer ability. However, a company’s delivery and innovation capabilities do not define their technology transfer ability in a positive manner, since the relationship between these latent variables is negative. This is clearly illustrated in Sturge Industries’ case, where the delivery advantage has nothing to do with technology transfer. There may be specific organizational practices that need to be transferred, but these were not captured through the survey. Innovation capability is a different type of capability, which has some relationship with technology transfer ability in that higher innovation capability means that they do not need technology transfer capability, as they do not have to work closely with other companies in their network – they are self-sufficient in terms of innovation. In terms of internationalization and entry mode selection, this will affect the technology transfer ability, as they will not have sufficient capabilities in this regard.

Within the receiver environment, with respect to entry mode decision similar results are shown as those relating to the host environment. The absorptive capacity of the receiver environment has a positive relationship with the entry mode selection. This means that where the absorptive capacity of the receiver environment is higher, the decision maker will choose higher levels of entry mode. This can be explained by the fact that the decision maker chooses higher levels of entry modes when there is a capacity to transfer to the receiver environment. Lower entry modes will lead to limitations in transferring knowledge and technology, and there are added complexities because there is a need to manage the relationship. The second determinant of the entry mode decision is the network relationship, which is based on trust, commitment and control. This relationship has been hypothesized as negative. The results show that as the receiver environment's trust, commitment and control towards the host environment increases, the decision maker will make higher levels of entry mode decisions. This may mean that higher levels of commitment, control and trust shown by the receiver environment help the decision maker to choose higher entry modes because there is a belief that there is a higher possibility to transfer knowledge to the receiver environment. This complements the absorptive capacity of the receiver environment because both relationships aim to maximize the technology transfer from the host to the receiver environment. The absorptive capacity of the receiver environment is predicted solely from the flexibility advantage of that environment, since the rest of the latent variables fail to predict the absorptive capacity. The cost, quality, delivery and innovation advantages do not explain the absorptive capacity of the receiver environment. The flexibility advantage can best be explained through the ability of the receiver environment to change processes. This is illustrated in the evidence form Sturge Indsutries, where technology transfer problems occurred because they were unable to change the processes as required. Changes in processes can be related to the need to increase the quality of manufacturing. The psychic distance of the environment explains the network relationships in the receiver environment. The same problem discussed above for the host environment is present here: the expected negative prediction was based on the idea that if psychic distance increases, there is fewer network relationships. The questions related to this therefore focus on *decreases* in psychic distance. The higher scores are related to lower psychic distance, and this means that there should be a positive relationship between this question and the network relationship. This has been perfectly predicted. The R^2 for this model is 0.591, which shows that it explained 60% of the variance in the data. The Q^2 value is 0.267, which is above 0. This means that the model has predictive power.

The next model to be evaluated is the role of the factory (Table 5.27). The host environment predicts the role of the factory using two latent variables: technology transfer ability and network relationships. Technology transfer ability is negatively related to the role of the factory, however it was hypothesized as being positively related to the role of the factory. This means that higher technology transfer ability will lead the decision maker to choose lower roles for the factory. An explanation for this may be that if the decision maker believes that if there are limitations in the ability to transfer knowledge from his/her organization to the receiver environment, then the foreign operation should have more autonomy and a higher ability to transfer knowledge and technology, so that there is enough transfer between these entities in the network. The technology transfer ability of the host organization is positively related to their flexibility and quality advantages. The delivery and innovation advantages are negatively related to the technology transfer ability. The negative relationship in delivery is easy to explain. This advantage does not explain, and is not even related to, transferring technology or knowledge, which is only possible if the competitive advantage of an organization relates to delivery. In this case, it is the organizational practices that are transferred from one organization to another. There is little evidence of this in the survey. An organization's innovation capability can negatively affect the technology transfer ability. A competent organization would not rely on external knowledge sources for innovation, and this means that they do not need to absorb and transfer knowledge for innovation. This will lead to a reduction in their ability to transfer knowledge. The same is true for internationalization and role of the factory. In the internationalization decision, the innovation predicts the technology transfer ability negatively because the ability to innovate means that there is no need for technology transfer ability. Furthermore, innovation capability has a relationship with other operations advantages which will provide some of the innovation advantage. The network relationship from the host environment positively affects the role of factory: higher trust, commitment and control within the relationship leads to higher levels of role of factory as a decision. This means that the decision maker will select higher roles for a foreign operation if they have higher trust and commitment, while having lower control. The role of the foreign operation is also affected by the absorptive capacity of the receiver environment. This has the highest affect on the decision relating to the role of the factory. Higher absorptive capacities will lead to higher roles; a possible explanation for this relationship is the decision maker's choice to place more importance on foreign operations that can absorb more information from their environment. The highest role is the leading factory, which is the hub for innovation within the network. A factory with this role should absorb all the information from the inter- and intra-network, and use this information to create innovations for the whole network. This requires a high absorptive capacity.

The absorptive capacity in the receiver environment is only explained by the flexibility advantage, since the rest of the operations and innovation capabilities do not explain the absorptive capacity. Flexibility is required to change the processes and other forms of technological and managerial systems to adopt the new technology and knowledge transferred from the host environment. The rest of the capabilities do not explain the absorptive capability. Quality, cost and delivery have no dynamism or change elements. They are purely capabilities, and do not explain the ability to change but rather the ability to do something good repeatedly.

The innovation capability of the receiver environment does not explain absorptive capacity. This is a result of the fact that the innovation capability uses the absorptive capacity of the receiver environment more than it creates absorptive capacity. Hypothesis 10b is actually explaining relationship between innovation advantage and absorptive capacity in the receiver environment was build on the innovation created by the organization is knowledge and this can serve as prior knowledge. However, the opposite is also true and was indeed the situation in this case this.

The network relationships explain the role of factory positively. This means that the decision maker will assign a higher factory role to a foreign operation if the receiver environment has higher trust, commitment and less need for control. This is sensible, because better relationships mean that knowledge and technology can be transferred easily. This has a positive effect on the overall technology or knowledge transferred from one organization to another. The network relationship in the receiver environment is explained through psychic distance. The problem with psychic distance in the host environment is experienced here. The positive relationship between psychic distance and network relationship arises from the question asked in the survey. The hypothesis is built around the fact that psychic distance is measured around how *much* of it there is between host and receiver, however the question asked how small it is. The strong relationship between psychic distance and network relationships means that differences in how business is conducted will define how much trust, commitment and control is there between network partners. The explanatory power of this model is high, as demonstrated by the R^2 (0.291). This model has the highest predictive power within the three models, which is measured by Q^2 (0.33).

The last model evaluated is that relating to the level of internationalization. This model has a drawback in terms of sampling. The data collected contained few higher levels of internationalization, while there were many early or mid-level internationalizations. Nevertheless, the predictive power of this model is high (Q^2=0.276).

The level of internationalization is best explained by the technology transfer ability and absorptive capacity of the host and receiver environments. The network relationships for the host and receiver environments do not predict the level of internationalization, however the psychic distance for the host and receiver environments positively predict the network relationships of their environment, though the overall path cannot predict the level of internationalization. The psychic distance is hypothesized to explain the network relationships negatively, but the survey used a negative question. Psychic distance is negatively related to the network relationship where the survey question asks how big it is. However, the survey question measures the size of knowledge, which is equivalent to how small the psychic distance is. As the psychic distance decreases, the strength of the network relationship will increase; hence the relationship observed in the model. Nevertheless, the path diagram of network relations is not significant. The level of internationalization of a company can only be explained through their technology transfer ability and the absorptive capacity of their receiving environment. Technology transfer ability is explained positively through quality and flexibility; it is higher if the company has flexibility and quality capabilities. Delivery capability was observed as negatively affecting the technology transfer ability. The explanation for this is related to the fact that the knowledge on delivery capability cannot be transferred that often. The sample of companies was chosen from the manufacturing industry; these companies do not base their competitive offerings on delivery capability, but rather on quality and flexibility. The engineering knowledge that is required for the transfer of knowledge can be a product of the flexibility and quality capabilities. Delivery capability can be secondary to these capabilities, or even negatively affect the technology transfer ability.

The technology transfer ability negatively predicts the level of internationalization. A company that has little technology transfer ability can achieve higher levels in terms of, for instance, sales from foreign operations, employees in foreign operations, and products produced in foreign operations. This can be explained through looking at the first model. The entry mode selection model explains that a company with very little ability to transfer technology will choose higher levels of entry mode. This means that higher levels of entry mode will result in higher levels of internationalization, and thus will result in the company's having more employees abroad, higher sales abroad and more products produced abroad. There is a link or a relationship between entry mode selection and level of internationalization.

Absorptive capacity is dependent on the flexibility capability of the receiver environment. This is very similar to the entry mode selection and role of the factory models. All models evaluating absorptive capacity found that the only contributor is flexibility capability. This can be explained through the fact that there is a need for change when a new technology is transferred from the host environment. This is particularly important with respect to adoption of the technology by the receiver environment. Flexibility capability enables changes to occur in the processes. Quality and delivery are more static in nature, and thus there is a need for flexibility to achieve any changes in these. The cost capability should be added to this list of static advantages. In terms of level of internationalization model, the cost advantage significantly and negatively explains the absorptive capacity. A closer look at the model and Table 5.28 reveals that the path coefficient between cost in the receiver environment and the absorptive capacity is very small. There is a very little explanation generated from cost in the receiver environment.

The model has a 0.204 R^2, which is moderate. There must be other latent variables that explain the level of internationalization of an SME. The Q^2 is 0.276, which demonstrates the high predictive power of the model.

In appendix 9 you can find all significant hypotheses for all three models.

5.7 Chapter summary

This chapter presents the analysis and results of the survey. The first part shows how the indicators are coded, which is followed by first entry mode then role of factory and finally level of internationalization models. Each model is first evaluated for the measurement model and then the structural model is evaluated. The entry model has 9 hypothesis proved out of 16 and shows that technology transfer ability of the company reflect negatively to the entry mode, while absorptive capacity of the host environment positively affects the entry mode. The technology transfer ability is explained by quality, flexibility and innovation advantages of the parent company. The absorptive capacity is only explained by the flexibility advantage of the host environment. Network relationships for the host and receiver environment positively affect the entry mode decision. The psychic distance of the decision maker positively affects the network relationships, which means that the manager will choose higher entry modes if the psychic distance decrease.

The role of factory model has similar results with entry mode model. Technology transfer ability negatively affects the role of factory decision, while absorptive capacity of the receiver environment has a positive impact on the role of factory decision. The technology transfer ability is best explained by flexibility and quality advantages, while absorptive capacity is best explained by flexibility dimension. The network relationships positively affect the role of factory decision and psychic distance impacts the network relationships in a positive manner.

The level of internationalization model is only affected negatively by technology transfer ability and positively with absorptive capacity. This shows that higher levels of internationalization are only achievable if the receiver environment has high absorptive capacity.

6 Findings and Discussion

6.1 Introduction

This chapter aims to explain the findings and discussion from two research approaches that make the mixed methodology design. The first section focuses on the two cycles of the action research analysis. A discussion of the survey follows this. This has been divided into three sections relating to entry mode selection, role of factory and level of internationalization. The last section of this chapter describes the managerial decision-making process for internationalization decision in SMEs.

6.2 Reflections and discussion for cycle 1

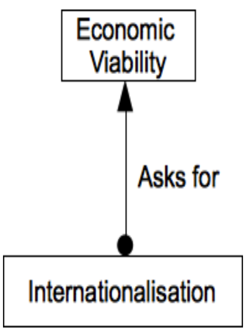
The main observation from this cycle is that companies and their managing directors are motivated by certain strategic responses to their environments. The managing director in Sturge Industries Ltd was motivated to respond to low-cost competitors from the Far East.

The internationalization of companies has been studied according to many different theories. The first group of theories is economic theories of internationalization. Transaction-cost-based economic theories look at lowering the cost of transaction through internationalization (Buckley and Casson, 1993), and this was exactly what Sturge Industries Ltd was trying to do. They were not trying to internalize a monopolistic advantage such as that discussed by Hymer (1976). From the ownership, location and internalization advantages of OLI paradigm of Dunning (2001) all advantages were present. Sturge Industries had a manufacturing advantage, and wanted to internalize the lower cost advantage of the international location. The decision-making process aimed to achieve this.

Cantwell and Narula (2001) explain that while ownership and location advantages explain why a company internationalizes, the internalization advantage explains the choice of entry mode. The decision-making process here was purely a location decision, and choice of entry was not discussed until the implementation stages. Ozawa and Castello (2001) see internalization as the learning element of the OLI paradigm. Ownership and location advantages are the source of country-specific advantage, which is only obtainable through learning. This decision-making process applied in the first cycle deliberately did not look at learning.

Thus, the first relationship to be derived from the decision-making process can be observed, as shown in Figure 6.1,.

Figure 6.1 The contribution of economic theories of internationalization



According to Figure 6.1, any internationalization decision will consider the economic viability of the new location. This will be in reference to the local advantages through that can be gained through the advantages of the internationalizing (ownership advantages) firm (Dunning, 2001). This is only possible through learning in that new location, which is also termed "internalization" by Dunning (2001) and Hymer (1976) (Ozawa and Castello, 2001).

The next set of internationalization theories is the learning theories developed by the Nordic school. These theories relate to the behaviour of the firms. The basic element of these theories is that firms gradually internationalize because they lack experiential knowledge about markets (Johanson and Vahlne, 1990). This type of knowledge is tacit in nature. Sturge Industries Ltd had been exporting to countries as distant as New Zealand and Chile, and thus had good market-based knowledge about many different countries. They followed the stages proposed by the learning theorists: Anderson (2004) proposed that companies coming from mature industries, as Sturge Industries were, can be early or late in their internationalization effort. It is very hard to judge what is "early" or "late", but it is definitely based on their learning process which is the early internationalization. For this cycle, learning theories have very little to offer for the decision-making process, although the psychic distance concept introduced by Johanson and Vahlne (1990) is useful. Swift (1998) explains that psychic distance relates to the personal perceptions of the decision maker; for internationalization in Sturge Industries Ltd this was the managing director. The managing director had lived in many different countries, had a French wife and regularly went to France to visit his wife's family. He was also exporting to and working with many different cultures. After he purchased the company, he increased overseas sales. Dow (2000) suggests that geographic distance is the main reason for psychic distance, however this seems to be less true for the managing director of this company, who was not concerned with cultural elements of psychic distance, as much as its organizational and individual levels (Hallen and Widersheim-Paul, 1984). At the organizational level trust is the most important factor, whilst at the individual level experience is the main focus. The country of internationalization was selected according to these factors. The managing director highlighted Turkey and India initially because he had prior relationships with companies there, and had build trust and individual-level experience with each of them over time. Dow's (2000) factors of psychic distance including the extent to which religion affects everyday life, the food and drink generally consumed, the extent to which politics are a focus of interest and many others do not play a crucial role in explaining the psychic distance here. This may be because the managing director has travelled extensively and worked with many different cultures. Nordstrom and Vahlne (1992), O'Grady and Lane (1996) and Evans and Mavondo (2002) proposed an alternative explanation for psychic distance. Their explanation is based more on how business relations are conducted, and more accurately explains psychic distance for the managing director of Sturge Industries Ltd. Psychic distance should have a positive relationship, or a correlation, with trust and experience, as proposed by Hallen and Wiedersheim-Paul (1984). Nordstrom and Vahlne (1992) proposed that level and differences of economic development, level and differences of education, differences in business language, differences in culture and local language, and existence of previous trading channels are important for the managing director of an internationalizing company.

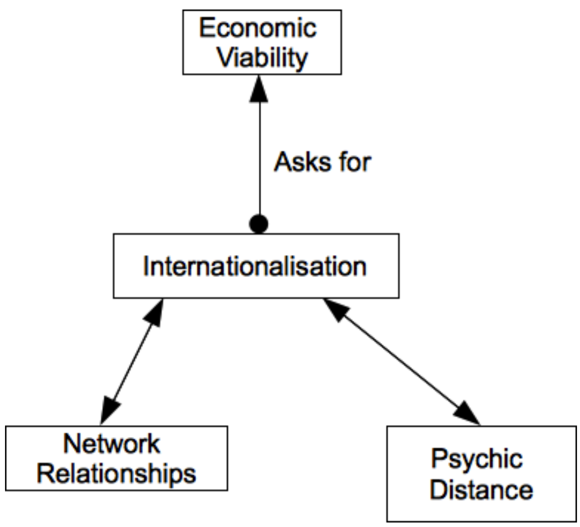
Economic performance and education data were also collected and used in the decision making process. The existence of a trading channel was more important for the selection of a partner. Evans and Mavondo (2002) looked at business practice differences, communication differences, economic environment, legal and political environment and industry structure differences. The business practice, communication and industry structure differences are all based on the experiential knowledge of the decision maker. The managing director chose companies that he knew for partnership, with the aim of reducing the effects of psychic distance. Economic, legal and political environment were all considered in the decision-making process. O’Grady and Lane (1996) considered achievement orientation, level of aggressiveness, level of optimism, action orientation, belief in hard work, attitudes towards authority, belief in competitiveness, risk propensity, positive attitudes toward risk, masculinity dimension, uncertainty avoidance dimension, individualism/collectivism dimension, power distance dimension, commitment to winning, mastery over one’s environment, cautiousness and attitudes towards equality as factors that can be gained by personal relationships with companies in other countries. The locations and the possible partner companies selected by the manager director provide proof that he used his experiential knowledge to reduce the risk.

Child, Ng and Wong (2002), Barkema, Bell and Pennings (1996), Kogut and Singh (1988) and Swift (1998) explain psychic distance with stronger reference to the cultural perspective than to business issues. However, most of these are not applicable to the decision maker in this action research. Some research (e.g. Swift, 1998; Child, Ng and Wong, 2002) includes business-related measures, but these do not provide as good an explanation of psychic distance for the decision maker in this action research as the constructs of O'Grady and Lane (1996) and Evans and Mavondo (2002). There are two reasons for this distinction. First, the managerial or management characteristics can play an important role in the managing director's perception of psychic distance. Child, Ng and Wong (2002) listed international education, professional management training of the decision maker, presence of a trusted friend, availability of loyal staff member, personal network of the decision maker, sending trusted employees to overseas location to manage the business, and leaving the overseas business to a trusted friend as psychic distance reducers. The managing director in the action research used many of these, including personal networks, sending trusted employees to overseas locations, undergoing and providing to trusted employees professional management training, and finally loyal staff members. Dichtl, Koeglmayr and Muller (1990) looked at the managerial characteristics of the decision maker. The education level, proficiency in foreign languages, foreign travel, higher age, risk aversiveness, willingness to change, expectation on the length of job-related stays abroad, and attitude towards exporting were all found to be very important factors to reduce or increase the psychic distance of decision makers. In this action research, the decision maker had high levels of foreign travel, some proficiency in foreign languages, a willingness to change, no problems with durations of stays for international business (he was travelling to China for business meetings and returning the same day), and a very positive attitude to exporting. These aspects significantly reduced the psychic distance and the insignificance of the cultural elements of psychic distance, and geographic distance can also be partially explained through this. The other important factor that we need to consider for learning theories and psychic distance is the fact that most of these studies have been done for exporting. The managing director of Sturge Industries had already committed to several markets, and was now progressing to the last stage of the Uppsala model by moving production abroad. According to the learning theories of internationalization, in each step the company takes it is expected that they will gain more experiential knowledge and commit more to international markets because of this higher level of knowledge (Johansson and Vahlne 1977,1990; Vahlne and Wiedersheim-Paul 1973). The cultural characteristics and geographic distance seem to be more suitable to explain early stages of internationalization, specifically exporting. In the latter stages of internationalization, companies have to make equity-based decisions, and different factors start to create the psychic distance. Gatignon and Anderson (1988), Meyer (2001) and Maitland and Nicholas (2002) support this finding. Maitland and Nicholas (2002) identified that companies seeking local partners in foreign countries for production purposes will try to reduce the following psychic distance factors: local market knowledge, government contracts, cultural and social knowledge, commercial contracts, access to marketing and distribution networks, past relationships, finding facilities, host government requirements, accessing supply networks, and spreading financial risk. The other risks identified by these authors are: bureaucratic obstructionism, foreign exchange and currency risk, inadequate infrastructure, lack of intellectual property rights protection, profit/payment remittance restrictions, host country political uncertainty, government favouritism, lack of state neutrality, embryonic nature of reform process, low labour productivity, rising labour cost, labour law and disputes. It is obvious that the managing director, as the decision maker in this action research, was affected by the above aspects more that the general psychic distance factors. The managing director asked possible Indian partners questions about their government regulations in terms of starting a business in that country. Furthermore, commercial contracts, supplier information, banking system, taxes, intellectual property rights, political uncertainty, economic growth, labour laws and disputes were all discussed in meetings with government officials and company owners. The decision-making process covers all of these issues about the countries in question. The decision maker wanted to obtain even more detailed knowledge about the countries, such as the availability of traverse round material and skilled labour for machine setting. This information shows that equity-based internationalization has a different set of psychic distance factors than export-based internationalization. This can be explained using Liesch and Knight (1999)'s hurdle rate, which states that as firms move to different levels or stages of internationalization based on learning theories, they will need different types of experiential knowledge. This will create a hurdle rate for each internationalization stage. The managing director in this action research has gone through other internationalization stages, and this new stage proposed a different set of difficulties and information and knowledge gaps. These were then used in the decision-making process. The managing director needed this experiential knowledge to make the internationalization decision (Dennis and Depelteau, 1985; Eriksson et al., 1997).

The next set of theories in internationalization look at internationalization as innovation. Bilkey and Tesar (1977), Cavusgil (1980) and Reid (1981) proposed different stages for internationalizing firms within the innovation theories. The number and the level of stages have little consequence for the action research. The most important contribution of innovation theories with respect to the action research came from Welch and Luostarinen (1988), who defined what changes in each stage of internationalization. The development will require companies to have higher levels of commitment, which should be supported by trust, control and profit potential as the risks will increase. In this action research, the decision-making process does not account for these issues, since it was purely to select the country the production would be moved to. The entry mode was a decision made by the managing director at the start of the action research. These parameters were considered when the decision maker made his decision on the entry mode.

Network theories of internationalization best explain the decision making process of this action research. Morgan and Hunt (1994) and Uzzi (1997) see trust and commitment as important factors from which to gain benefits from the international networks. This has also been covered by Welch and Luostarinen (1988) in innovation theories of internationalization. Johanson and Mattson (1988, 2003) believe that companies need to establish and cultivate relationships; obviously the managing director of Sturge Industries did this as he had identified possible partners as part of the internationalization decision. Welch and Welch (1996) introduced the idea of strategic management into internationalization through networks. Their model suggests that there is a need for a strategic blind spot to make a decision about internationalization. This was not the case for Sturge Industries Ltd, however; the idea of a blind spot indicates a proactive move from an opportunity within the network, wherein the company will use their strategic flexibility to internalize that opportunity. In Sturge Industries' case the move was a reaction to the increasing competition from the Far East, and a need to increase capacity to meet rising demand. There were also production problems, and to avoid these another location was needed in which to manufacture the product. Welch and Welch's (1996) model provides some useful explanations. Knowledge about markets is collected through networks. Internationalization is a strategic decision that requires a change in the network structure; this will eventually increase the knowledge about the markets, the competition and the environment, and hence reduce uncertainty for the business. Chetty and Patterson (2002) defined this as the internationalization capability, which is attained through flow of knowledge from the network partners. In Sturge Industries Ltd this was possible because two possible partner companies from the company's network could be interviewed. Furthermore, the consulate officials consulted can be considered as being within the network, even though they are further away from the centre of the network, and having with looser ties. D'Cruz and Rugman (1994) and Welch and Welch (1996) identified possible partners in the networks for internationalizing companies. One of these partners is the government institution. These authors did not differentiate between network partners that the internationalizing company could collect knowledge from and companies that could be partners in internationalization. Sturge Industries Ltd used many different government and international institutions to collect knowledge, including the United Nations and country promotion agencies. However, these institutions are loose and distant nodes in the network. The most important partners in the network are the companies with which the internationalizing company has close network ties. These companies that give the most important information and knowledge about internationalization.

Figure 6.2 Internationalization decision with psychic distance and networks



Lu and Beamish (2004) identify that there are two sources of knowledge within networks. These are internal network subsidiaries and external network alliances. Sturge Industries Ltd did not use either of these to gather knowledge.

Zanfei (2000) and Blanc and Sierra (1999) looked at the knowledge source of innovation from internal and external network perspectives. The key contribution from their paper is the embeddedness concept. For Andersson and Forsgren (2002), embeddedness consists of technical and relational components. Relational embeddedness can be found in the decision-making process, as the managing director has selected the partners according their relational embeddedness. Relational embeddedness shows the extent of business relations between different networks. Both of the companies selected for Sturge Industries had been working with the company already, to a degree. The final company was selected based on location and relational embeddedness. This helped to reduce the psychic distance of the managing director. This was achievable because trust, commitment and control are needed to use the existing business relations was available (O'Grady and Lane, 1996 and Evans and Mavondo 2002).

Tesar, Boter and Bohman (2003) looked at the environmental and propensity factors for SMEs. Environmental factors, such as economic condition, legal and political environment, were used in the decision-making process, while propensity factors such as psychological distance towards industrial networks, trust in networks, commitment to network, time urgency in terms of meeting deadlines within the networks, and commitment to quality were related to selecting the possible partners for the internationalization project. This is very close to the relational embeddedness of Andersson and Forsgren (2002). Trust, commitment and control are the products of these propensity factors (Tesar, Boter and Bohman, 2003).

Harland and Knight (2001) looked at network management roles, however this was not considered in the internationalization decision. Kulkarni, Magazine and Raturi (2004) recognized different international production networks. The internationalization decision did not recognize or plan for the type of international production network. The assumption was that this was about production abroad. This is classified as a product plant network, where products will be produced in different locations and then sold to customers from these locations. The end decision was actually a process plant network, wherein the chain that was to be manufactured in the partner would be delivered to Sturge Industries Ltd and assembled there to be sent on to customers.

The resource-based theories of internationalization represents a new development in the field, and the most important contribution here came from Tallman and Fladmoe-Lindquist (1994). Their study considered multinationals, but the concept of interest in capability development and resource availability can be applied to SMEs as well. The managing director had very little interest in developing the capabilities of another organization in another country, since Sturge Industries had limited resources with which to develop these capabilities. This made them a national firm in terms of their attitude, though they needed marginal interest in international markets, and licenses to export. This is contradictory to Tallman and Fladmoe-Lindquist's (1994) findings. Sturge Industries Ltd was highly internationalized, but did not possess the resources to build capabilities in another location within equity-based internationalization. The managing director paid specific attention to this limitation. The difference between multinational and SME internationalization is more evident from this model: SMEs do not have the resources to internalize the advantages as strongly as multinationals do.

Internationalization in operations management has considered two components: factors selection and method decision-making. Factor selection was used within this decision-making process. The following factors were considered from this list:

- The area's business climate (Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1979). This was considered partially through the economy of the proposed countries.
- Education and training strength of the area (Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1979; Schemenner et al., 1987; Stonebraker and Leong, 1994). This was important as the overseas company were expected to have a trained engineering workforce.

- Attitudes of local and state governments (Galbraith and De Noble, 1988; Schemenner, 1979). This is closely related to the area’s business climate, as the attitude of the state government was an issue for the decision maker.
- State and local government incentives (Blair and Premus, 1987; De Noble and Galbraith, 1992; Galbraith and De Noble, 1988; Stonebraker and Leong, 1994). This was included into the decision-making process directly. It was not included in the economic analysis of the location, but at the final calculation in selecting the locations.
- Transportation costs (Blair and Premus, 1987; De Noble and Galbraith, 1992; Fulton, 1971; Hekman, 1992; Stonebraker and Leong, 1994). This was directly used in the economic analysis.
- Availability of transportation facilities (Blair and Premus, 1987; De Noble and Galbraith, 1992; Galbraith and De Noble, 1988; Stonebraker and Leong, 1994). This was not directly included in the economic analysis, but was considered with reference to the availability in the country selection analysis.
- Labour productivity and attitude toward productivity (Fulton, 1971; De Noble and Galbraith, 1992; Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1997; Stonebraker and Leong, 1994). This was used extensively in the simulation of the economic analysis.
- Cost of labour (De Noble and Galbraith, 1992; Galbraith and De Noble, 1988; Hack, 1984; Hekman, 1992; Schmenner, 1982; Schemenner et al, 1987; Stonebraker and Leong, 1994). This was

directly included into the economic analysis, and was studied using qualified as well as basic labour costs.

- Availability of skilled labour (Blair and Premus, 1987; Fulton, 1971; Galbraith and De Noble, 1988; Hack, 1984; Hekman, 1992). This was one of the most important factors in availability with traverse round material.
- Availability of labour (Blair and Premus, 1987; Galbraith and De Noble, 1988; Stonebraker and Leong, 1994). This was included as a decision parameter but was less important than availability of skilled labour.
- Availability of unskilled labour (Galbraith and De Noble, 1988). This was considered to be the same as availability of labour.
- Availability and transfer of qualified technical and managerial personnel (Galbraith, 1985, 1990; Galbraith and De Noble, 1988). This was included as the availability of qualified technical personnel, which is very similar to the availability of skilled labour.
- Land availability for building and expansion (Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1982; Stonebraker and Leong, 1994). This was a minor part of the availability factors.
- Cost of land (De Noble and Galbraith, 1992; Fulton, 1971; Hekman, 1992; Stonebraker and Leong, 1994). This was included in the major data collection but not in the economic analysis, though it was a consideration. The economic analysis was conducted for the cost of production for 100 meters of chain.
- Proximity of highways (De Noble an Galbraith, 1992). This was not considered in the original calculations, though it was discussed in

the meeting with the Lithuanian officials. This country has the only unfrozen port in the Baltic sea. Not only, highways but the whole transportation network was considered, though they were considered an availability factor, rather than in reference to proximity.

- Availability of utilities (De Noble and Galbraith, 1992; Fulton, 1971; Hekman, 1992; Stonebraker and Leong, 1994). This was considered not as an availability factor but as a cost factor. Utilities were also included in the economic analysis, and simulations of them were conducted.
- Cost of utilities (Galbraith and De Noble, 1988; Hakman, 1992; Schemenner et al, 1987; Stonebraker and Leong, 1994). As mentioned above, availability was considered through the cost of the utilities and included in the economic analysis.
- Tax structure and rates (Blair and Premus, 1987; Fulton, 1971; Galbraith and De Noble, 1988; Schemenner, 1982; Schemenner et al, 1987). This was one of the most important factors for the managing director. He wanted this to be included especially for the study.
- Insurance consideration (Fulton, 1971). This was considered by the accounting manager, who was very concerned about this. This was planned as it will increase with international operations as there would be higher risk.
- Banking services (Stonebraker and Leong, 1994). This was considered indirectly, in terms of how to transfer the revenue from

the foreign to the home country. Restrictions on capital transfers were also considered in the calculations.

- Proximity to suppliers/resources (Galbraith, 1985, 1990; Galbraith and De Noble, 1988; Schemenner, 1982). This was an important consideration for Estonia and Lithuania, as traverse round material was only available in Germany. Their proximity to Germany was key.
- Access to raw materials (Blair and Premus, 1987; Karakaya and Stahl, 1989). This was a key consideration as traverse round material was very important for the production of the chain. Another important consideration for the chain production was availability of brass- and steel-based products. These were cheaper to obtain from Turkey.
- Access to distribution channels (Karakaya and Stahl, 1989). This was considered in terms of selling from these locations to other countries, but was not included in the final analysis.

The factors that was not used were: labour unionization, community attitude and distance, cost of construction, availability of markets, proximity and access to markets, cost of living in the area, financing options, quality of life in the area, residential housing, cost of municipal services, availability of services such as health, fire, police and recreational facilities, local and physical infrastructure, population density, climate, cost advantage of incumbents, environmental regulations, availability of fresh water, CEO ownership preferences, pre-export activity, and role of labour law. Most of these factors are related to living conditions or the market conditions of the location. The living conditions were not explored, as the intention was not to manage production in that country, but rather to have a partner in that country who would be responsible for the production. The market conditions within the country were also negligible as Sturge Industries were not opening a new facility or building a partnership to access the local markets, but rather were intending to produce in the new location and sell the products all over the world.

The decision-making methodology used differed to any of the methods used in previous studies, as it was designed around how the manager would make the decision. This was based on understanding the cost of manufacturing 100 meters of chain.

The internationalization decision would create an international manufacturing network. Colotla, Shi and Gregory (2003) identified two types of advantages within these networks. The decision-making in this action research definitely considered configuration advantages, since its main aim was to reduce cost and increase capacity for the organization. This is a network-level structural decision. According to Colotla, Shi and Gregory (2003) it is possible to gain coordination advantages within networks as well. The coordination was not questioned in the decision-making process. Shi (2003) introduced four different international manufacturing advantages, and the only advantage that was available to Sturge Industries throughout the decision-making process was the strategic resource availability. This advantage cannot materialize without learning ability (Shi, 2003) or internalization (Dunning, 1988. 1993, 2001).

The above discussion was based on a mixed theory of internationalization, which has been demonstrated as being applicable to businesses of any size. Below, the SME internationalization literature will be considered and discussed around the findings of the action research.

Brouthers and Nakos (2004) investigated SME internationalization from a transaction cost economics perspective. The asset specificity of Sturge Industries is high. The machines that produce the chain are faster than industry standards, as are the line plating machines. This knowledge is very sensitive, and enhance Sturge Industries' competitiveness. According to Brouthers and Nakos (2004), high asset specificity forces companies to choose equity-based internationalization. Behavioural uncertainty in Brouthers and Nakos' (2004) model works contrary to asset specificity. High behavioural uncertainty results in an incremental internationalization strategy. This is contradictory to asset specificity. Sturge Industries does not face behavioural uncertainty to the same extent as other SMEs, as Sturge Industries have already gone through other stages of internationalization. The last factor in Brouthers and Nakos' (2004) model is environmental uncertainty: high specificity will force companies to gain control in foreign operations, and this will increase environmental uncertainty, and hence risk. This was true for Sturge Industries Ltd, who wished to control the resources that reduces the risk in knowledge transfer. This results in more equity-based internationalization.

Winch and Bianchi (2006) identified four types of risk in international markets. These risks do not apply to Sturge Industries Ltd, except, to a small extent, investment in two different markets. The impact of this risk is reduced by selecting partnership as an entry mode. The company will benefit from their partners' knowledge, as well as the share of the finance for internationalization. Bell, Crick and Young (2004) examined the strategic reasons for SME internationalization. They found that SMEs can follow one of three strategies: unplanned, reactive and opportunistic. Sturge Industries Ltd followed a reactive but planned strategy for their internationalization. Bell, Crick and Young (2004) investigated the internationalization of SMEs from an export point of view. This may be one of the reasons why these strategies do not fit equity-based strategies. Welch and Welch's (1996) network theories also failed to fit well with the strategic implications of equity-based SMEs; their study is more about network structuring as suggested by Colotla, Shi and Gregory (2003). The latter study explains the strategy better than those of Welch and Welch (1996) and Bell, Crick and Young (2004). Bell, Crick and Young (2004) observed a difference between knowledge-intensive and traditional SMEs. According to this difference, knowledge-intensive SMEs will internationalize faster than traditional SMEs. The motivations for internationalization will differ as well. Traditional SMEs will internationalize because they face domestic problems in the marketplace. This was the case for the internationalization of Sturge Industries Ltd. The difference between export-based internationalization and equity-based internationalization is that in equity-based internationalization the problems may happen not in the domestic market, but in global one. This means that the SMEs will follow equity-based internationalization based on global pressures. Sturge Industries Ltd faced problems from Far Eastern competition. The quality of products from Far Eastern competitors was not as good as those of Sturge Industries, but there was no guarantee that this would not be rectified at some point in the future. Internationalization cannot happen just because an opportunity arises from an unsolicited order. Equity-based SME internationalization is usually reactive and planned, rather than unplanned and opportunistic. This is normal, as equity-based internationalization requires investment from the company. Bell, Crick and Young (2004) posited that traditional SMEs do not use their networks for internationalization, but rather choose destinations based on psychically close markets. This is not true for the equity-based internationalization observed in Sturge Industries Ltd, who used their networks and psychic distance to reduce the risks of internationalization.

Managerial characteristics represent a major research area for SMEs. Crick and Spence (2005) observed that higher education (Simpson and Kujawa, 1974; Chetty, 1999), international openness, foreign origins (Simmonds and Smith, 1968) and past experience (Chetty, 1999) are important factors. Lloyd-Reason and Mughan (2002) suggested that managers would be open to foreign cultures and have a willingness to understand and adapt to them. Lloyd-Reason and Mughan (2002) identified a willingness to develop language skills (Langston and Teas, 1976), and values and cultural differences as a determinant to cultural orientation. Cavusgil and

Nevin (1981) considered expectations of growth from internationalization (Chetty, 1999) and high degree of commitment to internationalization as important factors. Calof and Beamish (1995) viewed decision-makers' perceptions about benefits, costs and risk of internationalization as key determinants. Bolbrook, Cohen, Hounshell and Klepper (2000) and Welch and Luostarinen (1988) detected past internationalization experience as a key variable. Jaffe and Pasternak (1989) reported firm's competitive advantage and readiness to export, the risks associated with internationalization, and perceived internal and external barriers towards internationalization as factors. Kjellman and Ramstroem (2004) exposed the most detailed list of managerial characteristics required by SME managers. This includes: high interest in international orientation; commitment to internationalization; understanding, commitment and satisfying international customer needs; responding to international customer after-sales; product, service and relationship improvement; focus on value creation for customers; existence of foreign demand; importance given to selling; and urge for competition.

As stated previously, most of the existing literature considers the export behaviour of SMEs, as well as the reasons why certain companies internationalize faster than others. The managing director of Sturge Industries Ltd had increased the export volume of the company many times since taking over. He had the following traits:

- International openness (Crick and Spence, 2005; Lloyd-Reason and Mughan, 2002).

- Past international experience (Crick and Spence, 2005; Bolbrook, Cohen, Hounshell and Klepper, 2000; Welch and Luostarinen, 1988; Langston and Teas, 1976; Chetty, 1999).
- Willingness to understand and adapt to foreign cultures (Lloyd-Reason and Mughan, 2002).
- Expectations of growth from internationalization (Cavusgil and Nevin, 1981; Kjellmann and Ramstroem, 2004).
- High degree of commitment to internationalization (Cavusgil and Nevin, 1981; Kjellmann and Ramstroem, 2004).
- Understanding of the benefits, costs and risks (Jaffe and Pasternak, 1989) of internationalization (Calof and Beamish, 1995). It should be noted in here that every stage of internationalization can create many uncertainties and the above can be useful for repeated decision-making for exporting, but not for first-time, equity-based internationalization.
- Belief in competitive advantage gained from internationalization (Jaffe and Pasternak, 1989).
- Understanding, and commitment to satisfy international customer needs (Kjellmann and Ramstroem, 2004).
- Selling, especially internationally (Kjellmann and Ramstroem, 2004).

The managing director of the company has almost all the traits required for export-based internationalization, as proven by the fact that he increased the export volume of the company several times. It is questionable, however, how many of the above traits are useful for equity-based internationalization in SMEs. There were no opportunities to differentiate the traits that are, similar or even find new traits required for equity-based internationalization. Certainly, international orientation and experiential learning required for equity-based internationalization would be useful, and a manager with these traits would have a positive effect. Further study is needed to distinguish which traits are important for equity-based internationalization.

Merrilees, Miller and Tiessen (1998) looked at market selection according to four four steps. Their study is also oriented towards export-based internationalization. The first step of networking, referrals and meeting with other entrepreneurs is crucial for equity-based internationalization. The rest of the first cycle can be perceived as the rest of the steps for equity-based internationalization.

One of the most important studies on SME internationalization for this research is that of Weikl and Grotz (1999). Their focus is on equity-based internationalization. They identified the motives for equity-based internationalization, and found that there is a variety of motives that are applicable to different companies. In the case of Sturge Industries, the main objective was to obtain a labour cost advantage. From the clusters of motives set forth by Weikl and Grotz (1999), Sturge followed the cost-based motives and rejected market-based motives. The findings of this research are all related to one single cluster of motives, and it would be difficult to generalize these to companies with other motives.

The reflections from cycle 1 are as follows:

1. The internationalization decision had an economic purpose. The location-specific advantages are internalized through ownership advantages.

   Evidence: The decision-making process looks at the economic benefits of internationalization. The use of cost structure for the analysis of 100 meters of chain is directly related to the motivation of the organization. The possible savings that could be achieved were from cheaper labour, plus other savings such as in material costs (brass- and steel-based products). The ownership advantage was superior marketing in terms of reaching distant markets, as well as achieving high quality based on learning about their processes. Two other advantages have not yet been discussed, but are more important for the second cycle. These are the speed of their chain-producing machines, and speed of the line-plating process. The internalization is taken as an assumption that the company chosen will have experience in production, which will help in the internalization stage. This will be obtained directly, because the products will be sold to new markets.

2. The learning theories are related to decision making through what experiential knowledge is needed to reduce psychic distance.

   - The decision maker will have some experiential knowledge needs to make decisions, and the stage of internationalization will determine what kind of knowledge is needed.

     Evidence: The managing director had a clear intention to learn about new markets and answer two important issues. First, the location of the market is based on an analysis of how cheaply the product can be produce over time, as well as how sustainable the advantage is. The second relates to the mode of internationalization. The literature on learning theories relates to market-based knowledge and commitment (Johanson and Vahlne, 1990). Stages of involvement in international business are proposed. This is the last stage of the development process. Market knowledge is more important for the earlier stages; in the later stages, where there is a need for equity-based internationalization the knowledge required for the commitment is different. The managing director in this case wanted to learn how much it would cost to manufacture the product, rather than learning about the internal market conditions and distribution channels. The motivation of Sturge Industries Ltd was to internationalize and have a low-cost manufacturing base. This would have been different if the company was motivated to capture sales from the local market. Regardless of the motivation, information about production costs and conditions are more important because the major contribution will be made at this level. The market knowledge would have already been collected through other stages. The experiential knowledge is closely related to the concept of psychic distance. Non-equity-based internationalization seeks market information to increase commitment. The knowledge gap relates to the market information, as well as the decision maker's traits. Non-equity-based internationalization requires more business-related factors than those discussed above. These factors are needed for the coordination of two different network plants.

- Managerial characteristics are important to reduce or negate the knowledge gap. The literature on SME internationalization provides a very detailed list of managerial traits required for export-based internationalization. There is a need for further research to identify the traits required for equity-based internationalization.

  Evidence: The internationalization and SME literature is very detailed. Managerial characteristics such as international education, openness to international cultures are some of the traits that are useful to reduce psychic distance hence risk. Some of these aspects are in common with the managing director's characteristics, but there is no single evidence that can distinguish between export-related and equity-related traits. The managing director was active and increased the export volume of the company several times. This means that he naturally had traits that helped with that level of internationalization. The traits for internationalization in equity-based modes may differ. We cannot conclude with which traits are most helpful in equity-based internationalization.

- Management issues such as knowing trustworthy people in another country are important in decision making. This will also help to reduce the need for experiential knowledge for the manager.

  Evidence: The managing director selected companies that he had been working with for a time. This provided the necessary conditions, such as trust, to create a partnership. Another factor is having a trustworthy person to send to another country to work or manage the operations there. These are more important in other modes of equity-based internationalization. If the managing director decided on a green- or brown-field investment, or a merger with another company, the question would be raised of how to manage this. It is natural to leave the management of the international site, as well as some key work roles, to trustworthy people. This is a management issue within a newly formed international structure.

- The entry mode will be selected based on a trade-off between the manager's experiential knowledge and the possible management methods used to learn them or negate them.

Evidence: The managing director selected companies in possible two locations, Turkey and India, based on prior relationships. This would have been different if the internationalization decision was for Estonia or Lithuania, where there was no existing partnership and there would have been a need to build operations there with a trusted manager. This means that types of management method and entry mode decisions are related to each other. This is not a linear relationship: as the commitment increases, the management style does not have to increase as well.

3. Trust, control and profit potential are all important factors when a company is making a commitment decision. The above factors reduce the risk in that commitment.

   Evidence: Trust is an important condition in choosing a partner organization in another country. Control and commitment are dependent on the trust the two organizations have towards each other. There is evidence of trust in the first cycle, while the evidence of control and commitment was in the second cycle. The control element increased as the trust decreased. This was observed when the relationships became harder because of knowledge-transfer and quality problems. The control exerted by Sturge Industries increased to ensure that the products were produced at the right quality. The commitment of both parties changed only when they had problems in terms of costs and possible profits – i.e. during negotiations on what price would be paid to Pirinci by Sturge Industries. This was an important point for them. Once the profit potential and price were agreed the relationship was frozen. The profit potential acts like a moderating variable between trust and commitment. Without profit potential, the evaluation of trust by companies will differ.

4. The internationalization decision is strategic. It can be reactive or proactive. In each case, the strategy is developed through the knowledge gathered from the network partners. Internationalization will lead to a new network structure, which will result in more knowledge for strategy development and reduce uncertainty for the business.

   Evidence: This was true for Sturge Industries Ltd, and the evidence for this was available from the second cycle. They had a network partner that was supplying finished products from turkey. The reactive nature of the internationalization decision changed the relationship to a more intensive partnership. The decision was made using the knowledge collected from the network partners (evidence from the first cycle). The resultant new network structure reduced the cost of obtaining new knowledge, such as quality-related knowledge, in the second cycle. This created problems in production and a need for knowledge transfer. This new knowledge was not available at the time of the internationalization decision.

5. The internationalization decision is dependent on the knowledge collected from different levels of the network. It is most effective

when the partner company comes from within the close network. The knowledge gathered from such companies is experiential. Relational embeddedness is needed to ensure the effectiveness of the business relationships.

Evidence: The managing director trusted companies that were closer and with whom Sturge Industries had longer relationships with. This was more obvious between the distinctions and quality of information collected from possible Indian and Turkish partners. The Turkish partners had had a longer and closer relationship with Sturge Industries and its parent company. The Indian company was fairly new in their network, and became known to Sturge Industries at an exhibition. More information had been exchanged with the Turkish partner; this is how relational embeddedness is defined. It is obvious that companies get better knowledge from closer links in their network. This also affects their internationalization decision. Closer networks that provide the most useful information will be the location of choice for the manager.

6. The selection of factors for the internationalization decision will be made according to the motives and business needs of the decision maker. The decision-making process is usually simpler for SMEs than for larger organizations.

   Evidence: The managing director was motivated by low-cost manufacturing, rather than entering the local market. This is reflected in the factors selected. Factors such as market size and competition within the market were not selected, as knowing these would not have helped the company to achieve its aims. The same is true for innovation-based internationalization. The managing director was not interested in the number of patents by residents, or business expenditure on innovation-related activities. Rather, his interest was in having qualified personnel to set up and run the machines for production.

7. Manufacturing SMEs do not follow the same strategy and processes of internationalization in exporting and equity-based internationalization. Export-based internationalization can be unplanned, reactive and opportunistic. SMEs will choose destinations to reduce their psychic distance, and there is a difference between traditional and knowledge-based SMEs. Equity-based internationalization for SMEs will be more planned and reactive. They will also use their networks, as well as psychic distance, to reduce the risk. The differences between traditional and knowledge-based SMEs are hard to identify from this study.

   Evidence: SME internationalization has been dominated by an export focus. One stream of research that has been given a high level of attention is that relating to born globals. This provides a limited explanation for the equity-based internationalization of SMEs. Reactive, opportunistic and unplanned internationalization in exporting cannot be applied in the case of equity-based internationalization, as the level of investment differs. Sturge Industries were reactive to environmental changes, but had a planned route to internationalization. The commonality between export-based research and equity-based research is their use of their networks for internationalization. This is also a source of reducing psychic distance from other countries. As discussed above, the psychic distance factors differ for each type of internationalization. While market-based, export-focused internationalization looks at market and decision-maker factors, equity internationalization looks at business-related factors. It should be noted that, for equity-based internationalization, there will be a need to manage the relationships between organizations in two different countries. The importance of market-related information does lose its importance. This information changes to explain the competition in the market, and the structure of the market. There is no evidence of market-based information, but business-related information was demonstrated in the fact that the managing director was looking for business-related psychic distance information. He obtained knowledge on government regulations to start a business, commercial contracts, supplier information, the banking system, taxes, intellectual property rights, political uncertainty, economic growth, labour laws and disputes with possible partners.

6.3 Reflections and discussion for cycle 2

The discussion for the second cycle aims to detect the problems of the decision-making process within the first cycle.

The economic theories of internationalization look at reducing the cost of transactions (Buckley and Casson, 1993) or the use of monopolistic advantages in other countries (Hymer, 1976). The second cycle showed that ownership advantages are harder to internalize (Dunning, 1991) than expected. The location advantages that were forecasted were really assumptions. Furthermore, the cost advantages can be reduced because internalization (Dunning, 1991) can take longer than expected, or because there are many details in the transfer of production which can increase or decrease cost. Ozawa and Castello (2001) observed that ownership and location advantages can only be gained through learning, which is the equivalent of internalization in Dunning's (1991) OLI paradigm. The decision-making process accounts for reducing the transaction cost and the use of ownership advantages in order to internalize location-specific advantages. The problems start in the internalization part of this theory, resulting in higher transaction costs.

The learning theories of internationalization look at this learning process, which can provide the internalization of location specific advantages. The problem with this group of theories is their focus on export development. Equity-based internationalization is the last stage in Johanson and Vahlne's (1977, 1990) model. The experiential knowledge within these models is explained as the market knowledge, which leads to market commitment (Johanson and Vahlne, 1977). The commitment stage will include the transfer of technology or knowledge to the other organization. In this case, the tacit experiential knowledge about markets would have no significance to the transfer of knowledge to the new location. This means that the model predicts why the commitment is sought, and what is required to achieve it in the international markets, but not how to achieve it. Vahlne and Wiedersheim-Paul (1973) introduced psychic distance and tried to explain what sort of knowledge was needed for a company to commit more to internationalization. Knowledge such as business climate, cultural patterns, structure of the market system and characteristics of the individual customer firms and their personnel are rarely important for internalization (Dunning, 1991), or the realization of advantages from the commitment (Johanso and Vahlne, 1977, 1990). Psychic distance will revisited later. Johanson and Vahlne (1990) reported three exceptions to the Uppsala model of internationalization. The first exception is related to multinational enterprises. The second exception is related to market-related knowledge, which again does not explain equity-based internationalization for SMEs. The third exception is the use of experiential knowledge from one market in other markets. This can be true for different types of experiential knowledge, but not for market-related knowledge, as it is is not useful for equity-based internationalization.

Reid (1981, 1983) and Forsgren (2002) criticized the Uppsala model. Their criticisms were still based on export-related internationalization. The speed of internationalization (Andersson, 2004) does not make any difference in SMEs, and the difference between mature and knowledge-intensive industries will not be great either. After companies establish export-based internationalization, in which speed differences can be observed, these speed differences are replaced with knowledge needed for knowledge transfer from one country to another. Andersson (2004) did not capture this difference in his study. Psychic distance can be divided into business and other market-related factors. The market-related factors discussed in relation to the first cycle were not applicable in Sturge Industries' internationalization decision-making process. Hallen and Wiedersheim-Paul's (1984) model of psychic distance is applicable at the organizational and individual levels. At the organizational level, trust built on market-based knowledge may not be useful at the knowledge and technology transfer level in equity-based internationalization. There will be a need for the development of new trust in terms of working at another level. The experience relates to knowledge and technology transfer, as well absorptive capacity (this will be discussed later). Geographic distance (Dow, 2000) has no implications in equity-based internationalization, other than the distance needed to be travelled for knowledge and technology transfer. Swift (2000) identified 20 factors here. Most of these do not affect equity-based internationalization. General patterns of working, such as working hours/day have some influence on this level of internationalization.

Nordstrom and Vahlne (1992), O'Grady and Lane (1996), Evans and Mavondo (2002) and Child, Ng and Wong (2002) predicted better factors for equity-based internationalization. Nordstrom and Vahlne (1992) discovered three important factors that are partially beneficial in equity-based internationalization. These are level of economic development, education and differences in business language. Level of economic development affected the project because the German die material was expensive and also scarce. This meant that the manufacturer in Turkey did not use this material accordingly. Differences in education level are also an important issue, as the engineering skills are dependent on this.

Evans and Mavondo (2002) proposed three other factors for psychic distance that are useful for equity-based internationalization. These are: business practice differences, communication differences and industry structure differences. Business practice differences, especially quality management procedures, are clearly very important. Communication differences are also important; the technical manager and other stakeholders within Sturge Industries Ltd had no communication problems, however communication problems were caused by language differences between Sturge Industries and Pirinci, as well as the fact that some of the key stakeholders in Pirinci could not use email, and were having their secretaries reply to Sturge Industries' emails for them. The emails in English were first translated into English, and then taken to the relevant manager. The response from the manager was then translated back to English and the secretary sent the email.

Child, Ng and Wong (2002) added level of technological development as a factor for equity-based internationalization. This is a better measure than the level of economic development suggested by Nordstrom and Vahlne (1992), and it explains the technology and knowledge transfer difficulties Sturge Industries Ltd experienced. Level of technological development encompasses knowledge surrounding the technology.

O'Grady and Lane (1996) suggest the most useful factors in terms of explaining equity-based internationalization. These are achievement orientation, level of aggressiveness and optimism, action orientation, belief in hard work, attitude towards authority, belief in competitiveness, risk propensity and positive attitude towards risk. This list has all the elements that are needed for the technology and knowledge transfer, and are related to how companies conduct business relationships. The equity-based business relationship is different than the export-based relationship, as it requires close working and sharing sensitive information about competitiveness. It is hard for companies in Sturge Industries' field to share information about their cost structures and how they manufacture or design certain dies, as this is vital information for engineering firms. Level of aggressiveness is a good example. If one of the companies in this relationship was very aggressive in terms of business conduct, then it would be very dangerous for the other partner to reveal information. The risk is compensated, however, through increasing control through sharing equity between partners. This will not be an issue if the company decides to own all of the production facility, either through acquisition, or green- or brownfield investment. Equity-based internationalization which results in partnership relationships is harder to manage and suffers from many of these psychic distance issues.

Another very good example from O'Grady and Lane (1996) relates to attitudes towards authority. The technical manager had a very interesting breakthrough when he was able to observe the relationship between Zeki and Mahir Pirinci and their employees. He described it as a militaristic relationship. This had no impact on the relationship between Zeki and Mahir Pirinci and the technical manager. This has a different impact on the relationship between Pirinci and Sturge as any changes proposed by technical manager are applied within the organization through chain and command structure. This creates resentment from shop floor workers. Mahir Pirinci disliked situations in which his authority was questioned or even undermined by these actions. The technical manager was also very straight-talking, and this was a further potential source of disharmony. Another important factor is the action orientation; here, Sturge Industries and Pirinci differed. Their beliefs in competitiveness were also very different: Sturge Industries' belief was that quality is the most essential point, and a source of competitive advantage. Pirinci could most certainly improve their quality to compete against Sturge Industries; however, they wished to micro-manage and cut costs and in every department, which made it hard for them to realize greater quality. This caused problems in the quality initiatives and transfer of organizational practices from Sturge Industries to Pirinci.

Child, Ng and Wong (2002) identified several factors that reduce psychic distance. The factors that managers would find useful include professional training of the decision maker, presence of a trusted friend, availability of loyal staff, personal networks, and sending trusted employees to the overseas location to manage the business. These will work differently for export-based and equity-based internationalization. The motives for equity-based internationalization can also include accessing local markets, but this was not relevant to Sturge Industries Ltd.

Meyer (2001) and Maitland and Nicholas (2002) looked at how companies select local partners to reduce psychic distance. Local market and commercial knowledge, and accessing marketing and distribution networks are all related to either export-based internationalization, or market-seeking foreign direct investment. This was not an issue for Sturge Industries Ltd. The cost motive for internationalization requires an additional or different set of parameters in selecting partners. These are cultural and social knowledge, and access to supply networks within those countries. This may be similar for all equity-based internationalization. Of Maitland and Nicholas' (2002) factors that increase psychic distance, the most important for the equity-based internationalization of Sturge Industries Ltd were foreign exchange/currency risk, low labour productivity and rising labour costs. Other important factors that can be useful for managers in their decision making, including engineering excellence, quality assurance systems and changes in the management capability of the partner, can help to reduce psychic distance. However, these have never been mentioned in the literature, and are actually observations about the manager and the problems arising from the decision in action research cycle 2. At time of the decision making, the psychic distance of the manager was based on similar factors as those identified by the literature. The second cycle showed that the decision-making process can be improved by adding these variables into the study.

Innovation theories of internationalization add very little to the decision-making process. Luostarinen and Hellman's (1993) model is useful in terms of explaining internationalization through cooperation between two companies, as in the case of Sturge Industries and Pirinci. According to this model, after reaching the cooperation stage it is expected that equity-based internationalization will happen. Contrary to this model, however, this stage happened after the equity-based internationalization took place.

Network theories of internationalization are a development of learning theories. Early authors of network theories such as Johanson and Vahlne (1990) and Johanson and Mattson (1988) exploited the same ideas of stages and market knowledge. The difference between these is that knowledge about markets is sourced from networks. Morgan and Hunt (1994) and Uzzi (1997) placed importance on trust and commitment to achieve benefits from internationalization in networks. This was observed between Sturge Industries Ltd and Pirinci, as trust and commitment were the basis of their relationship. Welch and Welch (1995) modelled a link between strategic management and network-based internationalization. The second cycle focused on network development. This should be given importance, and the strategic opportunity should be evaluated through the possibility of developing a network with and within the new location. Lu and Beamish (2004) supported this through their analysis of the importance of technology and knowledge transfer within networks. Their study, like Zanfei’s (2000), focused on the innovation aspect of internationalization and networks. The most important contribution of the second cycle was the relational and technical embeddedness (Andersson and Forsgren, 2000). Relational embeddedness is measured by the frequency of interaction between companies, while technical embeddedness is the exchange of technical information between companies. This shows that companies working together for innovation are better choices for partnership in internationalization. The reason behind this is they are already building relationships that would allow them to effectively transfer the knowledge and technology necessary for internationalization.

Within the internationalization literature in operations management, the factors listed do not capture any of the difficulties faced by Sturge Industries Ltd. The decision-making processes and models include prescribed factors, but do not capture any of the issues after implementation. The decision of internationalization should enable easy implementation and probably achieve benefits in an acceptable time and cost.

The most important contribution that predicts what happened in this cycle is the international manufacturing networks literature. Colotla, Shi and Gregory (2003) identified the importance of configuration and coordination advantages. The difficulties Sturge Industries Ltd faced in internalizing location-specific advantages were actually based on a decision made solely on configuration advantages. The coordination advantages were not explored. Andersson and Forsgren's (2002) considered coordination aspects as well; these should be added to the decision-making process. The network-level advantages should be planned for in the decision-making process through looking at both structural and infrastructural practices (Colotla, Shi and Gregory, 2003). This will eventually lead to realization of all the international manufacturing advantages (Shi, 2003), which include:

- Strategic resource accessibility for capturing external resources. This is only possible with some coordination advantage.
- Thriftiness ability, which is about improving operations for higher economic and performance efficiency. This is also possible with good coordination between partners in a network.
- Manufacturing mobility, which is about resource allocation to different partners in the network. Without the first two advantages, allocation does not make sense. Coordination is the key to achieve this as well.
- Learning ability for improving operations. This can happen because the network partners share and learn information from each other. Obviously this is a very important advantage, which was tested in this case.

The SME internationalization literature to date has looked mostly at export-based internationalization. The dominant theories are learning and network theories. There is a good amount of discussion on market knowledge and the related learning process (Johanson and Vahlne, 1990; Lehtinen and Penttinen, 1999 and Ahokangas, 1989). Brouther and Nakos (2004) looked at the internationalization of SMEs from the transaction cost economics perspective. They took three concepts from this theory and applied them to internationalization. Asset specificity leads companies to choose their internationalization modes. High asset-specificity leads to equity-based internationalization by SMEs; however, it also leads to more complex knowledge and technology transfer. There is a trade-off between these outcomes. Managers would like to protect their asset specificity, which is their rent-earning potential through controlling the ownership of this in their new location. This will eventually result in the transfer of this technology and subsequent knowledge. The transfer may result in the same problems as those faced by Sturge Industries Ltd. The tacit and complex nature of asset specificity will lead to a more difficult knowledge transfer process. This also means that the recipient organization will not have enough absorptive capacity, which will make it harder. Behavioural uncertainty is about not being able to predict the behaviour of people in the other country. This will lead to even more protection of asset-specific resources, which means higher levels of equity-based internationalization. Environmental uncertainty is about external risks, such as political and legal risks. Higher environmental uncertainty will lead to equity-based internationalization. The same issues for asset specificity apply to this uncertainty as well. In Sturge Industries' case, however, this was not observed by the action researcher, though asset specificity and behavioural uncertainty were common in the second cycle.

Winch and Bianchi (2006) investigated the types of risks in export-based internationalization for SMEs. None of these risks are relevant in equity-based internationalization. The risks observed in the second cycle are more about:

- Lack of absorptive capacity
- Different organizational practices
- Changes in management difficulties
- General communication difficulties
- Changing conditions by reason of learning.

These are very different risks compared to Winch and Bianchi's (2006).

Bell, Crick and Young (2004) drew a distinction between knowledge-intensive and traditional SMEs. It is very hard to judge whether knowledge-intensive SMEs would face similar problem, without specifically studying the internationalization of one. Under these conditions, the action researcher cannot generalize the results obtained in the present study on traditional SMEs to knowledge-intensive SMEs.

The discussion of the first cycle included a large section on managerial characteristics. The second cycle relates more to technology and knowledge transfer problems, and the managerial characteristics that will help to internationalize faster or to distant markets does not have an impact on solving internalization problems. Most of the extant studies in this area relate to export-based internationalization. The managerial characteristics that would help for equity-based internationalization include:

- Negotiation skills for change management
- Technical ability to see potential problems related to knowledge and implementation of the technology.

These are necessary as most problems in the second cycle arose as a result of change management aspects in Pirinci. Negotiation skills would have saved time in terms of solving quality problems and avoiding repeats of them. For instance, Mahir Pirinci would not have changed the die material several times, and his experimentation would not have cost as much. The cost was accumulated because of defective materials, and foreign visits to Pirinci to solve quality problems.

The ability of the technical manager earned Sturge Industries credibility, as his knowledge about die designs and quality problems made the technicians and the shop floor workers accept his expertise. This was important to convince these people to apply the changes requested by him. However, convincing Mahir Pirinci was not that easy because he had other motives such as cost reduction. This was perfectly normal under his company strategy and management style.

The second cycle mainly focused on the technology and knowledge transfer between the two partners as a result of the internationalization decision. The technology and knowledge in this case mostly came from the technical manager's tacit knowledge of about the processes. Rollers were the only hardware that was transferred (Dosi, 1982). Keller and Chinta (1990) identified three modes of technology transfer that do not suit technology transfers of this kind; their additional four forms (exporting, licensing, joint venture and direct investment) define technology transfer of this kind better. The technology transfer did not happen as a result of one of these, however, as the relationship between Sturge Industries Ltd and Pirinci cannot be so neatly defined. It was not based on exporting or direct investment, and it had some elements of licensing, joint venture, partnership and off-shoring. It was not a relationship build on definitions. It also evolved over time because the companies began to trust each other more and see the benefits of working together.

Walker and Ellis (2000) distinguished five different strategies for technology transfer. The strategy used by Sturge Industries Ltd is the defensive strategy; this involves a knowledge-oriented transfer, which is a low-risk and low-pay-off strategy. Walker and Ellis (2000) also studied the barriers to technology transfer. Quality and performance caused problems between Sturge Industries and Pirinci. The complexity of the technology, i.e. the asset specificity, was the motive for the equity-based internationalization (Brouthers and Nakos, 2004). Fear of loss of ownership or even knowledge about key technologies was a worry for the technical manager, as well the managing director, of Sturge Industries Ltd. Language barriers and the different interests of partners were also a problem. Key reasons for success are strong relationship between organizations, clear business needs, mutual understanding of the objectives and technical capability of both companies (Walker and Ellis, 2000). Other barriers and success factors identified by Walker and Ellis (2000) were also faced by Sturge Industries and Pirinci. This action research can also contribute to Walker and Ellis' (2000) research, as the complexity of the product and quality problems are also barriers to technology transfer.

Kostova (1999) contributed to the technology and knowledge-transfer literature by looking at the cognitive and psychological dimensions. Her investigation was based on the transfer of organizational practices. This fits with the defensive-strategy (Walker and Ellis, 2000) transfer of Sturge Industries Ltd to Pirinci. Kostova (1999) identified two levels that ensure that the organizational practice is institutionalized. Implementation is about following formal rules. This was demonstrated by the fact that the technical manager taught Pirinci how to produce the right dies and solve quality problems. Quality monitoring introduced also falls into implementation. This is not a big problem, as it does not get institutionalized just because an organizational practice is implemented – it needs to be internalized. This is determined by practice commitment, satisfaction and employee psychological ownership (Kostova, 1999). This was the area in which all problems were experienced. Kostova (1999) defined practice commitment as a strong belief in and acceptance of the goals and values of the organizational practices based on the individual's involvement, identification, implementation and continuance of the organizational practice. This was aimed to be achieved with the technician in Pirinci because these people would be the users of the technology. Pirinci's workshop employees had difficulty accepting the changes. The Mahir Pirinci's support was one of the problems for technicians to accept the changes and this proves that managerial support is very important to achieve the knowledge transfer. Practice satisfaction is defined as positive attitude and valuation of its importance to the organization (Kostova, 1999). The implementation failed to explain the value of the internationalization to the employees of Pirinci; the result was even if they were satisfied with some changes, they did not see the value in them. The acceptance of poor quality was also a big problem. Commitment and satisfaction were key to achieving psychological ownership (Kostova, 1999). Social embeddedness is very similar to psychic distance, whilst organizational embeddedness has two important variables that were more important for this relationship: favourability of learning and change and compatibility of practices. In the technology and knowledge transfer between Sturge Industries and Pirinci there was variation in terms favourability of learning and change. The technician in charge of the CNC machine was very open to learning and change, however he was visited by Sturge Industries without the presence of Mahir Pirinci, who was always present during shop-floor visits. The militaristic management style was very obvious from his behaviour. The changes implemented during the visits either failed to remain in place, or were not actually followed through by the management. The expectation of shop floor workers' commitment and favourability towards learning and change was diminished severely from this lack of top management support. This is one of the barriers identified in Walker and Ellis' (2000) study.

The next important level of embeddedness identified by Kostova (1999) is the relational embeddedness. This is achieved by commitment and willingness to show effort from both partners. This was evident in the work of both companies. The relationship has continued to the point at which this research was published, despite the many problems faced.

Another aspect of relational embeddedness that was not included in Kostova's (1999) paper is the perceived benefit of the relationship. If the benefit of the relationship is considered by the companies to be high, then even if they face problems they will find ways to solve them.

The last factor that affects a successful transfer of organizational practice according to Kostova (1999) is trust. This is operationalized by not taking advantage of the other organization. Problems in technology and knowledge transfer will reduce trust, as it is cumulative and based on continual good relationships. This is compensated again by the commitment and perceived benefit of the relationship. Another aspect that has not been researched is the sunk cost within the project. If the sunk cost is perceived as high, then even if the managers lose some trust they will have exit barriers. This was observed with Pirinci.

The compatibility of practices (Kostova, 1999) is actually based on the work of Cohen and Levinthal (1990). Absorptive capacity is based on the prior knowledge of the recipient organization (Cohen and Levinthal, 1990), and is held by every individual in the relevant organizations. The cumulative knowledge of all employees in an organization forms the absorptive capacity of that company. Lane and Lubatkin (1998) and Albino, Garavelli and Gorgoglione (2004) identified organizational structures as a factor that affects knowledge transfer. In SMEs with a network of two manufacturing plants, this is minimal because the complexity of the relationship is low. Grant (1996) focuses on to find a company and absorb external knowledge for innovation from them, however this was also not the case in this dyadic relationship. The problems defined include the identification, assimilation and exploitation of knowledge. Augier and Vondelo (1999), Kostova (1999) and Langlis (1997) stated that tacit knowledge can only be transferred through strong ties between organizations. Face-to-face meetings are needed to develop a cognitive mental model between partners. In the case of Sturge Industries and Pirinci, both companies used face-to-face meetings to develop strong ties. The transfer of knowledge was done through a trusted employee of Sturge Industries visiting Pirinci and working there for short periods of time. Cohen and Levinthal (1990) and Lane and Lubatkin (1998) identified the knowledge gap as an important factor: if this gap is too large then transfer of knowledge is nearly impossible, while if the gap is very small then the value given to the transfer is very low, and this will lead to no commitment. According to these authors, there is an optimal knowledge gap for efficient knowledge transfer. The knowledge gap between Sturge Industries and Pirinci was probably near to optimum. Both companies can produce the same product with quality differences. These differences were perceived as a large gap by the host, and small by the recipient. Such differences in perception can create problems in technology and knowledge transfer.

The transfer of organizational practices, technology and product information all equate to an effort to replicate the performance objectives of the host in the recipient organization. This will be based on the role of the factory (Ferdows, 1996). The transfer between Sturge Industries and Pirinci actually tried to replicate the conformance quality (Gerwin, 1984). Sturge Industries Ltd gave the role of low-cost manufacturer to Pirinci, and did not want to increase the speed of production. This was also motivated by an effort to protect the competitive advantage of the company. The line plating was another competitive advantage held by

Sturge Industries Ltd. This was only available for transfer if both companies built a stronger partnership and the recipient showed high level of commitment. These factors show that the host gives a role to another manufacturing partner or plant they own, and transfers technology to these according to this role or value.

Reflections from cycle 2:

1. Ownership advantages can be used to internalize location-specific advantages. Ownership and location-specific advantages are easier to predict and manage, compared to internalization. Internalization means that there is an element of learning in the process, which may increase the cost of internationalization.

   Evidence: The quality problems and the need for knowledge transfer provide evidence of the difficulties in internalizing the location advantages. Though the ownership advantage was there, using it in the new location was a big problem. The cycle evidences how hard it is to internalize the location advantages. The manager should be prepared for the problems of internalization, and the decision process should take into account its importance.
2. Experiential learning needed for equity-based internationalization is different to that required for export-based internationalization. Knowledge regarding technology transfer and the capability of technologies (knowledge based on technologies) is required for equity-based internationalization.

   Evidence: The knowledge-transfer process between Sturge Industries and Pirinci demonstrated the importance of two factors of the decision-making process. First, knowledge about technologies and products are key for both organizations. The quality problems that Sturge Industries were able to control were those that they could transfer knowledge about. The knowledge of the technical manager was critical for the success of the transfer. This proves that the knowledge and capability of the host, as well as the recipient, are very important. The recipient's knowledge of the same issues is key for that organization to absorb the transfer. This was extensively discussed under absorptive capacity (section 2.4 in literature review). The source of knowledge for both organizations forms the components of operations advantage. There is evidence relating to quality here, but other issues such as flexibility and dependability can also be important in other contexts. Another important source of advantage for Sturge was the line plating technique, which was proving an important cost factor. The transfer of this advantage was also discussed and achieved in later stages of the relationship.

3. Psychic distance is still important for managers in their decision-making process. The motivation factors for internationalization and mode of internationalization will differ. Furthermore, equity-based internationalization will require different factors than export-based internationalization.

   Evidence: The managing director had already considered business-related factors were more important in their decision-making process for equity-based internationalization. The evidence proves that other psychic distance factors should be considered, that have not yet been discussed within the literature. The psychic distance literature is very underdeveloped for equity-based internationalization. Companies with internationalization experience will use other factors of psychic distance. The technology and knowledge transfer should build psychic distance towards companies and countries that are far away not in terms of distance, but rather in terms of their capability to absorb the knowledge. The managers should be aware of these difficulties. There are some business-related factors such as language, foreign exchange/currency risk, low labour productivity and rising labour costs. The literature does not mention factors such as engineering excellence, quality assurance systems and change management capabilities of the partner. Other factors are also important to a degree, such as: achievement orientation, level of aggressiveness and optimism, action orientation, belief in hard work, attitude towards authority, belief in competitiveness, risk propensity and positive attitude towards risk. There is a need for theory testing in equity-based internationalization.

4. Network theories of internationalization contribute the concepts of relational and technical embeddedness. Companies should select their partners for internationalization through these two important concepts. The frequency of interpersonal relationships and the amount of technical knowledge exchanged between companies is a determinant of how easy will it be to internalize location specific advantages.

   Evidence: It is obvious that companies should select companies that they have close relationships with. This was also discussed in one of the reflections for the first cycle. Companies with closer network relationships will exchange more information (relational embeddedness). Sturge Industries and Pirinci had a close relationship in terms of sharing information. This continued until there was a reduction of trust in the relationship arising from quality and knowledge transfer problems. At this time, Pirinci stopped sending quality monitor information to Sturge Industries, and failed to answer calls and emails. This clearly showed that their relational embeddedness was not as strong as before. The companies did not have any technical embeddedness before the start of the knowledge transfer; this is needed for success in terms of the transfer. An internationalization decision should consider both of these factors. Another important finding was the relationship between relational and technical embeddedness.

The trust between organizations involves having relational and technical embeddedness. This was also complemented by commitment and control, which were discussed in the reflections for the first cycle. Commitment will positively determine the relational and technical embeddedness. Trust and commitment are related to control and profit potential within the relationship: the profit potential reduced the trust and increased the control. This was observed in the second cycle when Pirinci faced unexpected increases in costs because they had to change their die production, and plating was labour-intensive and costly.

5. The decision making for internationalization should not only account for the configuration advantages, but also think about coordination advantages. The omission of these in the decision-making process will lead to problems, as seen in the second cycle. To avoid this, and to provide the chance to internalize location-specific advantages, as well as achieving international manufacturing network advantages, the decision-making process should also include coordination aspects.

   Evidence: The decision-making process in the first cycle only concentrated on the configuration aspect of the internationalization decision. The quality problems and knowledge transfer, with increased need for information exchange between parties, proves that coordination aspects of international manufacturing networks are also important for decision making.
6. Asset specificity, behavioural uncertainty and environmental uncertainty increase the need for equity-based internationalization. In fact, this will increase the problem of transferring technology and knowledge. The asset specificity will mean that the technology or knowledge will be tacit and complex. Behavioural uncertainty means that there will be relational problems when transferring the technology and knowledge. The managerial attitude to protect the asset-specific resources may lead to a trade-off that will eventually increase the cost.

   Evidence: Controlling production knowledge such as that relating to line plating and chain production was very important for the managing director and technical manager. They were ready to increase commitment to the partnership to ensure a higher degree of control over the diffusion of knowledge within the international partner. The asset specificity affected several incidents. The knowledge-transfer process was harder because the knowledge base of Sturge Industries was highly tacit, thereby increasing the asset specificity. This tacit knowledge was a source of competitive advantage for Sturge Industries, and transferring it meant that they would share key knowledge. This increased the need to control the international partner through raising the commitment level (line plating is a very good evidence for this[1]). Behavioural uncertainty is more of a function of trust. As the quality problems began and a need for knowledge transfer arose, the companies began to trust each other less. This affected the efficiency of the knowledge transfer and reduced trust further. This decreased trust lead the parties to negotiate over price, and at this time the relationship froze. The negotiations revealed that there was a behavioural uncertainty, with neither partner knowing how the other would conduct the business relationship.

7. The risks of equity-based internationalization for SMEs include lack of absorptive capacity, different organizational practices, change management difficulties, general communication difficulties and changing conditions through learning.

   Evidence: The quality and knowledge-transfer problems were seen as a lack of absorptive capacity (the technician for the CNC machines was the most capable, but the shop floor workers were

[1] You may recall that line plating was one of the issues in negotiations between Sturge Industries and Pirinci. The line plating is one of the main advantages of Sturge Industries within their industry.

less competent) and different organizational practices (quality management differences, die production differences). The relationship-related problems included change management difficulties (resistance to change from the shop floor workers and lack of support from top management (Mahir Pirinci)), general communication difficulties (language problems, email correspondence problems) and changing conditions through learning (die material changes, costs of barrel plating).

8. The managerial characteristics needed for equity-based internationalization of SMEs include negotiation skills for change management, technical ability to see problems related to knowledge, and implementation of technology.

   Evidence: Negotiation skills were most important in convincing the top management at Pirinci to implement change. It was explained repeatedly that the changes would improve quality and efficiency. Technical ability to see problems relating to knowledge were important when the technical manager was confronted with problems to be solved using different procedures, whereby he needed to intuitively improvise practical solutions. This was an important skill for trust building, as well as for obtaining the knowledge to be transferred. In fact, this did not involve replicating the knowledge in another organization, but rather adapting it to their knowledge base. The last of the key skills for the manager include awareness of how to transfer knowledge or technology.

9. Walker and Ellis (2000) listed barriers, reasons for failure, and key success factors for technology transfer. The action researcher

believes that decision makers should consider these in their decision-making process. Some of these have been supported by the findings of this research, but others may be useful with reference to different motives or types of equity-based internationalization. The only contribution to this list from this research is the complexity of the product, and quality problems.

Evidence: The chain production machines and the quality problems were all complex. The tacit nature of these made it even more complex for the recipient organization.

10. To transfer organizational practices, and hence knowledge and technology of any sort, the key to success is internalization through commitment, satisfaction and psychological ownership. This is only possible if there is favourability towards learning and change, compatibility or practices, commitment from both partners, willingness to show effort and trust. The cultural differences or psychic distance should be very low. Two other factors that moderate the relationship are perceived benefit of the transfer by top management, and sunk cost, which leads to exit barriers.

    Evidence: The transfer of quality issues was partially internalized. The die design and material was totally internalized as the satisfaction created psychological ownership. The commitment gradually increased as they saw the benefits of the knowledge transferred. The technician was pleased to learn about die manufacturing issues and how to solve problems by changing parameters. He showed effort, was willing to learn, and asked questions that probed how things are done. The practices and knowledge base for the technical manager and the technician were very similar. The technical manager was an outsider on the shop floor, even though he had good knowledge about the machines and production, but became an insider with the technician.

11. The knowledge gap between host and recipient organization should be optimal.

    Evidence: There was a large knowledge gap between Sturge Industries and Pirinci in terms of quality management, as Pirinci found it hard to see some of the quality problems. The knowledge gap was narrower for die design, as the problems were easier to solve and there was a high absorptive capacity. If the knowledge gap is too small, then there is nothing to learn and this may hinder the transfer of knowledge. This is a product of the perception by the receiver as they think there is nothing to learn. The shop floor workers shared Mahir Pirinci's negative attitude, and did not perceive the possible learning opportunities. Physical artifacts such as the rollers that were put into the machines were accepted with scepticism.

12. The aim of any technology or knowledge transfer is to replicate the operations performance in the other organization. This is governed by the role of factory given by the host organization to the recipient organization.

    Evidence: Sturge Industries aimed to replicate their operations performance in Pirinci. The assumption in the decision making was that once a location had been chosen production had begun, the products will start to be delivered straight away. This was not true as there was a need to transfer knowledge and improve quality. The role that Sturge Industries gave to Pirinci was that of a low-cost manufacturing plant, with some autonomy but no reverse knowledge transfer. The role may change over time, and higher roles within the foreign subsidiary or partner would mean that the replication of operations performance can be two-way process, or there is very little need for replication. There may be a need to transfer innovations for products, processes or organizational practices. The last of these innovations would be similar to the replication of operations performance between Sturge Industries and Pirinci.

6.4 The findings of the action research

Figure 6.3 Internationalization process

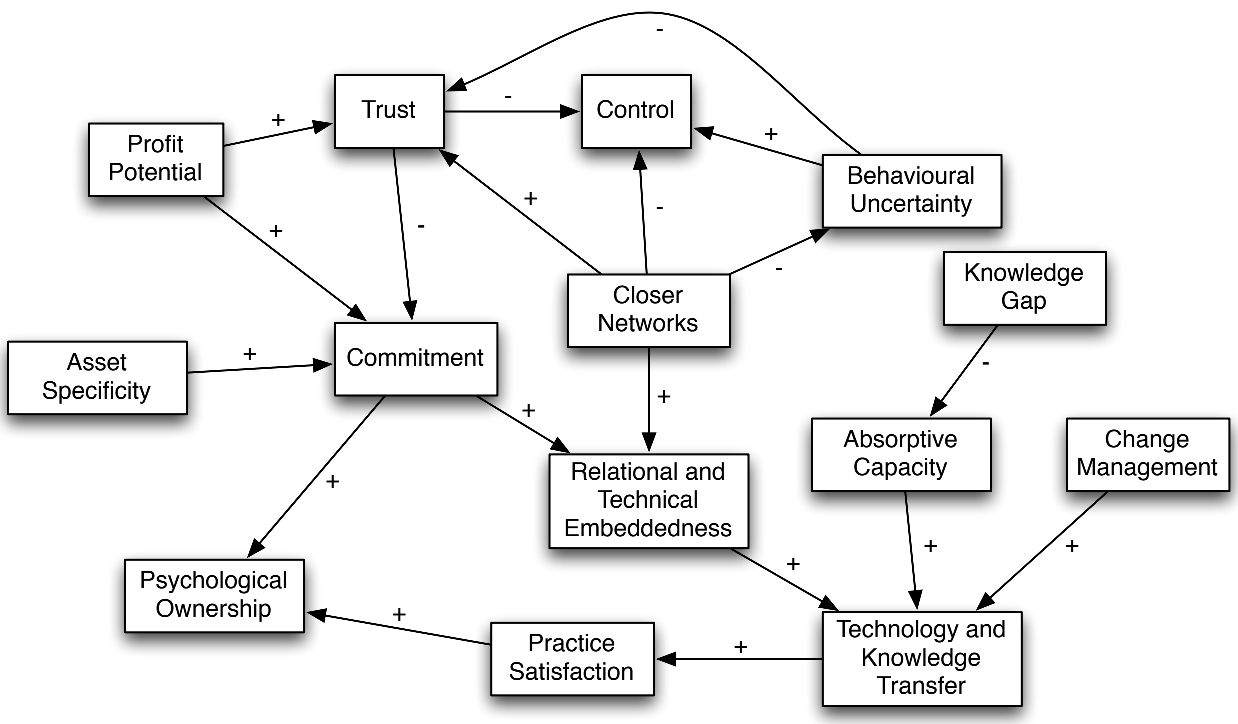
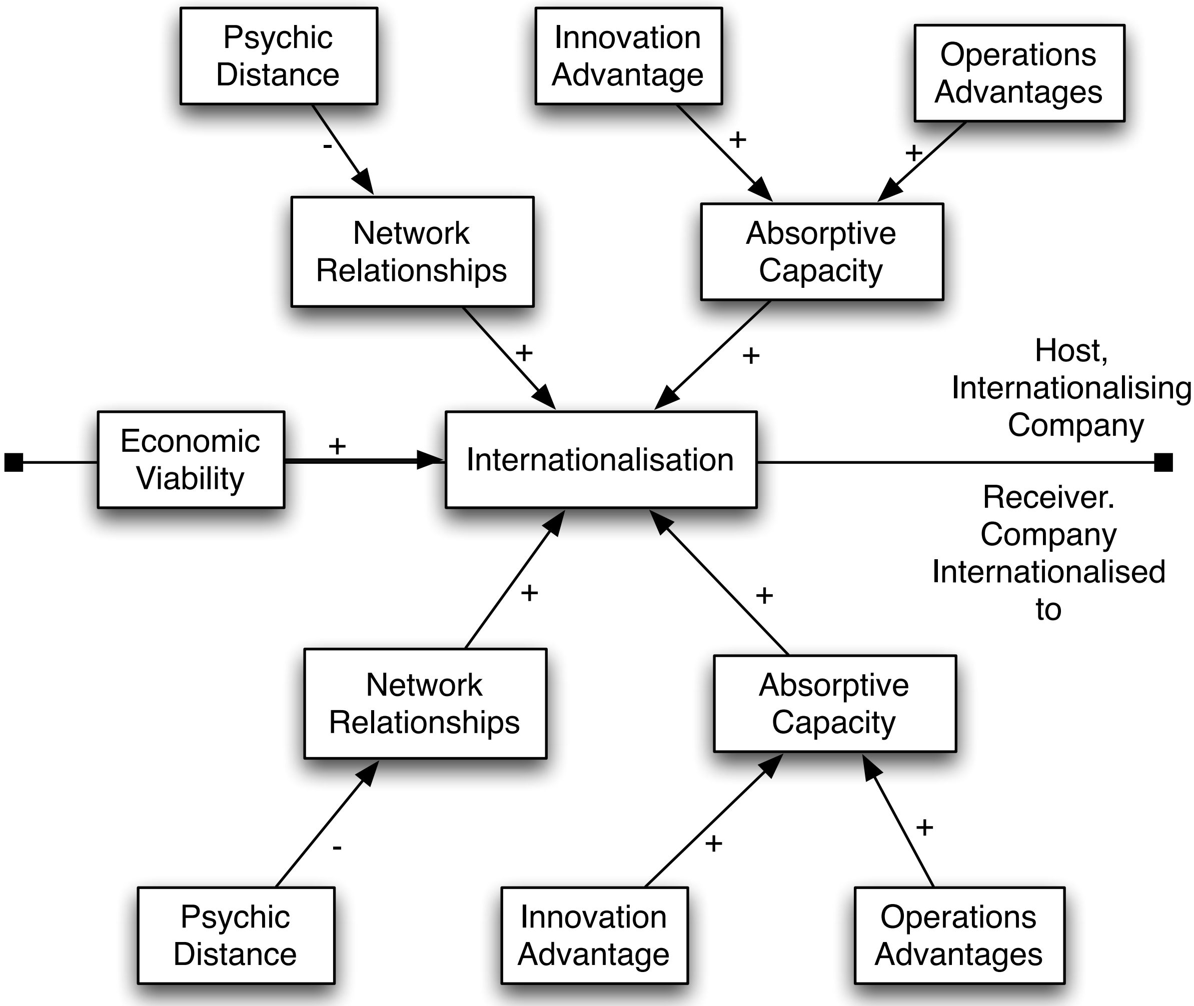


Figure 6.3 shows the internalization process for internationalizing SMEs, as obtained from the reflections and evidence presented above. According to this model, companies will start by selecting a company from their network, or have a company join their network. The closeness of that company within the network will define four variables. A partner that is close to the internationalizing company will have little behavioural uncertainty. The internationalizing company will trust them more and control them less, and the exchange of business and technical information between these companies will be high. If the company is far away from the internationalizing company, there will be high behavioural uncertainty, which will increase the control between the companies. Higher amounts of trust result in a reduction of control between the companies. A negative change in profit potential will reduce the trust, while a positive change will it. Commitment is very important in this model. An increase in trust will result in less commitment by the host company. They may have the chance to choose between lesser commitments in entry modes such as partnerships. Asset specificity and profit potential will increase the commitment of the company. Higher asset specificity means that the knowledge is tacit and complex, and to be able to transfer that knowledge and protect it from other companies the company must choose a higher degree of commitment in international business. Profit potential means that they will choose to commit more in international markets, rather than having a high level of control over the business. Commitment results in relational and technical embeddedness. High commitment means that the company will be in a sitatution where they can exchange more business and technical information than if they were less committed. The aim is to transfer technology or knowledge in order to internalize. Efficient technology and knowledge transfer is available through high levels of relational and technical embeddedness, absorptive capacity and ability to manage change. The knowledge gap between two companies will dictate the level of absorptive capacity. If the gap is too high then the absorptive capacity will be very low, as the prior knowledge will not make it sufficiently possible to absorb the new knowledge. Efficient technology and knowledge transfer will be seen as a practice satisfaction. If the transfer has commitment and practice satisfaction, then this will yield psychological ownership of the new technology or knowledge.

This model represents a single transfer between companies. It is possible to explain this as a dynamic model. Psychological ownership will produce a closer relationship and higher trust between companies, who will then start to control each other less as they begin to see more profit potential because of the internalization of the advantages. This will increase the commitment with trust. In turn, the behavioural uncertainty will decrease and become unimportant. These factors will produce more information exchange in business and technical areas. The knowledge gap will decrease and, because of higher absorptive capacity, higher amounts of information exchange and lessons learned about change management will increase the efficiency of the technology and knowledge transfer, and hence practice satisfaction and finally psychological ownership of a new technology and knowledge. This is a dynamic process wherein the relationships will develop and improve. This can be explained in relation to diseconomies of scale. If companies go through this cycle more at some times than others, the knowledge gap will become too small. This will lead to less practice satisfaction because the usefulness of the knowledge will be lower.

Figure 6.4 Internationalization decision making



In Figure 6.4, decision making for SMEs is modelled from the reflections and their evidence. The internationalization decision of an SME should look at the economic viability of the internationalization. This was done by Sturge Industries Ltd. The next stage in the decision making was not done, and this is why the problems in the second cycle occurred. The first problem faced by the companies was in the technology and knowledge transfer. This is actually modelled around the absorptive capacity of the host and receiver organizations. The host has to develop their absorptive capacity in order to be able to transfer the technology and knowledge – this is crucial as if they do not have enough knowledge, then the knowledge gap will be not be large enough. The recipient organization should develop absorptive capacity to absorb the new technology and knowledge. Absorptive capacity of both organizations is the product of their innovation and operational advantages. These will determine the absorptive capacity, because they will be sources of knowledge in the organizations.

It is not enough to be able to transfer and internalize knowledge to achieve economic advantages. The network relationships between these companies are also very important. The network relationships can be defined through the commitment and trust they have within the relationship, and how much control they apply to their network partner. This is a perception, and therefore will not be equal for both companies. This is negatively affected by the psychic distance that they feel, which is again an individual perception and differs for each organization. The psychic distance is not the same as in learning theory definitions, but relates more to business-relationship-based factors for equity-based internationalization.

6.5 Discussion of the survey findings

The discussion section will be divided into three sections. Each section will take a model and discuss this with reference to the literature and the action research findings.

6.5.1 Entry mode selection model discussion

The entry mode selection model is based on explaining the decision through technology and knowledge transfer and network relationships from the host and receiver perspectives.

The internationalization theories aim to explain the entry mode decision. The first theories of internationalization that will be discussed are the eclectic theories. The most important contribution to this was from Dunning (2001). His model of ownership, location and internalization is widely used in internationalization studies. The model evaluated for entry model selection really looks at the internalization advantage. The OLI model aims to reduce risk in order to avoid losing valuable knowledge. If the knowledge cannot be protected through patents and intellectual property rights, or if it is hard to license, then the choice of entry will be FDI (foreign direct investment). The model evaluated above does not look at this, but rather considers how internalization can happen. Ozawa and Castello (2001) defined internalization as a learning process. The entry mode selection model definitely looks at this type of learning. However, the learning in the model involves a dyadic transfer of knowledge between two entities in the international network.

The next theories of internationalization are the learning theories. Learning theory is also called the Uppsala model. Johanson and Vahlne (1977, 1990) proposed a model that begins with market knowledge. Witihin market commitment through current activities, the entry mode decisions are made. The Uppsala model (Johanson and Vahlne 1977, 1990) follows stages. The last stage is equity-based internationalization, and the earlier stages are all related to non-equity-based, export-oriented, modes of internationalization. The entry mode selection model evaluated above looks at equity-based internationalization. The importance given to technology and knowledge transfer is based on the selection of equity-based internationalization. The Uppsala model gives considerable importance to market knowledge (Johanson and Vahlne 1977, 1990 and Vahlne and Wiedesheim-Paul 1973). The entry mode selection model discussed within this dissertation gives more importance to the ability to transfer technology, absorptive capacity and network relationships. Reid (1981, 1983) and Forsgren (2002) criticized the Uppsala Model (Johanson and Vahlne, 1977, 1990) as deterministic. The entry mode selection model is not deterministic and instrumentalist, as it does not rely on stages of internationalization but rather explains the conditions under which to select any form of entry mode. Higher levels of entry mode are selected if the receiver environment has a high absorptive capacity and both parties can trust each other. If the host company does not possess technology transfer ability, they will select a higher level of internationalization. This differs from the Uppsala model (Johanson and Vahlne, 1977, 1990), which relies on market knowledge.

The Uppsala model (Johanson and Vahlne, 1977, 1990) also identified psychic distance as a constraint in internationalization. Companies will internationalize to more distant markets with higher modes of internationalization, as their psychic distance decreases (Johanson and Vahlne, 1977). The psychic distance in entry mode selection model explains network relationships. Within the action research, it was seen that the psychic distance actually affected trust, commitment and control within the network relationships. The entry mode selection model discussed here links psychic distance to network relationships, which are based on trust, commitment and control. The model predicts that psychic distance is a good determinant of the network relationships. However, the most important contributions of the model is in its measurement construct. Many authors have partially defined psychic distance as a construct related to geographic distance (Linnemann, 1966; Gruber and Vernon, 1970; Hirsch and Lev, 1973; Geraci and Prewo, 1977; Grosse and Goldberg, 1991; Grosse and Trevino, 1996; Dow, 2000), however the measurement model evaluation revealed that geographic proximity does not explain psychic distance. The manifest variables with the highest loadings to psychic distance are knowledge on business practice differences and knowledge on communication differences. The business practice differences have been presented as more reliable measures of psychic distance compared to market-based knowledge (O'Grady and Lane, 1996; Evans and Mavondo, 2002 and Child, Ng and Wong, 2002). Most of the research on psychic distance has discussed the importance of culture and its dimensions (Swift, 1998). However, in the entry mode selection model discussed above, though this manifest variable is found to provide some explanation for psychic distance, there were many other variables that explain the construct better. Gatignon and Anderson (1988) identified that equity-based internationalization is affected more by socio-cultural distance, which is the base of the psychic distance. The results from the entry mode selection model revealed that there is some evidence for this, but that many other variables need to be counted first, such as differences in business climate and communication.

The last theories of internationalization that will be used for the discussion are network theories. These have been developed from the learning theories, and are focused on the source of the market knowledge (Johanson and Mattsson, 1988; Johanson and Vahlne, 1990). Morgan and Hunt (1994), Uzzi (1997), Johanson and Mattson (1988, 1993), Axinn (1988) and Welch and Wiedersheim-Paul (1980) all agree that control, commitment and trust are key elements of network relationships, which moderate the learning ability of the companies within the networks. In the entry mode selection model, the network relationships have been modelled as a determinant of the entry mode selection. This has been done for two different contexts: host and receiver. The result shows that, in both contexts, the network relationships determine the entry mode. Another branch of network theories of internationalization studies the importance of networks and technology transfer for the innovation performance of the organizations (Lu and Beamish, 2004; Zanfei, 2000; Blanc and Sierra, 1999). The evidence in the entry mode selection model is a negative relationship between innovation advantage or capability and technology transfer ability. Lu and Beamish (2004), Zanfei (2000) and

Blanc and Sierra (1999) all studied multinational enterprises at a time when their networks were already established and working. The respondents of the present survey, however, are manufacturing SMEs, and their networks are currently being shaped. The difference may be that at the level of multinationals, their performance may be dependent on their innovation capability. However, at the time of their internationalization decision, SMEs do not need an innovation capability to enable them to transfer technology. The respondents also believe that in the receiver context the absorptive capacity is not dependent on the innovation capability. For SMEs, therefore, the innovation capability is not crucial for transferring knowledge and technology.

The international manufacturing networks model proposed by Colotla, Shi and Gregory (2003) combines configuration and coordination advantages. These can be achieved through improvements to the factory or network level. The entry mode selection model evaluated above actually looks at the internationalization decision with regards to the coordination elements at the network level. There is a tendency in international operations management literature to focus on the decision-making factors and methods. This literature is configuration based. The action research proves that companies need to think about coordination at the time of configuration. The international manufacturing network model (Colotla, Shi and Gregory, 2003) assesses these together. The factory-level improvements for better competitiveness are partially used here, but most focus is given to network-level improvements. However, there is a need for factory-level improvement as well. The network level of improvement at the infrastructural level is dependent on factory-level structural and infrastructural improvements (Shi, 2003). The network-level structural decisions should be related to both configuration and coordination decisions. The entry mode selection model evaluated above tells us that this decision should be made by considering the absorptive capacity of the receiver environment. If the host company does not have a technology transfer ability, the choice of entry mode will be higher. The trust and commitment between the host and receiver environment will affect the decision. These are not based on classical configuration factors and decision-making methods, but rather relate to the coordination aspects of the international networks. The contribution of this model and the action research is that they link these together at various levels.

The SME internationalization literature has focused on the managerial characteristics needed for SMEs to internationalize (Crick and Spence, 2005; Westhead, Wright and Ucbasaran, 2001; Chetty, 1999; Welch and Loustarinen,1988; etc.). The entry mode selection model does not look at these, but rather considers the effects of transfer of technology and network relationships. Weikl and Grotz (1999) provided the only research that talks about technology transfer and its effect on the innovation performance of SMEs. McDougall (1998), Davenport (2005) and Liesh and Knight (1999) talk about the effect of learning in SME internationalization, and its success, while Brouthers and Nakos (2004) identified asset specificity, behavioural uncertainty and environmental uncertainty as determinants of SME internationalization. The entry mode selection model accounts for behavioral uncertainty, as explained by the network relationship latent variables in the host and receiver environments. A higher network relationship means there will be lower behavioural uncertainty. Brouthers and Nakos (2004) explain that higher behavioural uncertainty will lead to higher modes of internationalization. The results of the entry mode selection model support Brouthers and Nakos' (2004) findings.

Technology transfer and absorptive capacity are the main components of entry mode selection model. The dimensions of absorptive capacity and knowledge transfer proposed by Kostova (1999) were found to only slightly affect the technology transfer ability and absorptive capacity. The most important factor that defined technology transfer ability and absorptive capacity was prior knowledge (Cohen and Levinthal, 1990). The respondents saw this as the most important factor. The following manifest variable was cultural differences, which was explained by Walker and Ellis (2000) as a barrier to technology and knowledge transfer. The next indicator with the most explanatory power was the ease of codifying the tacit knowledge. These are the three main determinants of entry mode selection. If a company is unable to transfer knowledge and technology, they will select higher entry modes; similarly if the absorptive capacity of the receiver environment is high, then the decision maker will select higher entry modes. These define the entry mode selection in relation to network relationship characteristics such as trust and commitment.

The entry mode selection model arose from the findings of the action research (Figure 3.6). The results above illustrate that the only unexpected relationships are that the network relationships will positively explain the entry mode. In Figure 6.3 & 6.4 in the action research findings, commitment can be interpreted as entry mode. This is similar to Johanson and Vahlne's (1990) market commitment. According to this, the entry mode will decrease with higher trust. Closer networks would also create higher trust. The results of entry mode do not support the trust relationships of Figure 6.3 & 6.4 but support control, commitment and closer relationships. Trust is closely related to commitment and control. The evidence from the analysis of the entry mode selection model enriches the findings of the action research in two ways. The technology transfer ability negatively predicts the entry mode. If a company is able to transfer knowledge, then it is expected that the decision maker will choose lower entry modes. Figure 6.3 & 6.4 should be explained from this point of view, as if a company can transfer knowledge and know that the receiver will absorb it, then it is expected that they will choose a partnership rather than a wholly-owned subsidiary.

6.5.2 Role of factory model discussion

The model for the role of the factory is based on two latent variables from two different contexts: technology and knowledge transfer, and network relationship,. within the host and receiver environments.

With regards to eclectic theories of internationalization, The OLI paradigm has been used extensively to analyze internationalization and multinationals (Dunning, 2001). However, this theory fails to discuss the role each different factory in an international network can take, though it does discuss how a company will choose a location and an entry mode. The role of factory has an impact on the entry mode selection.

In terms of learning theories, and particularly Uppsala school of internationalization (Johanson and Vahlne, 1977, 1990), as the market knowledge of the company increases, the company will choose higher levels of internationalization. This increase in entry modes can be associated with the higher roles given to the foreign operations. However, there is no certainty in explaining this within the Uppsala model. The learning theories do not directly discuss the role of the foreign operation, but indirectly assume that, for every stage, with increasing entry modes the role of the foreign subsidiary will increase. This is very deterministic. Reid (1981, 1983) and Forsgren (2002) criticized the Uppsala model of internationalization for this reason.

The Uppsala model (Johanson and Vahlne, 1977, 1990) integrates psychic distance, which has been linked to the network relationships in the role of the factory model. This was one of the results of the action research. Companies who suffer from higher level of psychic distance will find it hard to build relationships with foreign partners based on trust and commitment. The results demonstrate that a decrease in psychic distance positively affects the network relationship for both host and receiver environment. Better network relationships between the host and receiver environment means that the headquarters may assign higher roles to the foreign operations. The literature on psychic distance has not explained this effect of psychic distance on international networks.

Network theories represent an important development of learning theories. The role of the foreign operation model is affected by network relationships in two different contexts. The latent variables here are measured through trust, commitment and control manifest variables. Several studies in network theories of internationalization have observed the importance of trust and commitment. Morgan and Hunt (1994), Uzzi (1997), Johanson and Mattson (1988,1993), Axinn (1988) and Welch and Wiedersheim-Paul (1980) have given importance to these manifest variables because they moderate how much information will be exchanged between partners. Companies with higher roles of foreign operation should exchange more information and transfer more knowledge from intra- and inter-network partners. It is obvious that the decision maker will assign higher roles to companies that he trusts and will commit to, while seeing that the partners trust and are committed to him. The results from the analysis prove this. However, another branch of network theories identify innovation capability as a performance determinant for multinational enterprises. Lu and Beamish (2004), Zanfei (2000) and Blanc and Sierra (1999) believe that for multinationals to be successful they need to rely on the innovation creation. The innovation capability in the role of foreign operation model determines technology transfer ability and absorptive capacity in two different contexts. Technology transfer ability is negatively explained by innovation capability. This model is about the role of the foreign operation. It should be expected that higher roles will have more innovation capability. The role of the foreign operation model does not looking at this relationship, but rather considers whether innovation capability creates any technology transfer ability. The network theories of internationalization consider the opposite relationship.

The international manufacturing networks model (Colotla, Shi and Gregory, 2003) does not explicitly explain the different roles of the foreign operation. However, the model recognizes intrinsically that different network plants will have different roles. The role of the foreign operations model is evaluated and discussed above, and is actually related to the coordination aspects of the international manufacturing networks. The results show that the absorptive capacity of the receiver environment, and the trust and commitment that the host and receiver feel about each other, will determine the role of the foreign operations. The technology transfer ability of the host organization will negatively determine the role of the foreign operation. These relationships from the model are actually related to the coordination advantage of the international manufacturing networks. Vereecke, van Dierdonck and De Meyer (2006) also studied the manufacturing plants of an international network. They used three criteria proposed by Ferdows (1989) to define the role of foreign factory: autonomy of the plant, level of capabilities, performance of the plant and focus of the plant. Vereecke, van Dierdonck and De Meyer (2006) use the same parameters to divide the role of foreign operations into six categories. The role of the foreign operation model evaluated above and actually uses these six categories, but tries to find more parameters to define these categories. The results show that the decision maker assigns a role based on technology transfer ability, absorptive capacity, and network relationships in host and receiver environment.

SME internationalization literature considers the managerial characteristics and why certain companies internationalize faster than others (Crick and Spence, 2005; Westhead, Wrignt and Ucbasaran, 2001; Chetty, 1999; Welch and Loustarinen,1988; etc.). The role of factory model has not been explained by the SME internationalization literature, though there are efforts to explain the technology transfer (Weikl and Grotz, 1999). McDougall (1998), Davenport (2005) and Liesh and Knight (1999) recognized the importance of learning for the success of SME internationalization, while Brouthers and Nakos (2004) recognized the importance of asset specificity, behavioural uncertainty and environmental uncertainty as keys to SME internationalization. Nevertheless, none of these studies has ever explained the role of foreign operations. The behavioural uncertainty tries to explain the entry mode selection, but not the role that will be assigned with it. Technology and knowledge transfer, along with absorptive capacity, are the most important determinants of the role of the factory model. The same indicators for both latent variables, as discussed with respect to the previous model, are important for this model as well. Prior knowledge and ease of codifying, as set forth by Cohen and Levinthal (1990), as well as Walker and Ellis' (2000) cultural similarities, are the determinants of technology transfer ability and absorptive capacity. The latter has been proposed as a barrier to technology transfer (Walker and Ellis, 2000). The decision maker will assign higher roles to the foreign operation if the receiver organization has high absorptive capacity and the host has very little technology transfer ability. Other factors will also be important in explaining the role of the foreign operation, such as its autonomy and focus, as explained by Ferdows (1989).

The creation of the role of the factory model is one of the outcomes of the action research (Figures 6.3 and 6.4). The role of factory has been explained with reference to the technology transfer ability, absorptive capacity and network relationships of the host and receiver environment. The findings in Figures 6.3 & 6.4 should not be taken as a static model, but rather a dynamic one in which relationships develop. The role of the foreign operation will be dependent on the psychological ownership, practice satisfaction and commitment of the host and receiver organizations. The results from the role of the factory confirm this. The decision maker will assign higher roles of foreign operation if the absorptive capacity, and network relationship characteristics such as trust and commitment, are high between the host and receiver environments. The technology transfer ability is more like acting in the same manner as trust from Figure 6.3 The relationship will develop as there will be higher levels of technology and knowledge transfer within the international network, which will lead to the assignment of higher roles to the foreign operation.

6.5.3 Level of internationalization model discussion

The level of internationalization model is built around two latent constructs that are evaluated in two different contexts. These are technology and knowledge transfer and network relationships. The context of these latent variables is the host and receiver of the technology transfer.

The internationalization of any company has been analysed through several different theories. Eclectic theories of internationalization, particularly Dunning's (2001) eclectic paradigm, are very static and do not consider internationalization as steps to be taken in a progressive manner. However, the level of internationalization model recognizes that not all companies are at the same stage of internationalization. The OLI model does not provide an explanation as to why some companies are more internationalized than others.

Learning theories of internationalization, particularly the Uppsala model (Johanson and Vahlne (1977, 1990), identifies companies as committing more to foreign markets through increasing their knowledge about those markets. This commitment can be seen as higher modes of internationalization. This is, in essence, similar to level of internationalization. However, level of internationalization looks at different aspects of internationalization as well. A company may not internationalize to one single destination, but to many different locations with varying modes of internationalization. The overall composition of this international network determines the level of internationalization. The Uppsala model does not capture this richness and flexibility. Reid (1981, 1983) and Forsgren (2002) considered the Uppsala model deterministic, which may be one of the reasons why level of internationalization cannot be explained with this model.

Psychic distance states that companies will choose closer markets and internationalize using lesser modes of entry if they have no knowledge about certain issues such as culture. There is also extensive research which claims that geographic proximity can be a barrier for a company to internationalize (Linnemann, 1966; Gruber and Vernon, 1970; Hirsch and Lev, 1973; Geraci and Prewo, 1977; Grosse and Goldberg, 1991; Grosse and Trevino, 1996; Dow, 2000). The level of internationalization has been addressed with reference to psychic distance. The level of internationalization model evaluated above reveals that the most important manifest variable for the host and receiver environment is knowledge of business practices. However, in the level of internationalization model psychic distance is related to the network relationships based on trust and commitment. These network relationships do not explain the level of internationalization, and hence psychic distance does not explain the level of internationalization. This is opposite to the findings of Johanson and Vahlne (1977, 1990) and Vahlne and Wiedersheim-Paul (1973), whose studies used export-based companies, and each had different foci. Equity-based internationalization may be less affected by psychic distance and network relationships compared to entry mode selection and role of factory decision.

Network theories of internationalization consider the source of knowledge for internationalization. Johanson and Mattsson (1988) and Johanson and

Vahlne (1990) located this knowledge within the networks of any business. The next group of research looked at what determines success in networks and how this relates to the rate and speed of internationalization, which is closely related to the model of level of internationalization. Morgan and Hunt (1994), Uzzi (1997), Johanson and Mattson (1988,1993), Axinn (1988) and Welch and Wiedersheim-Paul (1980) observed that trust, commitment and control are key determinants of the efficiency of information exchange, as well as knowledge and technology transfer within networks. The level of internationalization model accounts for these issues under the network relationship latent variables in two different contexts. Nevertheless, these do not explain the level of internationalization. This is surprising, because most of the network theories of internationalization relate to multinational enterprises. Lu and Beamish (2004), Zanfei (2000) and Blanc and Sierra (1999) state that multinationals depend on innovation from their international networks for competitiveness. The innovation capability latent constricts in the two different contexts do not explaining technology transfer ability and absorptive capacity, respectively. This is because the above contributors to network theories of internationalization take the relationship between technology transfer and absorptive capacity as a determinant of innovation success. The level of internationalization model tales this relationship from another perspective: if a company is successful in innovation, then it should be expected that they would have some technology transfer ability and absorptive capacity.

The international manufacturing network model, proposed by Colotla, Shi and Gregory (2003), does not aim to explain the level of internationalization between different companies, but rather looks at the general network and how it should be designed and managed. The level of internationalization model evaluated above can be seen to develop this construct through explaining that technology transfer ability and absorptive capacity will lead to higher levels of internationalization. These are related to coordination aspects of the model, which are located within the network (Shi, 2003).

SME internationalization has many different strands of explanation. The first is the managerial characteristics to ensure success, speed and multi-directional internationalization (Crick and Spence, 2005; Westhead, Wrignt and Ucbasaran, 2001; Chetty, 1999; Welch and Loustarinen,1988; etc.). The level of internationalization model evaluated above does not examine these characteristics. They are important for SME internationalization, but most of the aforementioned studies look at the export-based internationalization, rather than equity-based internationalization. Weikl and Grotz (1999) identified technology transfer as an important success factor for SME internationalization. The results regarding level of internationalization reveal that technology transfer ability and absorptive capacity are very important determinants of success in internationalization. McDougall (1998), Davenport (2005) and Liesh and Knight (1999) identify the determinant of success in internationalization for SMEs as learning.

Technology transfer ability and absorptive capacity are the only explanations of the level of internationalization model. These are based on the seminal work of Cohen and Levinthal (1990) on absorptive capacity. In the measurement models, many indicators have been used to explain the technology transfer ability and absorptive capacity. Kostova (1999) and Lane and Lubatkin (1998) predicted that institutional and cognitive ownership of the new technology or knowledge is very important. This and previous models have found that this concept has some relevance, but the most important indicators were prior knowledge and ease of codifying tacit knowledge (Cohen and Levinthal, 1990) and similarities in culture and working systems (Walker and Ellis, 2000), the latter of which was labeled as a barrier to technology and knowledge transfer. Level of internationalization is positively explained by absorptive capacity, and negatively explained by technology transfer ability.

The action research findings (Figures 6.3 and 6.4) are the building blocks of the level of internationalization model. There are certain differences within the findings of the action research shown in Figure 6.3. The network relationship latent variables in host and receiver environment do not explain the level of internationalization. The only explanations of technology transfer ability and absorptive capacity are only parts of the Figure 6.3 findings in action research. Absorptive capacity, technology and knowledge transfer, practice satisfaction and psychological ownership are the only explanations from the level of internationalization model that are significant. A possible explanation for this is that network relationships, in the long run, can be managed, but what is most crucial is the absorptive capacity of the receiver environment. If this is not good enough, then further internationalization and higher roles for the foreign operations are not possible. However, technology transfer ability is negatively related to the level of internationalization. This should be viewed in relation to the entry mode selection model. A company with low technology transfer ability would select higher levels of entry mode to increase their control over the technology and knowledge transfer. These higher levels of entry mode mean that they will have more employees abroad, and higher levels of production and commitments. These commitments naturally increase the company's level of internationalization.

6.6 Managerial decision-making model

The international decision-making process is an instrument that aims to reduce risk for the decision maker. This is the motivation of the decision maker for SMEs (SMEs). The following four steps should be followed to achieve the least risky decision.

Step 1: Select possible candidate countries

The decision maker will start by selecting possible countries to internationalize to. These decisions will be affected by several criteria, including close network relationships. Companies with which there is a supply chain or new product development relationship are better candidates then companies in the same or similar industries.

Step 2: Select an entry mode for each candidate

This should be done based on four decision criteria. The first, which is the most controllable for the decision maker, is how much they trust the company. This should be based on previous experiences with that company. The decision maker will have a rough idea about the profit potential of the new location. If this is high, then the decision maker may overlook any problems in trust. The possible partner’s trust is also important. If the decision maker believes that they have sufficient levels of trust and commitment, then a higher level of partnership is the best option. If trust is not established and there are many behavioural uncertainties, then the decision maker should reduce the risk by opting for an acquisition of an existing company or a wholly owned green- or brown-field investment. This decision will be altered by the absorptive capacity of the candidate location. If trust is established between two companies and there is high flexibility capability of the candidate location, then the level of partnership should be increased further. If there is no or limited absorptive capacity within the candidate location because they have very little flexibility capability, then the level of partnership should be decreased. Higher levels of partnership decrease the risk of losing valuable knowledge to the other company. If the decision maker’s company has very little capability in terms of transferring technology and knowledge because they have limited knowledge on the quality and flexibility of their systems, then they should go for higher levels of entry mode. The decision maker should also assess the knowledge gap between organizations. It is not enough to know whether the candidate location or the host company has high absorptive capacity; the knowledge gap is very important as well. This knowledge gap should not be too small or large, but optimal so that the transfer of knowledge from one location to another can be achieved. The size of the gap will determine the usefulness of the absorptive capacity of the candidate location, or the technology and knowledge transfer of the decision maker's company.

Step 3: Select a role for the foreign operation for each candidate

Every internationalization decision will have three elements: location, entry mode and the role given to the new network entity. The decision maker needs to make choices about all three of these. Within the entry mode decision, the decision maker will have already assessed the absorptive capacity of the candidate location based on their flexibility. He will also know how much he can trust them and how much they trust him. These trusts will be based on previous experience. Finally, he will know his company's technology and knowledge transfer ability. This information will be obtained from his knowledge about his company's quality and flexibility advantages, and enriched by the motivation of his company's internationalization decision and the technical capability of the candidate company. He should first use Ferdows' (1989) model to assign a role of each candidate location. If the motivation of the decision maker is to be close to demand but the foreign operation has little capability, then he will choose a server operation. If the decision maker is motivated to access low-cost production and the candidate location has high capability, then he should assign them as source (role of factory). The absorptive capacity, mutual trust and technology transfer ability should be used to increase or decrease this role. If the candidate company has high absorptive capacity because they have high flexibility capability, and the decision maker trusts them and believes that they trust him or her, then the decision maker should assign them a higher role. These will allow the foreign operation to contribute more to the network, as well as learn more from it. If the technology and knowledge transfer ability of the decision maker's organization is high, then he will lower the role because he can easily transfer the technology and knowledge required for the foreign operation. This can be balanced with mutual trust and the absorptive capacity. This means that the role will stay the same or, depending on the strengths of these variables, may decrease or increase. If the decision maker's organization does not have enough technology or knowledge transfer ability, then he or she will automatically decide to increase the role of the foreign operation because the decision maker's organization cannot really help the new network partner as much as possible. Absorptive capacity and technology transfer ability have a relationship which helps to solve the knowledge gap problem between the decision maker's organization and the candidate location. If the gap is to large then it is hard to transfer knowledge between them, regardless of their strengths; if the gap is too small then motivating these two companies will be very hard.

Step 4: Select the entry mode with the least investment and risk

The decision maker will now know the entry mode and the role for each of these candidate locations. The investment required for each of these candidates with respect to their entry modes should be calculated. Higher investment is associated with high risk, and higher entry modes need higher investment. The justification of any higher investment should be made based on one single criterion: the absorptive capacity of the candidate location. Locations with higher absorptive capacity should be chosen, even if it means that there is a need for higher investment. The entry mode and the associated trust will determine the speed of realizing the benefits of the internationalization. If there are two similar candidates in terms of absorptive capacity, the candidate with the highest mutual trust and higher entry mode should be selected. The investment is the risk taken; the wise risk is to realize the benefits as soon as possible. If the period of realization is long in duration, the investment increases and so does the probability of failure.

In Appendix 10 the process flow chart for the decision making model is presented in three pages.

6.7 Chapter summary

This chapter explains the findings and discussion from the action research and survey. The reflections from cycle one and two are represented. The internationalization decision had an economic purpose. The location specific advantages are internalized through ownership advantage. The decision maker will have some experiential knowledge needs to make decisions, and the stage of internationalization will determine what kind of knowledge is needed. Managerial characteristics are important to reduce or negate the knowledge gap. The literature on SME internationalization provides a very detailed list of managerial traits required for export-based internationalization. The management issues such as knowing trustworthy people in another country are important in decision-making. This will also help to reduce the need for experiential knowledge for the manager. The entry mode will be selected based on trade-off between the manager's experiential knowledge and the possible management methods used to learn them or negate them. Trust, control and profit potential are all important factors when a company is making a commitment decision. The internationalization decision is strategic. It can be reactive or proactive. In each case, the strategy is developed through the knowledge gathered from the network partners. Internationalization will lead to new network structure, which will result in more knowledge for strategy development and reduce uncertainty for the business. The internationalization decision is dependent on the knowledge collected from different levels of network. The selection of factors for the internationalization decision will be made according to the motives and business needs of the decision maker. Manufacturing SMEs do not follow the same strategy and processes of internationalization in exporting and equity-based internationalization. The reflections from the cycle two are listed below. The ownership advantages can be used to internalize location-specific advantages. Ownership and location-specific advantages are easier to predict and manage, compared to internalization. Internalization means that there is an element of learning in the process, which may increase the cost of internationalization. Experiential learning needed for equity- based internationalization is different to that required for export-based internationalization. Knowledge regarding technology transfer and the capability of technologies (knowledge based technologies) is required for equity-based internationalization. Psychic distance is still important for managers in their decision-making process. The equity-based internationalization will require different factors than export-based internationalization. Network theories of internationalization contribute the concepts of relational and technical embeddedness. Companies should select their partners for internationalization through these two important concepts. The decision making for internationalization should not only account for the configuration advantages, but also think about coordination advantages. Asset specificity, behavioural and environmental uncertainty increase the need for equity-based internationalization. The risks of equity-based internationalization for SMEs include lack of absorptive capacity, different organizational practices, change management difficulties, general communication difficulties and changing conditions through learning. The managerial characteristics needed for equity-based internationalization of SMEs include negotiation skills for change management, technical ability to see problems related to knowledge and implementation of technology. To transfer organizational practices, and hence knowledge and technology of any sort, the ley to success is internalization through commitment, satisfaction and psychological ownership. The knowledge gap between host and recipient organization should be optimal. The aim of any technology or knowledge transfer is to replicate the operations performance in the other organization.

The reflections from two cycles are then put into a process of internationalization, which is represented as a figure.

Survey has been discussed against the literature and main finding from entry mode and role of factory is the need for absorptive capacity in the recipient organization should be high so that the new foreign subsidiary can contribute to the network with higher roles and knowledge. The absorptive capacity of the receiver environment is a product of the flexibility advantages within their operations. The technology transfer ability gives confidence to the internationalizing SME and would lead to lower roles and entry modes. The network relationships such higher trust,

commitment and lower control would lead to higher roles and entry modes.
The level of internationalization in terms of multinationality index is only dependent on the absorptive capacity of the receiver organization.
These discussions are then reduced to a managerial decision-making model with four step.

7 Conclusion

7.1 Introduction

The following chapter will present the conclusions of this thesis. These conclusions can be best understood with reference to its original contribution to the literature. The thesis started by posing some questions to investigate (Chapter 1); the present chapter will show how these research questions were answered, and will end by looking at the study's theoretical and managerial implications, which will provide directions for future research.

7.2 Conclusions

Conclusion 1: SME location decisions are only dependent on their ability to transfer and absorb new knowledge, which is controlled by the manager's perception of the new location.

SMEs will internationalize according to their ability to transfer or their receiving organizations ability to absorb new knowledge (Evidence: level of internationalization model results). If the knowledge is very hard to transfer then SMEs will choose higher forms of entry mode such as wholly owned factory because they would like to control the transfer of the technology (Evidence: entry mode model results). However, the transfer of knowledge would be a lot easier if their ability and the absorptive capacity of the new environment is high enough hence this provides lower forms of entry mode such as partnership (Evidence: entry mode model results). The limited resources of SMEs restrain them to choose lower forms of entry and this means that they need to find high absorptive capacity companies to partner with. Their absorptive capacity will not be useful if the knowledge gap is too wide (Evidence: Cycle two reflection 11). Therefore, they can reduce their commitment to international markets by choosing a partner with which they have good network relationships (Evidence: Entry Mode Model Results), or whose asset-specific knowledge is easy to codify (Evidence: Cycle two reflection 6), and finally if they believe that the receiving organization has the ability to change (Evidence: Cycle two reflection 8, 10). Such network relationships reduce the psychic distance arising from business differences between two countries (Evidence: Cycle two reflection 3 and entry mode and role of factory model results). This psychic distance is different for non-equity, compared to equity-based, internationalizations (Evidence: Cycle two reflection 3 and entry mode and role of factory model results).

Asset specificity (Brouthers and Nakos, 2004) requires more control of the organization in terms of technology and knowledge transfer. This is a development on findings that high behavioural uncertainty leads to higher modes of internationalization (Brouthers and Nakos, 2004). Knowledge gaps (knowledge distance of Liyanage and Barnard, 2003[1]) increase as asset specificity (Brouthers and Nakos, 2004) increases, and in turn codifying knowledge (Walker and Ellis, 2000) becomes harder (Evidence: Cycle two reflections 6 and entry mode model results). The entry mode decision has been linked to behavioral uncertainty by Brouthers and Nakos (2004), and has not yet been related to technology or knowledge

[1] The knowledge distance between two organizations is resultant of the difference between their knowledge. Similar but nearly the same level of knowledge means very little knowledge distance. This is also called cognitive distance.

transfer by any research. The originality of the present research, therefore, is that it links all of these together with explanations regarding absorptive capacity (Cohen and Levinthal, 1990). There is a need for higher entry modes when the absorptive capacity of the receiving organization or the technology and knowledge transfer ability of the host organization is very low (Evidence: Entry mode model results). The internationalizing SME can solve this via a superior ability to manage change (Evidence: Cycle two reflection 7). An additional important conclusion of the present research is that it creates a definition of psychic distance. Many previous authors have also defined this, but they have never have looked at it with reference to equity and non-equity based internationalization. The closest findings are those of O'Grady and Lane (1996) and Child, Ng and Wong (2002), who used mixed samples of firms following equity- and non-equity-based internationalization. The former form of internationalization requires different sets of knowledge compared to the latter, and relates more to how to run a factory abroad (Evidence: Cycle two reflection 3).

Conclusion 2: The subsidiaries will only have important roles if they are able to transfer knowledge from within the national and international boundaries.

The SME's internationalization decision-maker will give higher roles to new manufacturing enterprises if the receiving organization has ability to absorb external knowledge (Evidence: Role of factory model results). This should be coupled with good network relationships, which will reduce the need for control and increasing the role of the factory (Evidence: Role of factory model results). If the decision maker believes that the host organization has the ability to transfer knowledge, then they will select roles that require less commitment (Evidence: Role of factory model results). The aim of the decision maker is to achieve successful technology and knowledge transfer. This requires high absorptive capacity (Evidence: Role of factory model results) (optimal knowledge gap (Evidence: Cycle two reflection 11), low asset specificity and/or ease of codifying (Evidence: role of factory model results, Internationalization process figure at the findings of action research)), and good network relationships (Evidence: Role of factory model results).

Knowledge transfer through absorptive capacity (Cohen and Levinthal, 1990) affects the role the decision maker should give to the foreign manufacturing operation. This is related to the motivation and capability of the foreign operation, according to Ferdows (1997). This may be true, but in relation to role selection we have found that a better explanation relates to the foreign operation's ability to absorb new knowledge. Behavioural uncertainty will lead to selecting higher roles, regardless of the ability to transfer or absorb new knowledge (Evidence: Cycle two reflection 6). If the ability of the host organization to transfer new knowledge is high, then they will not give higher roles to the foreign organization because they will aim to control the relationship. Higher roles are given to organizations that have been proven to have absorptive capacity, hence developing the network with new knowledge. This is also true for roles that require some form of learning from the external environment. The contribution here is the relationship between the role of the factory and absorptive capacity (Evidence: Role of factory model results).

Conclusion 3: SME internationalization success is only dependent on the ability to transfer and absorb new knowledge. An SME's level of internationalization depends on its ability to transfer knowledge, and the absorptive capacity (Cohen and Levinthal, 1990) of the receiving environment (Evidence: Level of internationalization model results). The knowledge transfer will determine how much an organization will grow internationally. The literature has not yet addressed this issue, and therefore this represents an original contribution of the thesis. The asset specificity and ease of codifying will have great effects on the ability of the host company to transfer knowledge (Evidence: Level of internationalization model results). The asset specificity negatively affects the level of internationalization of the SME, while ease of codifying positively affects the level of internationalization. These relationships explain why SMEs that have high knowledge about their technology can easily internationalize.

7.3 Critical reflection on research objectives

The research questions of this thesis, as listed in Chapter 1, are as follows.

1. What factor provides the least risk in relation to entry mode decision? The factor that provides the least risk in relation to entry mode decision is the ability to transfer and absorb knowledge. The moderators for this include asset specificity and ease of codifying knowledge. The network relationships negatively

affect the entry mode decision: if an SME has good relationships within a network, they select a less risky entry mode. The ability to manage change has a similar effect.

2. **What factors provide the least risk in the role of foreign manufacturing internationalization decision?** Higher roles within the new manufacturing network are only given to foreign factories that have good network relationships and high absorptive capacity, which provide high levels of information and knowledge exchange. The technology transfer ability negatively affects the role, as the internationalizing SME will wish to control the relationship and manage the technology and knowledge transfer.
3. **What factors provide high levels of success in international manufacturing decisions?** Success is only achievable if the SME has a high technology and knowledge transfer ability. The internationalizing SME will wish to control and manage the technology and knowledge transfer. Alternatively, they will aim to have receiver organizations that have high absorptive capacity through which technology and knowledge transfer can be successful. SMEs' success in internationalization is dependent on their success in relation to technology and knowledge transfer.

7.4 Theoretical implications and future research

This section will only look at the how the conclusions affect the theory of internationalization in general and for SMEs. The managerial implications and methodological limitations will be explored below.

The internationalization theories of international business and operations management can only explain part of the process. They are usually limited in terms of their background as, for instance, behavioral researchers (Johanson and Vahlne 1977, 1990) analyse internationalization as a behaviour. This limits their findings, as they assume that certain issues – such as making a commitment – are instantaneous or lead to the same performance in every company. Economic theories such as eclectic paradigm (Dunning, 1988, 1993) take a similar approach, but provide an analysis from the perspective of capturing monopolistic advantages. If we take two similar firms investing in the same location, one of them will be better able to internalize the monopolistic advantages. Hence, economic theories can only explain the *advantage and location* for internalization, without explaining the process of internationalize. In other words, the question of "why" is answered, but the process is not.

The operations management literature on internationalization explores the phenomenon from a decision-making perspective. This is also limited, as it is hard to encompass all the factors needed for a successful decision.

This thesis aims to build a bridge to explain internalizations, changing commitment and initial coordination between two operations in different countries. The scope of the research is limited, however, because coordination is defined as technology and knowledge transfer. There can be many other forms of coordination that has not been included within this thesis. It was also mentioned below, in the managerial implications, that there are many forms of coordination between two operations in different international locations; these can only be understood through a longitudinal study of internationalization which takes account of may different ways to coordinate between network partners.

There is also a need to develop a better understanding of psychic distance in equity-based internationalization. The survey in this thesis revealed that there are many differences between export-based and equity-based internationalization.

7.5 Managerial implications and future research

SME managers should think about both location advantages (configuration) and technology and knowledge transfer issue advantages (configuration) when making decisions relation to internationalization. A decision given with only coordination advantages may not be actualized for three reasons. First, the company may find it hard to transfer the knowledge that is necessary for success in foreign operations. This may be because the knowledge is not codified, and they may be learning and developing their competence based on that knowledge. The manager will select technologies that they are confident they have the necessary skills to transfer, and, in addition, managers will be reluctant to transfer technologies that they believe are their competencies. Second, the receiving company may find it hard to absorb the knowledge (Cohen and Levinthal, 1990). There are two forms of problems that can occur here: first, the receiving company may not have the necessary prior knowledge (Cohen and Levinthal, 1990) that is required to learn the new knowledge.

The knowledge gap (Liyanage and Barnard, 2003) should therefore be optimal to achieve maximum benefits from the new knowledge. This will lead to selecting partners that are knowledgeable enough, but yet need to learn. Second, the receiving company may have the necessary prior knowledge, but the process of technology transfer may not be managed well. This thesis did not look at this issue, and it should be researched further.

Last, the relations between two companies, or host and subsidiary, directly affect the success of knowledge transfer. The manager should work to build good relationships between companies and manage that relationship in the implementation stage. The decision-making process should take into consideration companies or ways to manage wholly owned subsidiaries. Most SMEs would consider partnerships rather than wholly owned subsidiaries. The manager should be careful in selecting partners, as if there is no partner available that they can trust and work with then the only option should be wholly owned subsidiaries. Managers value the control and benefits of wholly owned subsidiaries more than partnerships, as they are able to become more experienced in internationalization decisions.

This thesis is limited in terms of explaining the importance of coordination for internationalization decision-making. There are other forms of coordination after transferring technologies and related knowledge to the recipient organization. These were not explored here, partly because the inductive action research was only continued up to the point that the technology and knowledge transfer had been partially achieved. The duration of the relationship should be observed and analysed to understand other important coordination issues. These should also be addressed as far as possible in the decision-making process.

7.6 Methodological limitations

The limitations of this research have three levels. The first is the mixed methodological level, which then has two sub-levels. The limitations of the sub-levels also affect the overall research.

The limitations of the mixed methodology are mainly based on its design. There are two main design types for mixed methodology (Tashakkori and Teddlie, 1998) – these are sequential and concurrent designs. This research uses sequential design, and the main disadvantage of this is the time required to complete it. This was one of the limitations of this research as well. The concurrent design has many limitations that have not been the case for this research. The integration between the qualitative and quantitative research took place late in the sequential design, and this meant it took even longer to complete the research. The mixed-methodology research design used gives equal importance to the qualitative and quantitative investigations. However, one of the limitations of the research within this thesis is the sequence of integration. If we change the sequence of integration then the inferences from the mixed methodology will change. Another limitation is that the inferences made in qualitative research are the inputs for the qualitative research. This means that if the wrong inferences are drawn from the qualitative study, the efforts of the quantitative study may be misdirected. Furthermore, it may not be that the inferences are wrong per se, but rather are idiosyncratic, and in turn the quantitative study may not show any relationships. This is a general risk with this type of mixed methodology. Triangulation was used within this research between the theory the methodology. However for each design – qualitative and quantitative, there is also a possibility of data and investigator triangulation (Jick, 1979). This is more important for the action research study for this dissertation. The data triangulation for action research has been achieved to a degree, but investigator triangulation understood by case study research has not been achieved. Instead, the participants of the action research provided the investigator triangulation. The limitation of the mixed methodology design in itself, if we do not look at the individual designs that made up the mixed methodology, does not provide data and investigator triangulation, but is good for methodological triangulation. Onwuegbuzie and Johnson (2006) listed nine legitimation criteria to confirm validity and reliability of the mixed methodology research. The mixed methodology design used provided most of these legitimations; several are good for only concurrent design, such as conversion legitimation. The only limitation of this research in terms of validity and reliability is commensurability legitimation, which asks for constant switches between qualitative and quantitative methods to create a third viewpoint. This was not possible within this design, as switches are only possible if the integration point is very early in the research design. The integration point for this design is when the inferences from the qualitative research are known, and they are then used for input into the quantitative study. The switches between them are not clear; however, the discussion provided an opportunity to switch between qualitative and quantitative methods, while interpreting the inferences.

The action research methodology used in this study also has several limitations, most of which are limitations of action research itself. The most important limitation of the action research and design used is the scope of the study, which cannot claim any generalizability. This is due to the fact that a single company was researched. However, although action research does not aim for any generalizability, it does offer other types of advantages such as rich data and inferences. From most scientific or philosophical stances this has a problematic nature. However, this drawback of the action research has been remedied through use of mixed methodology and survey methodology applied through the results of the action research managed t generalize the results of the action research. The key to achieve generalizability is through achieving or exceeding the maximum number of responses required. This is calculated through either multiplying the number of paths with 10 or multiplying the largest number of indicators of a formative construct by 10 (Hair, Ringle and Sarstedt, 2011; Chin et al., 1996). The survey used within this research does not have any formative measurement and the numbers of paths between constructs are 16. The responses are 320 and this means that action research results have been generalized successfully. The action research asks for the researcher to become an active participant in the change process (Lewin, 1946), yet some academics propose that the researcher should be an observer and should reflect on observations (Stenhouse, 1975). This creates a spectrum of where a researcher stands in the research design. Most of the literature proposes participation from the researcher, and the level of this varies from source to source. The researcher for this thesis chose a design wherein he became an active implementer, rather than playing a consultant role in which he needed to give advice on the best way to make a decision. The managing director was asked how he would tackle the problem at hand, and his way of problem-structuring and -solving was then considered via the researcher's implementation. This is a limitation from a methodological perspective (McNiff and Whitehead, 2002; Westbrook, 1995; Coughlan and Coghlan, 2002). The logic behind this consultant role is to be able to use the theory proposed from previous studies in the new context (McNiff and Whitehead, 2002; Westbrook, 1995). However, most action research using previous theories would find similar results, which would make few changes to the theory. This is an addition limitation of this type of study. The limitation of the design used lies in the fact that it does not utilize available theory at the start, but rather uses the managing director's view on how the problem should be solved. This has provided other advantages (Coughlan and Coghlan, 2002), such as reporting the problems and difficulties in the implementation stage.

Another problem associated with participation in the implementation of the action research is the subjectivity of the inferences. This is a limitation to all action research studies. Most of the literature (McNiff and Whitehead, 2002; Westbrook, 1995) recognizes this limitation, but also reports that action research does not aim to report objective results. The validity and reliability of action research is definitely achieved in other ways. Winter

(1989) and Reason and Bradbury (2001) suggest several ways in which to achieve validity in action research. This research adheres to most – if not all – of these. The limitation of subjectivity is not a problem once the results are validated, though the inferences remain highly subjective, and subjectivity is also decreased by a high number of visits to the company. Kemmis and McTaggart (1988) believe that there should be a plan in terms of number and duration of visits to the company. This should reduce subjectivity and increase the consulting effects proposed by many action researchers. However, the researcher in this thesis was based within the company, and was dealing with the specified problem for a long period of time – hence, the subjectivity of the results may have been increased. Although a theory was not used at the start of the research, thereby increasing the validity of the findings, a discussion and critique of the accepted theory has been included at the end of the action research analysis chapter.

The scope of studies in action research is limited to one single company, and this cannot be really changed. Most action research is done for small samples, and the time requirement is the biggest obstacle to increasing the number of samples. Learning can only happen through implementation, which requires extensive amounts of time by the researcher. The scope set should be very narrow, but the study's representativeness must be based on the definition of *what* the company is representing. The company that participated in this research is a small manufacturer from Dudley, UK. Their products are mature, with very little innovation. The competition for their industry comes from developing countries including China. This company therefore does not represent a high technology company that is competing with innovations in their industry. However, they may have some similarities with such companies, as well as many differences.

The action research data can be collected through a number of means. This study collected data mainly from informal meetings and reports. Other forms of data collection were not suitable because of the long duration of the study and interaction between participants.

The survey has different limitations compared to action research. The most important limitation relates to the question of whether it is exploratory or theory-testing. The inferences from the action research served as the input for the survey study. The aim of the exploratory study is to understand the theory from the perspective of a well-established theory. However, theory testing aims to test the relevance of a theory. This research is neither of these, but fits into a more holistic construal (Bagozzi and Philips, 1982). This explains the type of survey study design. This approach starts through developing a new model (through the action research, in this study) which is used for hypothesis generation. An holistic construal is very suitable for structural equation modeling, but this model does not use the last stage of it. Rather, the model stays the same after it has been tested. The mixed methodology and its integration points make it harder to define the survey design through one of these established methods, which also makes it harder to communicate to other academics.

The scope of this research is based on relations to the action research company. The first decision made was that the sample would be from manufacturing companies, and then that it would consist of SMEs. These decisions were made at the start of the research. However, because of the limitations on time and capital, only UK SMEs were selected. The execution of the survey required several calls from the researcher to the companies, and some of the companies were also sent several questionnaires. The cost of following such a survey execution with overseas SMEs would be very high, and the study would have taken even longer. A decision was made to include the full range of manufacturing SMEs from the UK, which helped to identify commonalities between different industries. The limitation of selecting UK SMEs means that while the results may predict the behaviour of SMEs in other developed countries, they may not predict decision making within those in developing countries. It is obvious that there will be cultural changes in decision making in each country. The countries that have cultural backgrounds in common with the UK will have similar ways of making decisions. Nevertheless, some of the relationships found from the survey model, such as internationalization success, will depend on the ability to transfer and absorb new knowledge, which would be similar for all countries.

Another limitation relates to the constructs used. The constructs used by previous researchers were not available in most constructs. The construct definitions were developed through the available literature. There was a need to test the constructs, and this was done through obtaining loadings from structural equation modeling. The constructs were selected according to the inferences made in the action research. Thus, the subjectivity problem was carried into the survey through this vessel. However, through defining the constructs, the subjectivity problem has been solved to a degree. The hypothesis testing also provided generalization of the results by identifying those that are common in all manufacturing SMEs.

The role of factory construct is single item construct, which is not advisable in structural equation modeling. However, Sarstedt and Wilczynski (2008) has revealed that the difference between using single or multiple items in partial least squares based structural equation modeling decrease the path coefficients between the constructs that are related. However, the difference is not significant between two groups. Sarstedt and Wilczynski (2008) calls for careful use of single item constructs as a last resort.

The responses to the survey have been received at different times. At the time of their arrival they were marked with serial numbers but not with date and time. This makes it very hard to do a response bias test because the cut off point is hard to decide. Nevertheless, a careful examination of the responses indicates that they are not much different than early responses.

7.7 Chapter summary

There are three main conclusions for this thesis. SME location decisions are only dependent on their ability to transfer and absorb new knowledge, which is controlled by the manager's perception of the new location. The subsidiaries will only have important roles if they are able to transfer knowledge within their national and international boundaries. SME internationalization success is only dependent on the ability to transfer and absorb new knowledge. These conclusions directly relate to the research objectives set from the introduction chapter of this thesis. The theoretical implications are the importance of the knowledge and technology transfer in internationalization because this governs the internalization of location advantages with company specific advantages. The managerial implications are related to the decision making model presented in findings and discussion chapter. The limitations of the research presented within this thesis are described within mixed methodology, action research and survey. The application of mixed methodology helped to overcome some inherent methodological limitations of each method.

References

Ahokangas, P. (1998) Internationalisation and resouces: an analysis of processes in Nordic SMSs, doctoral dissertation, Universitas Wasaensis, Vaasa

Albino, V., Garavelli, A. & Gorgoglione, M., (2004) Organization and technology in knowledge transfer, *Benchmarking: An international Journal,* Volume 11 issue 6 pp 584-600

Allen, T.J. & Cohen S.D. (1969) Information flows in R&D labs, *Administrative Science Quarterly,* Volume 20 pp 12-19

Anderson, O. (1993) On internationalisation process of firms: a critical analysis *Journal of International Business Studies,* Volume 23 issue 2 pp 209-231

Andersson, S. (2000) The internationalization of the firm from an entrepreneurial perspective, *International Studies of Management and Organization*, Volume 30 number 1 pp 63-92

Andersson, U. & Forsgren, M. (2000) In search of centre of excellence: network embeddedness and subsidiary roles in multinational corporations, *Management International Review,* Volume 40 issue 4 pp 329-350

Anderson, S. (2004) Internationalization in different industrial contexts, *Journal of Business Venturing*, Volume 19 issue 6 pp 851-875

Argyris, C. (1974) *Behind the Front Page: Organisational Self-Renewal in a Metropolitan Newspaper* San Francisco Jossey Bass

Artikis, G.P. (1993) Financial factors in plant location decisions: a case study in the Greek metal industry *International Journal of Operations and Production Management,* Volume 13 issue 8 pp 58-65

Atthirawong W. & B. MacCarthy (2002) *An application of the analytical hierarchy process to international location decision-making* Proceedings of the 7th Annual Cambridge International Manufacturing Symposium: Restructuring Global Manufacturing- towards global Collaborative Supply Network edited by Mike Gregory and Yongjiang Shi pp 1-18

Atthirawong W. & B. MacCarthy (2001) *Identification of the location pattern of manufacturing plants in Thailand* Proceedings of the 6th Research Symposium on International Manufacturing Global Integration Organised by IMNet (International Manufacturing Network) pp 1-13

Atthirawong W. & B. MacCarthy (2000) Factors Affecting International Location/ allocation Decisions: Can we structure them? Proceedings of 5th International Manufacturing Research Symposium: International and Strategic Network Development pp 1-8

Augier, M. & Vondelø, M.T. (1999) Networks, cognition and management of tacit knowledge, *Journal of Knowledge Management,* Volume 3 number 4 pp 252-261

Axinn, C.N. (1988) Export Performance: Do Managerial Perceptions Make a Difference *International Marketing Review*, Volume 5 number 2 pp 61-71

Babbie, E. (1990) *Survey Research Methods*, Wadsworth, Belmont, CA

Bagozzi, R.P. (1980) Performance and satisfaction in an industrial sales force: An examination of their antecedents and simultaneity, *Journal of Marketing*, Volume 44 number 2 pp 65-77

Bagozzi, R.P. & Phillips, L.W. (1982) Representing and testing organizational theories: a holistic construal, *Administrative Science Quarterly*, Volume 27 issue 3 pp 459-489

Barda, O.H., Dupuis J. & Lencioni P. (1990) Multi-criteria Location of Thermal Power Plants *European Journal of Operational Research,* Volume 45 issue 2,3 pp 332-347

Barkema, H.G., Bell, J.H.J. & Pennings, J.M. (1996) Foreign entry, cultural barriers and learning, *Strategic Management Journal*, Volume 17 number 2 pp 151-166

Bartezzaghi, E. (1999) The evolution of production models: is a new paradigm emerging? *International Journal of Operations & Production Management*, Volume 19, number 2 pp 229-50

Bartlett, C. & Ghoshal, S. (2003) *Transnational management: Text, cases and readings in cross-border management*, 4th Ed. Boston: Irwin

Bartmess, A.D. (1994) The Plant Location Puzzle *Harvard Business Review* March- April pp 20-37

Beasmish P.W. & da Costa, R.C. (1984) Factors affecting the comparative performance of multinational enterprises. *Proceedings of European International Business Association* Conference, Rotterdam

Beckarmann, W. (1956) Distance and pattern of intra-European trade, *Review of Economics and Statistics*, Volume 28 pp 31-40

Bell, J. & Young, S. (1998) Towards and integrative framework of the internationalisation of the firm, in Hooley, G. Loveridge, R. and Wilson, D. (Eds) *Internationalisation: Process, Context and Markets*, Macmillan, London

Bell, J., Crick, D., & Young, S. (2004) Small Firm Internationalization and Business Strategy, *International Small Business Journal*, Volume 22 issue 1 pp 23-56

Bell, J., McNaughton, R., Young, S. &Crick, D. (2003) Towards a integrative model of small firm internationalisation, *Journal of International Entrepreneurship*, Volume 1 issue 4 pp 339-362

Benito, G.R.G. & Gripsrud, G. (1992) The expansion of foreign direct investment: discrete rational location choices or a cultural learning process?, *Journal of International Business Studies,* Volume 23 issue 3 pp 461-476

Bergman, J., Jantunen, A. & Saksa J-M. (2004) Managing knowledge creation and sharing- scenarios and dynamic capabilities in inter-industrial knowledge networks, *Journal of Knowledge Management,* Volume 8 number 6 pp 63-76

Bergstrand, J.H. (1989) The generalised gravitation equation, monopolistic competition and the factor proportions theory in international trade, *The Review of Economics and Statistics,* Volume 71 issue 1 pp 143-153

Berry, W. L.; Hill, T. & Klompmaker, J.E. (1999) Aligning marketing and manufacturing strategies with the market. *International Journal of Production Research*, Volume 37 issue 16 pp 3599-3618

Bharati, P. & Chaidhury, A. (2006) Studying the current status of technology adoption, *Communications of the ACM*, Vol. 49, No. 10, pp. 88-93

Bhatt, G. D. (2000) Information dynamics, learning and knowledge creation in organisations, *The learning organisation,* Volume 7 number 2 pp 89-98

Bilkey, W. & G. Tesar (1977) The export behaviour of smaller sized Wisconsin manufacturing firms *Journal of International Business Studies,* Volume 8 issue 1 pp 93-98

Blair, J.P. & Premus, R. (1981) Major Factors in Industrial Location: a review *Economic Development Quarterly,* Volume 1 number 1 pp 72-85

Blanc, H. & Sierra, C. (1999) The internationalisation of R&D by multinationals: a trade-off between external and internal proximity. *Cambridge Journal of Econo*mics, Volume 23 pp 187-206

Bloodgood, J.M., Sapienza, H.J. & Almeida, J.G. (1996) The internationalisation of New High-Potential US Ventures: Antecedents and Outcomes. *Entrepreneurship Theory and Practice*, Volume 20 issue 4 pp 61-76

Bollen, K. A. (1989). *Structural equations with latent variables*. New York: Wiley.

Boter, H., & Holmquist, C. (1996)Industry characteristics and internationalisation processes in small firms, *Journal of Business Venturing*, Volume 11 issue 6 pp 471-478

Brewer, J., & Hunter, A. (1989) *Multimethod research: A Synthesis of styles*. Newbury Park, CA

Bromiley, P. & Cummings, L. (1995) Transaction cost in organisations with trust, in R. Bies, R. Lewicki, and B. Sheppard (Eds.), *Research in negotiation in organisations,* Volume 5 pp 219-247 Greenwich CT AI Press

Brouthers, K. D. & Nakos G. (2004) SME Entry Mode Choice and Performance: A Transaction Cost Perspective, *ET&P* 1024-2587 pp 229-247

Browne, J., Dubois, D., Rathmill, K., Sethi, S.P. & Stecke, K.E. (1984) Classification of Flexible Manufacturing Systems, *The FMS Magazine* pp 137-140

Bolbrook, D., Cohen, W.M., Hounshell, D.A. & Klepper, S. (2000) The nature, sources and consequences of firm differences in the early history of the semiconductor industry, *Strategic Management Journal*, Volume 21 pp 1017-1041

Bollen, K.A., (1989). *Structural Equations with Latent* Variables. Wiley, New York.

Bourdieu, P. (1990) *In other words: Essays towards a reflexive sociology*, California, Stanford University Press

Buckley, P.J. & Ghauri P.N. (1993) *The Internationalisation of the Firm*, London: Academic Press

Buckley, P.J. & Casson, N. (1993) Multinational Enterprises in Less-developed Countries: in *Transactional Corporations and Economic Development* edt. By Sanjaya Lall, 1993 New York: Routledge

Calof, J. & Beamish, P.W. (1995) Adapting to foreign markets: explaining internationalisation, *International Business Review*, Volume 4 number 2 pp 115-131

Canel, C. & Khumawala, B.M. (1996) A mixed integer programming approach for the analysis of an international facilities location problem. *International Journal of Operations and Production Management,* Volume 16 number 4 pp 49-68

Canel, C. & Khumawala, B.M. (1997) Multi-period international facilities location: an algorithm and application. *International Journal of Production Research* Volume 35 number 7 pp 1891-1910

Cantwell, J.A. (1995) The globalisation of technology: what remains of the product life-cycle model?. *Cambridge Journal of Economics*, Volume 19 pp 155-174

Cantwell, J. & Narula, R. (2001) The eclectic paradigm in the global economy, *International Journal of the Economics of Business*, Volume 8 issue 2 pp 155-172

Carmines, E.G. & Zeller, R.A. (1990), *Reliability and Validity Assessment*, Sage, New York, NY.

Carr, W. & Kemmis, S. (1986) *Becoming critical: knowing through action research*. Victoria, Australia Deakin University Press

Cavusgil, S. (1980) On the Internationalisation Process of Firms, *European Research*, Volume 8 issue 6 pp 273-281

Cavusgil, S. (1984) Differences among exporting firms based on their degree of internationalisation *Journal of Business Review* Volume 12 issue 2 pp 195-208

Cavusgil, S.T. & Nevin J. (1981) Internal determinants of export marketing behaviour: an empirical analysis, *Journal of Marketing Research,* Volume 18 number 1 pp 111-119

Cherryholmes, C.H. (1992) Notes on pragmatism and scientific realism. *Educational Researcher,* Volume 21 pp 13-17

Chetty, S. (1999) Dimensions of Internationalisation of Manufacturing Firms in Apparel Industry, *European Journal of Marketing*, Volume 33 number 12 pp 121-142

Chetty, S. & Patterson A. (2002) Developing Internationalisation capability through industry groups: the experience of a telecommunications joint action group, *Journal of Strategic Marketing* Volume 10 pp 68-89

Child, J., Ng S.H. & Wong, C. (2002) Psychic distance and internationalisation, *International Studies of Management & Organisation*, volume 32 number 1 pp 36-56

Chin, W., Marcolin, B.L. & Newsted P.R. (1996) A partial least squares latent variable modeling approach for measuring interaction effects: results from a Monte Carlo simulation study and coice mail emotion/adoption study. *Proceedings of the 7th International Conference on Information Systems.* Cleveand, OH pp21-41.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cohen, W.M. & Levinthal D. A. (1990) Absorptive Capacity: A New perspective on learning and innovation, *Administrative Science Quarterly* Mar 1990, Volume 35 issue 1 pp 128-153

Cohen, M.A. & Lee, H.L. (1989) Resource deployment analysis of global manufacturing and distribution networks *Journal of Manufacturing and Operations Management*, Volume 2 pp 81-104

Cohen, M.A., Fisher M. & Jaikumar, R. (1989) International manufacturing and distribution networks: a normative model framework, in Ferdows, K. (eds.) *Managing International Manufacturing*, Elsevier Science Publishers, BV, North Holland pp 67-93

Collier, J. (1945) United States Indian Administration as a laboratory of ethnic relations, *Social Research,* Volume 12 issue 3 pp 265-303

Collins, R.S. & Cordon, C. (1997), " Survey methodology issues in manufacturing strategy and practice research ", *International Journal of Operations & Production Management*, Volume 17 number 7 pp 697-706.

Colotla, I., Shi, Y. & Gregory, M.J. (2003) Operation and performance of international manufacturing networks, *International Journal of Operations & Production Management*, Volume 23 number 10 pp 1184-1206.

Conner, K.R. (1991) A historical comparison of resource-based theory and five schools of thought within industrial organization economics: Do we have a new theory of the firm?, *Journal of Management*, Volume 17 number 1 pp 121-154

Conway, T. & Swift, J.S. (2000) International relationship marketing: the importance of psychic distance, *European Journal of Marketing*, Volume 34 number 11/12 pp 1391-1413

Coughlan, P. & Coghlan D. (2002) Action research for operations management, *International Journal of Operations and Production Management*, Volume 22 issue 2 pp 220-240

Creswell, J.W. (2003*) Research Design: Qualitative, Quantitative and Mixed Methods Approaches*, (3rd ed.) CA Sage Publications Inc.

Creswell, J.W., Clark, P., Gutmann, V.L. & Hanson W.E. (2003) Advanced mixed methods research designs In A. Tashakkori and C. Teddlie (Ed.) *Handbook of mixed methods in social and behavioural research* pp 209-240 Thousand Oaks, Ca Sage Publications Inc.

Crick, D. & Spence, M. (2005) The internationalisation of high performing UK high tech SMEs: a study of planned and unplanned strategies, *International Business Review*, Volume 14 pp 167-185

Cronbach, L.J. (1951), Coefficient Alpha and the internal structure of tests , *Psychometrika*, Volume 16 number 4 pp 297-334.

Curry,B. & L. Moutinho (1992) Computer Models for Site Location Decisions *International Journal of Retail and Distribution Management,* Volume 20 issue 4 pp 12-18

Czinkota, M. & W. Johnston (1981) Segmenting U.S. firms for export development *Journal of Business Review,* Volume 9 issue 4 pp 353-365

Datta, L. (1994) Paradigm wars: A basis for peaceful coexistance and beyond. In C.S. Reichardt & S.F. Rallis (Ed.) *The qualitative-quantitative debate: New perspectives,* pp 53-70 San Francisco, Jossey Bay

Davenport, S. (2005) Exploring the role of proximity in SME knowledge-acquisition, *Research Policy*, Volume 34 pp 683-701

Davidson, W.H. (1983) Market similarity and market selection: implications for international marketing strategy, *Journal of Business Research,* 11(December), pp 439-456

Davidson, W.H. (1980*) Experience Effects in International Investment and Technology Transfer*. UMI, Ann Arbor, MI

D'Cruz, R. J. & Rugman M. A. (1994) Business Network Theory and the Canadian Telecommunications Industry International Business Review, Volume 3 issue 3 pp 275-288

Dearborn, R. & Simon, H.A. (1958) Selective perception in executives, *Sociometry,* Volume 21 pp 140-144

De Chiara, A. & Minguzzi, A. (2002) Success factors in SMEs' Internationalization Process: An Italian Investigation, *Journal of Small Business Management*, Volume 40 number 2 pp 144-153

De Maenseneire W. & Claeys T. (2011) SMEs, foreign direct investment and financial constraints: The case of Belgium, *International Business Review,* Volume 21 issue 3 pp 408-424

De Meyer, A. Ferdows, K. (1988) Influence of manufacturing improvement programmes on performance. *International Journal of Production Management*, Volume 10 issue 2 pp 120-131.

De Meyer, A., Nakane, J., Miller J.G. & Ferdows, K. (1989) Flexibility: The next competitive battle, *Strategic Management Journal*, Volume 10 pp 135-144

Dennis, J.-E. & Depelteau, D. (1985) Markey knowledge, diversification and export expansion. *Journal of International Business Studies*, Volume 16 issue 3 pp 77-89

De Noble, A.F. & C. S. Galbraith (1992) Competitive strategy and high technology regional/ site location decisions: a cross-country study of Mexican and US Electronic Component Firms *The Journal of High Technology Management Research,* Volume 3 number 1 pp 19-37

De Vaus, D. (2004) *Surveys in Social Research*, 5th Ed. Australia, Allen &Unwin

Denzin, N.K. (1978) The logical of naturalistic inquiry. In N.K. Denzin (ed.) *Sociological methods: A sourcebook*. New York McGraw-Hill

Department of Business Innovation and Skills (2010) Government's Manufacturing Strategy

Department of Business Innovation and Skills (2009) The Future of Manufacturing in UK

Dew, N., Velamuri, S.R. & Venkataraman, S. (2004) Dispersed knowledge and an entrepreneurial theory of the firm, *Journal of Business Venturing*, Vol. 19 no. 15 pp 659-679.

Diamantopoulos, A. & Winlhofer, H. (2001) Index construction with formative indicators: An alternative to scale development*, Journal of Marketing Research*, Vol. 38, No 2, pp 269-277

Dichtl, E., Koeglmayr, H.-G. & Mueller S. (1990) International orientation as a precondition for export success, *Journal of International Business Studies,* Volume 21 issue 1 pp 23-40

Dillman, D.A. (2007) *Mail and Internet Survey: The Tailored Design Method*, 2nd ed. New Jersey, John Wiley & Sons Inc.

Doremus, P.N., Keller, W. Pauley, L. & Reich, S. (1998) *The Myth of Global Corporation*, Princeton, NJ, Princeton University Press

Dosi, G. (1982) Technological paradigms and technological trajectories. *Research Policy*, Volume 11 pp 147-162

Douglas, S., Craig, S. & Keegan, W. (1982) Approaches to assessing international marketing opportunities for small and medium sized companies *Columbia Journal of World Business*, Volume 17 issue 3 pp 26-32

Dow, D. (2000) A note on psychological distance and export market selection, *Journal of International Marketing*, Volume 8 number 1 pp 51-64

Dunning, J. (1988) The eclectic paradigm of international production: a restatement and some possible extensions. *Journal of International Business Studies,* Volume 19 issue 1 pp 1-31

Dunning, J. (1993) *The globalization of business*, London: Routledge

Dunning, J. (2001) The Eclectic (OLI) Paradigm of International Production: Past, Present and Future, *International Journal of the Economics of Business*, Volume 8 number 2 pp 173-190

Ebbutt, D. (1985) Educational Action research: some general concerns and specific quibbles, in Burgess, R. (ed.) *Issues in Educational Research: Qualitative Methods* Lewes, Falmer

Ekanem, I. & Smallbone, D. (2007) Learning in small manufacturing firms. The case of investment decision-making behaviour, *International Small Business Journal*, Vol 25 No 2 pp 107-129

Elliott, J. (1991) *Action Research for Educational Change*, Buckingham, Open University Press

Eriksson, K., Johanson J., Majkgard, A. & Sharma, A. (1997) Experiential knowledge and cost in the internationalisation process. *Journal of International Business Studies*, Volume 28 issue 2 pp 337-360

Espinosa, M.P. (1992) On the Efficiency of Location Decisions Under Discriminatory Pricing *International Journal of Industrial Organisation,* Volume 10 issue 2 pp 273-297

Etemad, H. & Wright, R. W. (1999) Internationalisation of SMEs: management responses to a changing environment. *Journal of International Marketing,* Volume 7 issue 4 pp 4-10

European Commission on Enterprise and Industry (2011) European SMEs

Evans, J., & Mavondo, F.T. (2002) Psychic distance and organisational performance: an empirical examination of international retailing operations, *Journal of International Business Studies*, Volume 33 issue 3 pp 512-535

Ferdows, K & De Meyer, A. (1990) Lasting improvements in manufacturing performance: in search of a new theory, *Journal of Operations Management*, Volume 9 number 2 pp 168-184

Ferdows K (1997) Making the most of foreign factories, *Harvard Business Review*, March-April pp 73-88.

Ferdows, K., Miller, J.G., Nakane, J. & Vollmann, T.E. (1986) Evolving global manufacturing strategies: projections into the 1990s, *International Journal of Operations and Production Management*, Volume 6 issue 4 pp 6-16

Filippini, R. (1997) Operations management research: some reflections on evolution, models and empirical studies in OM, *International Journal of Operations and Production Management*, Volume 17 issue 7 pp 655-670

Fine, C.H. & Hax, A.C. (1985) Manufacturing strategy: a methodology and an illustration, *Interfaces,* Volume 15 number 6, November-December

Fletcher, M. & Prashantham, S. (2011) Knowledge assimilation process of rapidly internationalising firms: Longitudinal case studies of Scottish SMEs. *Journal of Small Business and Enterprise Development*, Volume 18 issue 3 pp 475-501

Florida, R. (1997) The globalisation of R7D: results of a survey of foreign affiliated R&D laboratories in the USA, *Research Policy*, Volume 26 pp 85-103

Flyn, B.B., Sakakibara, S., Schroeder, R.G., Bates, K.A. & Flynn, E.J. (1990) Empirical research methods in operations management, *Journal of Operations Management*, Volume 9 number 2 pp 250-284

Frohlich, M.T. (2002) Techniques for improving response rates in OM survey research, *Journal of Operations Management*, Volume 20 number 1 pp 53-62

Fornell, C., Rhee, B. & Yi, Y., (1991). Direct regression, reverse regression, and covariance structural analysis. *Marketing Letters,* Volume 2 issue 3 pp 309–320.

Fornell, C., &. Larcker D.F. (1981), Evaluating Structural Equation Models with Unobservable Variables and Measurement Error, *Journal of Marketing Research*, Volume 18 issue 1 pp 39–50.

Forsgren, M. (2002) The concept of learning in the Uppsala internationalization process model: a critical review, *International Business Review,* Volume 11 issue 3 pp 257-277

Forza, C. (2002) Survey research in operations management: a process based perspective, *International Journal of Operations and Production Management*, Volume 22 issue 2 pp 152-194

Forza, C. (2009) Surveys in C. Karlsson: *Researching Operations Management* 1 Ed. New York Routledge pp 84-161

Fowler, F.J. Jr (1993), *Survey Research Methods*, Sage Publications, New York, NY.

Fulton, M. (1971) New factors in plant location. *Harvard Business Review* Volume 49 May-June pp166-168

Fynes, B., Voss, C. & de Burca, S. (2005) The impact of supply chain relationship quality on quality performance, *International Journal of Production Economics*, Volume 96 issue 3 pp 339-354

Galbraith, C.S. (1985) High technology location and development: the case of Orange County *California Management Review* Fall pp 98-109

Galbraith, C.S. (1990) Transferring core manufacturing technologies in high technology firms *California Management Review* Summer pp 56-70

Galbraith, C. & De Noble, A.F. (1988) Location decisions by high technology firms: a comparison of firm size, industry type and institutional form, *Entrepreneurship Theory and Practice,* Volume 13 Winter pp 31-48

Garvin, D.A. (1984) Product quality: An important strategic weapon, *Business Horizons*, Volume 27 issue 3 pp 40-43

Gatignon, H. & Anderson E. (1988) The multinational corporations' degree of control over foreign subsidiaries: An empirical test of a transaction cost explanation. *Journal of Law, Economics and Organisation,* Volume 4 issue 2 pp 305-336

Gassman, O. & von Zedwitz, M. (1999) New concepts and trends in international R&D organisation, *Research Policy*, Volume 28 pp 231-250

Gefen, D., Straub, D.W. & Boudreau, M., (2000). Structural equation modeling and regression: guidelines for research practice. *Communications of the AIS,* Volume 1 issue 7 pp 1–78.

Geisser, S. (1974) A Predictive Approach to the Random Effects Model, *Biometrika*, Volume 61 issue 1 pp 101–107.

Geraci, V.J. & Prewo, W. (1977) Bilateral trade flows and transport costs, *The Review of Economics and Statistics,* Volume 59 issue 1 pp 64-74

Gerring, J. (2007) *Case Study Research: Principles and Practices*, Cambridge, Cambridge University Press

Gerwin, D. (1993) Manufacturing Flexibility: A Strategic Perspective, *Management Science*, Volume 39 number 4 pp 395-410

Ghoshal, S. & Bartlett, C. (1988) Creation, adoption and diffusion of innovations by subsidiaries of multinational corporations; *Journal of International Business Studies*, Volume 19 pp 365-388

Gilroy, B. M. (1993) Networking in Multinational Enterprises*: The Importance of Strategic Alliances, Critical Issues Facing The Multinational Enterprise Columbia*, University of South Carolina Press

Giffi, C., Roth, A.V. & Seal M. (1990) *Competing in world-class manufacturing: America's 21st century challenge*, Centre for Manufacturing Sciences US, Irwin Professional Publishing

Gjellerup, P. (2000) SME support services in the face of globalisation, *Conference Proceedings*, *Danish Agency for Trade and Industry*, Copenhagen pp 16-28

Grant, R.M. (1996) Prospering in dynamically competitive environments: Organisational capability as knowledge integration, *Organisational Science,* Volume 7 pp 375-387

Grant, R.M. (2002) The Knowledge Based View of the Firm, in Choo, C.W. and Bontis, N. (eds.) *The Strategic Management of Intellectual Capital and Organisational Knowledge*, Oxford: Oxford University Press pp 133-148

Gray, A.E. (1993) Modelling the selection of markets and the migration of manufacturing across countries, *Proceedings of the Symposium on Globalisation of Operations Management*, Georgetown University, Washington, DC

Green, G.I., Kim C.S. & Lee S.M. (1981) A Multi-criteria Warehouse Location Model *International Journal of Physical Distribution and Materials Management,* Volume 11 issue 1 pp 5-14

Greene, J.C., Caracelli, V.J. &Graham, W.F. (1989) Towards a conceptual framework for mixed method evaluation designs. *Educational Evaluation and Policy Analysis*, Volume 11 pp 255-274

Greene, J.C. & Caracelli, V.J. (1997) Defining and describing the paradigm issue in mixed-method evaluation in J.C. Greene and V.J. Caracelli ed. *Advances in mixed-method evaluation: the challenges and benefits of integrating diverse paradigms: new direction for evaluation*, number 74 pp 5-17 San Francisco: Joseey-Bay

Grosse, R. & Goldberg, L.G. (1991) Foreign bank activities in the United States: An analysis by country origin, *Journal of Banking and Finance,* Volume 15 (December), pp 1093-1112

Grosse, R. & Trevino, L.J. (1996) Foreign direct investment in the United States, An analysis by country origin, *Journal of International Business Studies*, Volume 27 issue 1 pp 139-155

Gruber, W.H. & Vernon R. (1970) The technology factor in world trade matrix, in *The Technology Factor in International Trade*, Vernon, R. ed. New York: Columbia University Press pp 233-272

Guba,E.G. & Lincoln, Y.S. (1994) Competing paradigms in qualitative research, in N.K. Denzin & Y.S. Lincoln (ed.), *Handbook of qualitative research* pp 105-117, London: Sage

Gummesson, E. (2000) *Qualitative Methods in Management Research*, California, Sage Publications Inc.

Gupta, Y.P. & Somers T.M. (1992) The measurement of manufacturing flexibility, *European Journal of Operations Research*, Volume 60 issue 2 pp 166-182

Habermas, J. (1979) *Legitimation crisis in the modern society. Communication and the Evolution of Society,* Boston Beacon Press

Hack, G.D.(1984) The plant location decision making process *Industrial Development,* Volume 153 September/October pp 31-33

Haenlein, R.W. & Henseler J. (2009) An empirical comparison of the efficacy of co-variance based and variance-based SEM, *International Journal of Research in Marketing*, Volume 26 issue 4 pp 332-344

Hair, J.F., Anderson, R.E., Tatham, R.L. 7 Black, W.C. (1995) *Multivariate Data Analysis with Readings*, 4th Edition, Englewood-Cliffs, New Jersey: Prentice-Hall, Inc.

Hair, J. F.,. Black W. C, Babin B. J., & Anderson R. E. (2010) *Multivariate Data Analysis*, Englewood Cliffs, NJ: Prentice Hall

Hair, J.F., Ringle, C.M. & Sarstedt, M. (2011) The use of partial least squares (PLS) to address marketing management topics, *Journal of Marketing Theory and Practice*, Volume 19 number 2 pp 35-47

Hair, J.F., Ringle, C.M. & Sarstedt, M. (2011) PLS-SEM. Indeed a Silver Bullet, *Journal of Marketing Theory and Practice*, Volume 19 issue 2 pp 139-151

Hall, R.W. (1987*) Attaining manufacturing excellence*, Dow John-Irwin, Homewood

Hall, R.W. & Nakane J. (1990) *Flexibility- manufacturing battlefield of the 90s: A report on attaining manufacturing flexibility in Japan and the United States*, Waseda University, Association for Manufacturing Excellence

Hallén, L. & Wiedersheim-Paul, F. (1984) The evolution of psychic distance in international business relationships, in Hagg, I. and Wiedersheim-Paul, P. (Eds.) *Between Market and Hierarchy*, University of Uppsala, Department of Business Administration, Uppsala, pp 15-27
Handfield, R.B. & Melnyk, S.A. (1998) The scientific theory-building process a primer using the case of TQM, *Journal of Operations Management*, Volume 16 number 4 pp 321-339

Harland, C.M. & Knight, L.M. (2001) Supply network strategy: role and competence requirements, *International Journal of Operations & Production Management*, Volume 21 number 4 pp 476-489.

Haug, P. (1985) A multiple-period, mixed integer programming model for multinational facility location *Journal of Management,* Volume 11 number 3 pp 83-96

Haug, P. (1992) An International location and production transfer model for high technology multinational enterprises *International Journal of Production Research,* Volume 33 number 3 pp 559-572

Havnes, P.A. (1998) SME Development- challenging the Incremental Change Model, *Proceedings of 43rd ICSB World Conference*, Singapore

Hayes, R.H. & Wheelwright, S.C. (1984) Restoring *Our Competitive Edge: Competing Through Manufacturing*. Wiley, New York, NY

Hekman, J.S. (1992) What are businesses looking for? *Federal Reserve Bank of Atlanta Economic Review,* Volume 67 June pp 6-19

Hermel, P.& Khayat, I. (2011) The role of resources: micro-firms internationalization in French context, *Journal of Small Business and Enterprise Development*, Volume 18 issue 2 pp 298-310

Hessels, J. and Terjesen, S. (2010) Resource dependency and institutional theory perspectives on direct and indirect export choices, *Small Business Economics*, Volume 34 number 2 pp 203-220

Higgins, A. (2000) Action research: a means of changing and improving the clinical learning environment. In McNiff, J., McNamara, G. (Ed.), *Action Research in Ireland* September Books, Dublin

Hill, C.W.L.; Hwang P. & Kim W. C. (1990) An Eclectic theory of the choice of international entry mode, *Strategic Management Journal,* Volume 11 issue 2 pp 117-128

Hirsch, Z, & Lev B. (1973) Trade and per capita income differentials: a test of the Burenstam-Linder hypothesis, *World Development*, Volume 1 issue 9 pp 11-17

Hitt, M.A., Hoskisson, R.E. & Kim H. (1997) International Diversification: effects on innovation and firm performance in product-diversified firms, *Academy of Management Journal*, Volume 40 pp 767-798.

Hodder, J.E. & Dincer, M.C. (1986) A multi-factor model for international plant location and financing under uncertainty *Computers and Operations Research,* Volume 13 number 5 pp 601-609

Hodder, J.E. & Jucker, J.V. (1985) International plant location under price and exchange rate uncertainty *Engineering Costs and Production Economics,* Volume 9 pp 225-229

Hoffman, J.J. & Schniederjans M.J. (1994) A two-stage Model for Structuring Global Facility Site Selection Decisions: The Case of the Brewing Industry, *International Journal of Operations and Production Management,* Volume 14 number 4 pp 79-96

Hofstede, G. (1980) *Culture's consequences: International differences in work related values,* Beverly Hills, California: Sage Publications

Holm, D.B., Eriksson, K. & Johanson, J. (1996) Business networks and cooperation in international business relationships *Journal of International Business Studies*, Volume 27 pp 1033-49

Holzmuller, H.H. & Kasper, H. (1990) The decision maker ad export activity: a cross national comparison of foreign orientation of Austrian managers, *Management International Review*, Volume 30 issue 3 pp 217-230

Howells, K. (1990) The internationalisation of R&D and the development of global research networks, *Regional Studies*, Volume 24 issue 6 pp 495-512

Hymer, S.H. (1976) *A Study of Direct Foreign Investment*. MIT Press: Cambridge MA.

Jackson, D.L., (2003). Revisiting the sample size and number of parameter estimates: some support for the N:q hypothesis.*Structural Equation Modeling,* Volume 10 issue 1 pp 128–141.

Jaffe, E.D. & Pasternak, H. (1994) An attitudinal model to determine the export intention of non-exporting small manufacturers, *International Marketing Review*, Volume 11 number 3 pp 17-32

Jeffrey L.H. & C.J. Duerksen (1980) Environmental Regulations and the Location of Industry: An Industrial Perspective. *Columbia Journal of World Business*, New York, Summer, Volume 15 issue 2 52

Jick, T.D. (1979) Mixing qualitative and quantitative methods: Triangulation in Action. *Administrative Science Quarterly*, Volume 24 Number 4 Qualitative Methodology pp 602-611

Johanson, J. & Mattsson, L.G. (1988) Internationalization in industrial systems- a network approach. In N. Hood and J.-E. Vahlne (edt.) *Strategies in global competition.* London: Croom Helm

Johanson, J. & Mattson, L. G. (1993) Internationalisation in industrial systems- a network approach, In Buckley, P.J. and Ghauri, P.N. (eds.), *The Internationalisation of the Firm*: A Reader. New York: Academic Press: Harcourt Brace Jovanovich.
Johanson, J & Vahlne J.E. (1977) The internationalization process of the firm- A model of knowledge development and increasing foreign market commitments, *Journal of International Business Studies,* Volume 8 issue pp 22-32

Johanson, J & Vahlne J.E. (1990) The mechanisms of Internationalisation, *International Marketing Review*, Volume 7 issue 14 pp 11-24

Johanson & Wiedersheim- Paul (1975) The Internationalization of the Firm- four Swedish cases *Journal of Management Studies,* Volume 12 issue 3 pp 305-322

Jöreskog, K. G., & Wold H. (1982), The ML and PLS Techniques for Modeling with Latent Variables: Historical and Comparative Aspects, in *Systems Under Indirect Observation*, Part I, Herman Wold and Karl G. J.reskog, eds., Amsterdam: North- Holland, pp 263–270

Jucker, J.V. & Carlson, R.C. (1976) The simple plant location problems under uncertainty, *Operations research*, Volume 24 issue 6 pp 1045-1055

Jucker, J.V. (1977) The transfer of domestic market production to a foreign site *AIEE Transaction,* Volume 9 number 4 pp 321-329

Karakaya, F. & Stahl, M.J. (1989) Barriers to entry and market entry decisions in consumer and industrial markets. *Journal of Marketing,* Volume 53 April pp 80-91

Karlsson, C. (2003) The development of industrial networks: challenges to operations management in an extraprise, *International Journal of Operations & Production Management*, Volume 23 number 1 pp 44-61

Katz, D. & Kahn, R.L. (1966) *The social psychology of organisation,* New York, Wiley

Kedia, B. & Bhagat, R. (1988) Cultural constraints on transfer of technology across nations: Implications for research in international and comparative management, *Academy of Management Review*, Volume 13 pp 559-571

Keller, R.T. & Chinta R.R. (1990) International technology transfer: strategies for success, *The Academy of Management Executive*, Volume 4 issue 2 pp 33-43

Kemmis, S. & McTaggart, R. (1988) *The Action Research Planner*. Victoria, Australia Deakin University Press

Kenny, B. & Fahy, J. (2011) Network resources and international performance of high tech SMEs, *Journal of Small Business and Enterprise Development*, Volume 18 issue 3 pp 529-555

Kjelmann, A. & Ramstroem J. (2004) Management of successful and internationally active small firms, Proceedings of 13th Nordic Conference on Small Business Research.

Kim, W.C. & Hwang P. (1992) Global strategy and Multinationals’ entry mode of choice, *Journal of International Business Studies*, Volume 19 issue 3 pp 411-432

Kirpalani, V. & MacIntosh, N. (1980) International marketing effectiveness of technology-oriented small firms. *Journal of International Business Studies*, Volume 11 Winter pp 81-90

Krathwohl, D.R. (1993) *Methods of educational and social science research: An integrated approach*, New York, Longman/ Addison Wesley Longman

Kogut, B. (1991) Country capabilities and the permeability of borders, *Strategic Management Journal*, Volume 12 pp 33-47

Kogut, B. & Singh H. (1988) The effect of national culture on the choice of entry mode, *Journal of International Business Studies,* Volume 19 issue 3 pp 411-432

Kogut, B. & Zander, U. (1992) Knowledge of the firm, integration capabilities, and the replication of the technology, *Organisational Science,* Volume 3 pp 383-397

Kontinen, T. & Ojala A. (2010) Internationalization pathways of family SMEs: psychic distance as a focal point, *Journal of Small Business and Enterprise Development*, Volume 17 issue 3 pp 437-454

Koste, L. & Malhotra, M.K. (1999) A theoretical framework for analyzing the dimensions of manufacturing flexibility, *Journal of Operations Management*, Volume 18 pp 75-93

Kostova, T. (1999) Transnational Transfer of Strategic Organisational Practices: A Contextual Perspective, *The Academy of Management Review* Volume 24 number 2 Apr 1999 pp 308-324

Kuemmerle, W. (1997) Building effective R&D capabilities abroad, *Harvard Business Review*, March-April, pp 61-70

Kuemmerle, W. (1999a) Foreign direct investment in industrial research in the pharmaceutical and electronics industries: results from a survey of multinational firms, *Research Policy*, Volume 28 pp 179-193

Kuemmerle, W. (1999b) The drivers of foreign direct investment into research and development: an empirical investigation, *Journal of International Business Studies*, Volume 30 issue 1 pp 1-25

Kulkarni, S.S, Magazine, M. J. & Raturi A.S. (2004) Risk pooling advantages of manufacturing network configuration, *Production and Operations Management*, Volume 13 number 2 Summer pp 186-199

Lam A. (2003) organisational Learning in Multinationals: R&D Networks of Japanese and US MNEs in the UK, *Journal of Management Studies*, Volume 40 issue 3 pp 673-703

Langston, C.M. & Teas, R.K. (1976) Export commitment and characteristics of management, paper presented at the Annual Meeting of Midwest Business Association, St Luis, MO

Lane, P.J. & Lubatkin, M. (1998) Relative absorptive capacity and inter-organisational learning, *Strategic Management Journal,* Volume 19 pp 461-477

Langlois, R.N. (1997) Transaction-cost economies in real time in *Resources, Firms and Strategies: A Reader in the Resource-Based Perspective* edt by J. Foss, Oxford, Oxford University Press.

Lawshe C.H. (1975), A quantitative approach to content validity, Personnel Psychology, Volume 28 number 4 pp 563-75.

Leamar, E.E. (1974) The commodity composition of international trade in manufacturers: An empirical analysis, *Oxford Economic Papers*, Volume 26 issue 3 pp 350-374

Lee, D.J. (1998) The effect of cultural distance on the relational exchange between exporters and importers: The case of Australian Exporters., *Journal of Global Marketing*, Volume 11 issue 4 pp 7-22

Lee, S-C.; Liang. H. & Liu, C-Y. (2010) The effects of absorptive capacity, knowledge sourcing strategy, and alliances forms on firm performance, *The Service Industries Journal*, Volume 30 issue 14 pp 2421-2440

Leanidou, L. & Katsikeas, C.S. (1996) The export development process: an integrative review of empirical models, *Journal of International Studies,* Volume 27 issue 3 pp 517-551

Lehtinen, U. & Penttinen, H. (1999) Definition of the internationalization of the firm, in Lehtinen, U. & Seristoe, H. (eds.) *Perspectives on Internationalization*, Helsinki School of Economics and Business Administration, Helsinki pp 3-19

Lewin, K. (1946) Action research and minority problems in G.H. Lewin (ed.) *Resolving social conflicts: Selected papers on group dynamic*s pp 201-216 New York: Harper & Brouthers

Lewin, K. (1951*) Field theory in social science; selected theoretical papers.* D. Cartwright (ed.) New York Harper & Row

Li, T. & Cavusgil S.T. (1995) A classification and assessment of research streams in international marketing, *International Business Review*, Volume 4 issue 3 pp 251-277

Li, L., Li, D. & Dalgic T. (2004) Internationalization process of small and medium-sized enterprises: toward a hybrid model of experiential learning and planning, *Management International Review*, Volume 44 pp 93-116

Liesch, P.W. & Knight G.A. (1999) Information internationalisation and hurdle rates in small and medium sized enterprise internationalisation, *Journal of International Business Studies,* Volume 30 issue1 pp 383-394

Lincicome, S. (2009) Personal Blog Available at: *http://lincicome.blogspot.co.uk/2011/02/american-manufacturing-decline.html)*

Lincoln, Y.S. & Guba, E.G. (1985) *Naturalistic Inquiry*, CA, Sage Publications Inc.

Lindqvist, M. (1997) Infant multinationals: internationalization of small technology based firms. In D Jones & M Klofsten (Eds.) *Technology, innovation and enterprise: The European experience.*

Linneman, H. (1966) *An econometric study of international trade flows,* Amsterdam: North Holland

Liyanage, S. & Barnard, R. (2003) Valuing of firm's prior knowledge: A measure of knowledge distance, *Knowledge and Process Management,* Apr/Jun 2003, Volume 10 issue 2 pp 85-99

Lloyd-Reason, L. & Mughan, T. (2002) Strategies for internationalisation within SMEs: the key role of owner-manager, *Journal of Small Business and Enterprise Development*, Volume 9 issue 2 pp 120-129

Longois, R. (1997) Cognition and capabilities: opportunities seized and missed in the history of the computer industry, in Garud, R., Nayeer, P. & Sahpira, Z. (eds.) *Technological innovation: Oversights and foresights*, Cambridge University Press, New York, NY, pp 71-94

Lohmöller, Jan-Bernd (1989), Latent Variable Path Modeling with Partial Least Squares, Heidelberg: Physica.

Lu, J.W. & Beamish P.W. (2001) The Internationalization and Performance of SMEs, *Strategic Management Journal*, Volume 22 pp 565-586

Lu, J.W. & Beamish P. W. (2004) Network Development and Firm Performance: A Field Study of Internationalizing Japanese Firms *The Multinational Business Review,* Volume 12 number 3 pp 41-61

Luostarinen, R. & H. Hellman (1993) Internationalisation process and strategies of Finnish family enterprises In: M. Virtanen (eds), *Proceedings of the Conference on the development*, Finland. Helsinki: Ministry of Trade and Industry, Studies and report 59/1994

Loustarinen, R. (1980) *Internationalisation of the Firm*, Helsinki: The Helsinki School of Economics

MacCallum, R.C., Browne, M.W. & Sugawara, H.M., (1996). Power analysis and determination of sample size for covariance structure modeling, *Psychological Methods,* Volume 1 issue 1 pp 130–149.

MacCormack, A.D.; Newman L.J.; & Rosenfield D.B. (1994) The New Dynamics of Global Manufacturing Site Location, *Sloan Management Review* Summer pp 69-80

Madsen, T.K. & Servais, P. (1997) Internationalisation of born globals: an evolutionary process, *International Business Review*, Volume 6 numbers 6 pp 561-583

Maitland, E. & Nicholas, S. (2002) Internationalisation of Australian firms in Asia, *International Studies of Management and Organisation*, Volume 32 number 1 pp 79-108

Makadok, R. (2001) Towards a synthesis of the resource-based and dynamic-capability views of rent creation, *Strategic Management Journal*, Volume 22 issue 5 pp 387-401

Malhorta, M.K. & Grover, V. (1998) An assessment of survey research in POM: from constructs to theory, *Journal of Operations Management*, Volume 16 number 17 pp 407-425

Mapes, J., New, C. & Szwejczewski, M.J. (1997) Delivery and Trade-offs, *International Journal of Production Economics*, Volume 53 pp 323-330

Marsh, H.W., Balla, J.R. & McDonald, R.P., (1988). Goodness-of-fit indexes in confirmatory factor analysis: the effect of sample size. *Psychological Bulletin,* Volume 103 issue 3 pp 391–410.

McKernan, J.(1991) *Curriculum action research: a handbook of methods and resources for the reflective practitioner*. London, Kogan Page

McDougall, P. (1989) International versus domestic entrepreneurship: a new venture strategic behaviour and industry structure. *Journal of Business Venturing*, Volume 4 pp 387-400

McDougall, P., Shane, S. & Oviatt, B.M. (1994) Explaining the formation of international joint ventures: the limits of theories from international business research, *Journal of Business Venturing*, Volume 9 pp 469-487

McNiff, J. & Whitehead, J. (2002) *Action Research: Principles and Practice* (2nd Ed) London, Routledge Falmer

Meijboom, B. & Vos, B. (1997) International Manufacturing and Location Decisions: balancing configuration and coordination aspects, *International Journal of Production and Operations Management*, Volume 17 number 18 pp 790-805

Merrilees, B., Miller, D. & Tiessen, J. (1998) Serendipity, leverage and the process of entrepreneurial internationalisation, *Small Enterprise Research*, Volume 6 issue 2 pp 3-11

Metcalfe, J. & James, A. (2000) Knowledge and capabilities: a new view of the firm in Foss, N.J. & Robertson, P.L. (eds.) *Resources, technology and strategy: Explorations in the resource based perspective,* Routledge, London pp 31-52

Meyer, K. (2001) Institutions, transaction costs, and entry mode choice in eastern Europe, *Journal of International Business Studies*, Volume 32 number 2 pp 357-367

Miles, R.E. & Snow, C.C. (1992) Causes of failure in network organizations, *California Management Review*, Volume 34 number 4 pp 53-70

Mills, G.E. (2003) *Action research: A guide for the teacher researcher*. Upper Saddle River. NJ Merrill Prentice Hall.

Morgan, R. & Hunt, S. (1994) The commitment-trust theory of relationship marketing. *Journal of Marketing*, Volume 58 pp 20-38

Morosini, P.; Shane, S. & Singh H. (1998) National cultural distance and cross-border acquisition performance, *Journal of International Business Studies*, Volume 29 number 1 pp 137-158

Mohr, A. & Shoobridge, G.E. (2011) The role of multi-ethnic workforces in the internationalisation of SMEs, *Journal of Small Business and Enterprise Development*, Volume 18 issue 4 pp 748-763

Murphy, J.P. (1990) *Pragmatism: From Peirce to Davidson*. Boulder, CO Westview

Nakane, J. (1986) *Manufacturing futures survey in Japan, A comparative survey 1983-1986*, Tokyo: Waseda University, System Science Institute, May 1986

Nail, B. & A.K. Chakravarty (1994) A strategy for locating a network of international manufacturing facilities *Proceedings of the Symposium on Globalisation of Technology, Manufacturing and Service Operations* Tulane University New Orleans, LA

Nelson, R. & Winter, S. (1982) *An evolutionary theory of economic change, Cambridge*, MA Harvard University Press

Noble, M.A. (1995) Manufacturing Strategy: Testing the Cumulative Model in a Multiple Country Context, *Decision Sciences*, Volume 26 issue 5 pp 693-721

Noffke, S.E. (1997) Professional, personal and political dimensions of action research*, Review of Research in Education,* Volume 22 pp 305-343

Nordström K. & Vahlne J.E. (1994) Is the globe shrinking? Psychic distance and the establishment of Swedish sales subsidiaries during the last 100 years. *Proceedings of International Trade and Finance Association's Annual Conference*, April 22-25, Laredo, Texas

Nonaka, I., Toyama, R. & Konno, N. (2001) SECI, Ba and Leadership: a Unified model of dynamic knowledge creation, in *Managing Industrial Knowledge: Creation, transfer and utilisation* edited by Nonaka, I. & Teece, D. 2001 Sage Publications London

Nunnally, J.C. (1978) *Psychometric Theory*, 2nd Ed., McGraw-Hill, New York, NY

Nunnally, J.C. & Bernstein, I.H (1999) Psychometric theory, *Journal of Psychoeducational Assessment*, Volume 17 pp 275-280

Paiva, E.L., Roth, A.V. & Fesnterseifer, J.E. (2002) Focusing information in manufacturing: a knowledge management perspective, *Industrial Management and Data Systems*, Volume 102 issue 7 pp 381-389

Patel, P. (1995) The localised production of global technology, *Cambridge Journal of Economics*, Volume19 pp 141-153

Patton, M.Q. (1990) *Qualitative Evaluation and Research Methods* (2nd ed.) Newbury Park, CA Sage Publications Inc.

Pitelis, C. (2007) Edith Penrose and a Learning Based Perspective on the MNE and OLI, *Management International Review*, Volume 47 pp 207-219

Price Waterhouse and Coopers (2009) UK Manufacturing

Pomper, C.L. (1976) *International Investment Planning: An Integrated Approach*, North Holland Publishing Company, New York, NY

Porter, M.E. (1980), *Competitive Strategy: Techniques for Analysing Industries and Competitors*, Free Press, New York, NY

Pull, K. (2002) The comparative attractiveness of international business locations: The role of labour law. Management Decision, London, Volume 40 issue 7/8 pp 647-654

Raymond, L. & St-Pierre, J. (2010) Configuring strategic capabilities for the internationalization of SMEs, *Entrepreneurial Practice Review*, Volume 1 number 2 pp 13-35

Rea, L.M. & Parker, R.A. (1992) *Designing and conducting survey research: A comprehensive guide*, San Francisco, Jossey-Bass

Reason, P. & Bradbury, H. (2001) *The SAGE Handbook of Action Research, Participative Inquiry and Practice.* 1st Ed. London Sage

Reichardt, C.S. & Rallis, S.F. (1994) Qualitative and quantitative inquiries are not compatible: A call for a new partnership. In C.S. Reichardt & S.F. Rallis (Ed.), *The qualitative-quantitative debate: A New perspective* pp 85-92 San Francisco, Jossey-Bass

Reid S.D. (1981) The decision-maker and export entry and expansion, *Journal of International Business Studies*, Volume 12 number 2 pp 101-112

Reid S.D. (1983) Managerial and firm influences on export behaviour, *Journal of the Academy of Marketing Science,* Volume 11 number 3 pp 323-332

Reinartz, W. J., Haenlein M., & Henseler J.(2009), An Empirical Comparison of the Efficacy of Covariance- Based and Variance-Based SEM, *International Journal of Market Research*, Volume 26 issue 4 pp 332–344.

Reuber, A.R. & Fisher, E. (1997) The Influence of the Management Team's International Experience on the Internationalisation Behaviours of SMEs, *Journal of International Business*, Volume 28 issue 4 pp 807-825

Richardson, P.R., Taylor, A.J. & Gordon, J.R.M. (1985) A strategic approach to evaluating manufacturing performance, *Interfaces*, Volume 15 number 6 November-December pp 15-27

Rindskopf, D. (1984), Structural Equation Models, *Sociological Methods and Research*, Volume 13 issue 1 pp 109–119.

Ritter, T., Wilkinson, I.F. & Johnston W.J. (2002) Measuring network competence: some international evidence, *The Journal of Business and Industrial Marketing*, Volume 17 number 2/3 pp 119-138.

Roberts, E.B. (2001) Benchmarking global strategic management of technology, *Research Technology Management*, Volume 44 issue 2 pp 25-36

Rosenfield, D.B., Shapiro, R.D. & Bohn, R.E. (1985) Implications of cost-service trade-offs on industry logistics structures, *Interfaces*, Volume 15 No 6 November-December pp. 47-59

Rosenweig, E.D. & Roth A.V. (2004) Towards a Theory of Competitive Progression: Evidence in High-Tech Manufacturing, *Production and Operations Management Journal*, Volume 13 issue 4 pp 354-368

Rogers, E. (1962) *Diffusion of Innovations* New York: The Free Press

Rossi, P.H., Wright, J.D. & Anderson, A.B. (1983) *Handbook of Survey Research*, New York, National Communication Association

Roth, A.V. (1996) Competitive progression theory: Explanations and Empirical Evidence in *Manufacturing strategy: Operations Strategy in Global Context*, Edt by C. Voss, London, London Business School pp 309-314

Roth, A.V., Gray, A.E., Singhal, J. & Singhal, K. (1997) International Technology and Operations Management: resource Toolkit for Research and Teaching, *Production and Operations Management*, Volume 6 issue 2 pp 167-187

Roth, P.L., Switzer, F.S. & Switzer, D.M. (1999) Missing data in multiple item scales: A Monte Carlo analysis of missing data techniques, *Organizational Research Methods*, Volume 2 issue 3 pp 211-232

Ruzzier, M. Hisrich R.D. & Antoncic B. (2006) SME internationalization research: past, present and future, *Journal of Small Business and Enterprise Development,* Volume 13 number 4 pp 476-497 (22)

OECD (1999-2003) Country Statistics Database

O'Grady, S. & Lane H.W. (1996) The Psychic Distance Paradox, *Journal of International Business Studies*, Volume 27 number 2 pp 309-333

Onwuegbuzie, A.J. & Johnson R.B. (2006) The validity issue in mixed research, *Research in the Schools*, Volume 13 number 1 pp 48-63

Oviatt, B. & McDougall, P. (1994) Toward a theory of international new ventures. *Journal of International Business Studies*, Volume 25 issue 1pp 45-64

Ozawa, T. & Castello, S. (2001) Towards and International Business Paradigm of Endogenous Growth: Multinationals and Governments as Co-Endogenisers, *The International Journal of the Economics of Business*, Volume 8 number 2 pp 211-228

Sarstedt, M. & Wilczyski, P. (2008) More for less? A comparison of Single-Item and Multi-Item Measures. Proceedings of INFORMS Marketing Science Conference, Canada, Vancouver.

Sekeran, U. (1992) *Research Methods for Business*, John Willey & Sons, New York, NY

Schmenner, R.W. (1976) Looking beyond the obvious in plant location *Harvard Business Review,* Volume 57 Jan-Feb pp 126-132

Schmenner, R.W. (1982) *Making Business Location Decisions* Prentice, Hall, Inc, Englewood Cliffs, NJ.

Schmenner, R.W., Huber, J. & Cook, R. (1987) Geographic Differences and the Location of new manufacturing facilities *Journal of Urban Economics*, Volume 21 January pp 83-104

Schmenner, R.V. & Swink, M.L. (1998) On Theory in Operations Management, *Journal of Operations Management*, Volume 17 issue 1 pp 97-113

Schmidt, T. (2010) Absorptive capacity-one size fits all? A firm-level analysis of absorptive capacity for different kinds of knowledge, *Managerial and Decision Economics*, Volume 31 issue 1 pp 1-18

Schonberger, R.J. (1986) *World Class Manufacturing: The Lessons of Simplicity Applied*, NY Free Press

Schoberger, R.J. (1990) *Building A Chain of Customers: Linking Business Functions to Create The World Class Company*, NY Free Press

Schroeder, R.G., Sakakibara, S., Flynn, E.J. & Flynn, B.B. (1992) Japanese Plants in America: How Good are They?, *Business Horizon*, July-August pp 66-72

Sethi, K. & Sethi, S.P. (1990) Flexibility in manufacturing: A Survey, *International Journal of Flexible Manufacturing Systems*, Volume 2 number 4 pp 289-328

Shah, R. & Goldstein, S.M. (2006) Use of structural equation modelling in operations management research: Looking back and forward, *Journal of Operations Management*, Volume 24 pp 148-169

Sherer, S. A. (2003) Critical success factors for manufacturing networks as perceived by network coordinators, *Journal of Small Business Management*, Volume 41 number 4 pp 325-345.

Shi, Y. (2003) Internationalisation and Evolution of Manufacturing Systems: Classic Process Models, New Industrial Issues and Academic Challenges, *Integrated Manufacturing Systems,* Volume 14 issue 4 pp 357-368

Slack, N.; Chambers, S. & Johnston R. (2010) *Operations Management*, 6th Ed., Harlow Essex

Simango, C.C.B. (1993) Strategic locational factors influencing foreign investment, *European Business Review*, Volume 93 issue 4

Simmonds, K. & Smith, K. (1968) The first export order: a marketing innovation, *British Journal of Marketing*, pp 93-100

Simpson, C.L. & Kujawa, D. (1974) The export decision process: an empirical inquiry, *Journal of International Business Studies*, Volume 5 number 1 pp 107-117

Skinner, W. (1969) Manufacturing- the missing link in corporate strategy, *Harvard Business Review*, May-June pp 136-145
Skinner, W. (1974) The focused factory, *Harvard Business Review*, May-June, pp 113-121

Srivastava, R.K. & Green, R.T. (1986) Determinants of Bilateral Trade¸ *Journal of Business*, Volume 59 issue 4 pp 623-640

Stenhouse, L. (1975) *An Introduction to Curriculum Research and Development*, London Heinemann Educational

Stone, M. (1974), Cross-Validatory Choice and Assessment of Statistical Predictions, *Journal of the Royal Statistical Society*, Volume 36 issue 2 pp 111–147.

Stonebraker, P.W. & Leong, G.K. (1994) *Operations Strategy, Focusing Competitive Excellence*, Allyn and Bacon Inc. Needham Heights, MA

Swift, J.S. (1998) The relationship between market culture and market language: British executives in overseas markets, unpublished PhD thesis, Department of Modern Languages, University of Liverpool

Swift, J.S. (1999) Cultural closeness as a facet of cultural affinity: A contribution to the theory of psychic distance, *International Marketing Review*, Volume 16 issue 3 pp 182-201

Swink, M. & Way, M.H. (1995) Manufacturing strategy: Propositions, current research, renewed directions, *International Journal of Operations and Production Management,* Volume 15 issue 7 pp 4-26

Szulanski, G. (1996) Exploring internal stickiness: Impediments to the transfer of best practices within the firm, *Strategic Management Journal*, Volume 17 Winter Special Issues pp 27-43

Tallman, S. & K. Fladmoe- Lindquist (1994) *A resource based model of the multinational firm*. Paper presented at the 1994 Strategic Management Society Conference, Paris.

Tang, Y.K. (2011) The Influence of networking in the internationalisation of SMEs: Evidence from internationalized Chinese firms, *International Small Business Journal*, Volume 29 number 4 pp 374-398

Tashakkori, A. & Teddlie, C. (1998) *Mixed Methodology: Combining Qualitative and Quantitative Approaches* Applied Social Research Methods Series Volume 46 CA, Sage Publications Inc.

Tenenhaus, M., Amato, S., & Vinzi, E. V. (2004). A global goodness-of-fit index for PLS structural equation modeling. In *Proceedings of the XLII SIS Scientific Meeting* pp 739–742 Padova: CLEUP.

Tenenhaus, M. (2008), Component-Based Structural Equation Modelling, *Total Quality Management & Business Excellence*, Volume 19 issue 7–8 pp 871–886

Tesar, G., Boter, H. & Bohman, H. (2003) Network participation and internationalisation of smaller manufacturing enterprises in Central Europe: A Case for Research, Proceedings of 19th annual IMP Conference University of Lugano, 4 – 6 September, Lugano Switzerland

Thorpe, R., Holt, R., Macpherson, A. & Pittway, L. (2005) Using knowledge within small and medium-sized firms: a systematic review of evidence, *International Journal of Managaement* Reviews, Vol. 7 No. 4 pp 257-281

Timothy, J.L., Richard E.W. & Gang H. (2002) Screening location strategies to reduce exchange rate risk. *European Journal of Operational Research*, Volume 36 issue 3 pp 573-590

Tsikriktsis, N. (2005) A review of techniques for treating missing data in OM survey research, *Journal of Operations Management*, Volume 24 pp 53-62

Tushman, M.L. (1978) Technical communication in R&D laboratories: The impact of project work characteristics, *Administrative Science Quarterly,* Volume 22 pp 587-605

UNCTAD (1999) Trade and Development Report 1999

UNCTAD (2000) Trade and Development Report 2000

UNCTAD (2001) Trade and Development Report 2001

UNCTAD (2002) Trade and Development Report 2002

UNCTAD (1999) World Investment Report 1999

UNCTAD (2000) World Investment Report 2000

UNCTAD (2001) World Investment Report 2001

UNCTAD (2002) World Investment Report 2002

United Nations (1999) Human Development Report 1999

United Nations (2000) Human Development Report 2000

United Nations (2001) Human Development Report 2001

United Nations (2002) Human Development Report 2002

Uzzi, B. (1997) Social structure and competition in inter-firm networks: the paradox of embeddedness, *Administrative Science Quarterly*, Volume 42 pp 35-67

Vahlne, J.-E. & Wiedersheim-Paul, F. (1977) Psychic distance: An inhibiting factor in international trade, *Working paper* No. 1977/2 Centre for International Business Studies, Department of Business Administration, University of Uppsala

Vereecke, A., Van Dierdonck R. & De Meyer A. (2006) A Typology of Plants in Global Manufacturing Networks, *Management Science,* Volume 52 number 11 pp 1737-1750

Verter, V. & Dincer, C. (1992) An integrated evaluation of facility location, capacity acquisition and technology selection for designing global manufacturing strategies, *European Journal of Operational Research,* Volume 60 pp 1-18

Verter, V. & Dincer, C. (2002) The plant location and flexible technology acquisition problem, *European Journal of Operational Research,* Volume 136 pp 366-382

Van den Bosh, F.A.J., Volberda H.W. & de Boer M. (1999) Coevolution of firm absorptive capacity and knowledge environment: Organisational forms and combinative capabilities, *Organisational Science,* Sep/Oct 1999, Volume 10 issue 9 pp 551-569

Walker, A. & Ellis, H. (2000) Technology transfer: strategy, management, process and inhibiting factors. A study relating to the technology transfer of intelligent systems, *International Journal of Innovation Management*, Volume 4 number 1 pp 97-122

Weikl, C. & Grotz, R. (1999) Transnational technology transfer of SMEs and its impact on regional development, *Entrepreneurship & Regional Development*, Volume 11 pp 301-315

Welch, L.S. & Luostarinen, R. (1988) Internationalization: evolution of a concept, *Journal of General Management,* Volume 14 number 2 pp 34-55

Welch, L.S. & Luostarinen, R. (1993) Inward-Outward connections in internationalisation, *Journal of International Marketing*, Volume 1 number 1 pp 44-56

Welch D. E. & Welch L.S. (1996) The Internationalization Process and Networks: A Strategic Management Perspective, *Journal of International Marketing*, Volume 4 number 3 pp 11-28

Westbrook, R. (1995) Action research, a new paradigm for research in production and operations management, *Journal of Operations Management*, Volume 11 number 2 pp 123-142

Westhead, P., Wright, M. & Ucbasaran, D. (2001) The internationalization of new and small firms: a resource-based view, *Journal of Business Venturing*, Volume 16 pp 333-358

Westhead, P., Binks, M., Ucbasaran, D. & Wright, M. (2002) Internationalization of SMEs: a research note, *Journal of Small Business and Enterprise Development*, Volume 9 number 1 pp 38-48

Winch, G.W. & Bianchi, C. (2006) Drivers and dynamic processes of SMEs going Global, *Journal of Small Business and Enterprise Development*, Volume 13 issue 1 pp 73-88

Wiedersheim-Paul, F. & Olson, F. & Welch L. S. (1978) Pre-export activity: The first step in internationalisation, *Journal of International Business Studies,* Volume 9 issue 1 pp 47-58

Winter, R. (1989) Learning from Experience: principles and practice in action research. Lewes, Falmer.

Wu, J.A. & N.L. Wu (1984) Analysing Multi-dimensional attributes for the single plant location problem via an adaptation of the analytical hierarchy process *International Journal Operation and Production Management* pp 13-21

Young, S. (1987) Business Strategy and the Internationalisation of Business: Recent Approaches *Managerial and Decision Economics* Chichester, Volume 8 issue 1

Zander, U. & Kogut, B. (1995) Knowledge and speed of transfer and imitation of organisational capabilities: An empirical test, *Organizational Science*, Volume 6 pp 76-92

Zanfei, A. (2000) Transnational firms and the changing organisation of innovation activities, *Cambridge Journal of Economics*, Volume 24 pp 515-542

Zehra, S.A., Ireland, R.D. & Hitt, M.A. (2000) International Expansion by New Venture Firms: International Diversity, Mode of market Entry, technological Learning and Performance, *Academy of Management*, Volume 43 issue 5 pp 925-950

Zenger, T.R. & Lawrence, B.S. (1989) Organisational demography: The differential effects of age and tenure distributions on technical communication, *Academy of Management Journal*, Volume 32 pp 353-376

Appendix 1

List of Factors

Location Factors are: the area's business climate (Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1979), the education and training strengths of the area (Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1979; Schemenner et al., 1987; Stonebraker and Leong, 1994), labour unionization (Blair and Premus, 1987; Fulton, 1971; Schemenner, 1979, 1982; Stonebraker and Leong, 1994), the attitudes of local and state government (Galbraith and De Noble, 1988; Schemenner, 1979), state and local government incentives (Blair and Premus, 1987; De Noble and Galbraith, 1992; Galbraith and De Noble, 1988; Stonebraker and Leong, 1994), community attitude (Schemenner, 1982; Stonebraker and Leong, 1994), community distance (Schemenner, 1979; Schemenner et al.,1987), other competitive industries in the area (Schemenner,1979), transportation cost (Blair and Premus, 1987; De Noble and Galbraith, 1992; Fulton, 1971; Hekman, 1992; Stonebraker and Leong, 1994), availability of transportation facilities (Blair and Premus, 1987; De Noble and Galbriath, 1992; Galbraith and De Noble, 1988; Stonebraker and Leong, 1994), labour productivity and attitudes towards productivity (Fulton, 1971; De Noble and Galbraith, 1992; Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1997; Stonebraker, 1994), cost of labour (De Noble and Galbraith, 1992; Galbraith and De Noble, 1988; Hack, 1984; Hekman, 1992; Schmenner, 1982; Schemenner et al., 1987; Stonebraker and Leong, 1994), availability of labour (Blair and Premus, 1987; Galbraith and De Noble, 1988; Stonebraker and Leong, 1994), availability of skilled labour (Blair and Premus, 1987; Fulton, 1971;

Galbraith and De Noble, 1988; Hack, 1984; Hekman, 1992), availability of unskilled labour (Galbraith and De Noble, 1988), availability and transfer of qualified technical and managerial personnel (Galbraith, 1985, 1990; Galbraith and De Noble, 1988), land availability for building and expansion (Galbraith and De Noble, 1988; Hekman, 1992; Schemenner, 1982; Stonebraker and Leong, 1994), cost of land (De Noble and Galbraith, 1992; Fulton, 1971; Hekman, 1992; Stonebraker and Leong, 1994), cost of construction (Hekman, 1992; Schemenner et al., 1987; Stonebraker and Leong, 1994), proximity and access to markets (Blair and Premus, 1987; Galbraith, 1985, 1990; Galbraith and De Noble, 1988; Hack, 1984; Hekman, 1992; Schemenner, 1982; Stonebraker and Leong, 1994), proximity to highways (De Noble an Galbraith, 1992), availability of utilities (De Noble and Galbraith, 1992; Fulton, 1971; Hekman, 1992; Stonebraker and Leong, 1994), cost of utilities (Galbraith and De Noble, 1988; Hakman, 1992; Schemenner et al., 1987; Stonebraker and Leong, 1994), cost of living in the area (Galbraith and De Noble, 1988; Hakman, 1992; Schemenner et al., 1987; Stonebraker and Leong, 1994), tax structure and rates (Blair and Premus, 1987; Fulton, 1971; Galbraith and De Noble, 1988; Schemenner, 1982; Schemenner et al., 1987), insurance considerations (Fulton, 1971), financing opportunities (Blair and Premus, 1987; Fulton, 1971; Schemenner, 1982), banking services (Stonebraker and Leong, 1994), social and cultural climate (Blair and Premus, 1987; De Noble and Galbraith, 1992; Fulton, 1971; Galbraith, 1985,1990; Galbraith and De Noble, 1988; Hack, 1984; Hekman, 1992), quality of life in the area (Blair and Premus, 1987; Schemenner, 1982), residential housing (Galbraith and De Noble, 1988; Stonebraker and Leong, 1994), cost of municipal services (Fulton, 1971), availability of services such as health, fire, police and recreational facilities (De Noble an Galbraith, 1992; Galbraith and De Noble, 1988; Stonebraker and Leong, 1994), local and physical infrastructure (Blair and Premus, 1987), population density (Schemenner et al., 1987), climate (Schemenner et al., 1987; Stonebraker and Leong, 1994), proximity to suppliers and resources (Galbraith, 1985, 1990; Galbraith and De Noble, 1988; Schemenner, 1982), access to raw materials (Blair and Premus, 1987; Karakaya and Stahl, 1989), access to distribution channels, cost advantage of incumbents (Karakaya and Stahl, 1989), environmental regulations (Schemenner et al., 1987; Stonebraker and Leong, 1994; Jeffrey and Duerksen, 1980), and role of labour laws (Pull, 2002).

Appendix 10

Managerial Decision Making Process Chart

Appendix 2

Quantitative Decision Making

Methodology	***Type of Study***	***Author***
Fuzzy Set Theory	Descriptive Theoretical	Nail and Chakravarty (1994)
0-1 Mix Integer Programming	Descriptive Theoretical	Canel and Khumawala (1996)
0-1 Mix Integer Programming	Descriptive Theoretical	Canel and Khumawala (1997)
Quadratic Programming	Theoretical	Hodder and Junker (1985)
Quadratic Programming	Theoretical	Hodder and Dincer (1986)
Heuristic	Theoretical	Haug (1992)
0-1 Mix Integer Programming	Theoretical	Cohen et al (1989)
0-1 Mix Integer Programming	Theoretical	Gray (1993)
Sitex Model (Possible Computer Models)	Theoretical	Curry and Moutinho (1992)
Economic Models (Pricing)	Theoretical	Espinosa (1992)
Pairwise Stochastic Comparison	Theoretical	Timothy, Richard and Gang (2002)
Analytical Hierarchy Process	Theoretical	Wu and Wu (1984)
Simultaneous Optimization Model	Theoretical	Verter and Dincer (2002)
0-1 Mix Integer Programming	Theoretical	Jucker and Carlson (1976)
Analytical Hierarchy Process	Theoretical	Atthirawong and MacCarthy (2002)
Breakeven Analysis	Theoretical	Jucker (1977)
0-1 Mix Integer Programming	Theoretical	Haug (1985)
Dynamic Programming	Theoretical application	Pomper (1976)
0-1 Mix Integer Programming	Theoretical application	Cohen and Lee (1989)
Electre 3	Theoretical Application	Barda, Dupuis and Lencioni (1990)
Integer Goal Programming	Theoretical application	Green, Kim and Lee (1981)
Goal Programming	Theoretical application	Hoffman and Schiederjans (1994)

Appendix 3

Conway and Swift's (2000) 25 cultural factors for Psychic Distance.

Conway and Swift (2000) identified 25 elements of culture. Ranked in order, these are: language/communication, religion/religious beliefs, food, drinks, politics/government, social/community organization, status differentiation, style/clothing (business), manners/protocol, transport/travel, family, education, time-keeping/punctuality, currency/money, law/legal concerns, values and attitudes, healthcare provision, ethics/morals, body language/NVC, eating habits/mealtimes, historical tradition, working practices/hours, attitude towards women, role of women in business and division of labour (male/female). Finally, they reduced this list to 20 elements of culture that affect psychic distance: the extent to which religion affects everyday life, the food and drink generally consumed, the extent to which politics are a focus of interest, and are actively discussed in everyday life, the existence and relative importance of differences in status in business relationships, the clothing generally worn by people in business, the style of greeting/address/introductions, the overall efficiency of the public transport system, the extent to which everyday life appears to revolve around the family, the level of respect for education in general, keeping appointments and meetings on time, the extent to which legal formalities appear to influence business negotiations, the quality of public sector healthcare provision, standards of ethics and morals in business, the use of gestures, eye contact and body language, the general patterns of mealtimes, the importance of historical tradition in society, general patterns of working (e.g. working day/hours), the extent to which men and women appear to have the same opportunities open to them in society, the behaviour of men towards women in business, and the general availability of leisure/entertainment facilities.

Appendix 4

Performance Objectives Literature

Performance objectives

The last section of this chapter looks at what is transferred from one organization to another. In the case of manufacturing enterprises, whether they are SMEs or large organizations, the operational capability is transferred. Knowledge about the operation's capability is a key resource. The performance objectives literature, outlined below, explains these capabilities and how they are formed, as well as the relationships between them. These will be used in later chapters of the research.

Internationalization has been explained in economic theories as internalizing countries' location advantages (Dunning, 2001). Internalization can be achieved through different types of entry modes. Those entry modes that require equity investment or transfer of technology and knowledge from one location to another actually try to replicate firm-specific advantages in other countries (Hymer, 1976; Dunning, 2001). These are the economic explanations of this phenomenon. The transfer of technology or knowledge in operational terms involves replicating the performance objectives in another country. This replication aims to achieve similar quality, dependability, flexibility, delivery, innovation and cost performances in other countries. Internationalizing firms replicate their operational advantage, which is defined by these performance objectives in other countries. The performance objectives will improve owing to location advantages.

There are several competing explanations on performance objectives. These are explained below.

Trade-off theories

Skinner (1969, 1974) introduced the trade-off model. According to this, managers have to choose from a generic strategy apart from cost. The generic strategies include quality, dependability, flexibility and cost. Achievements at one level of performance can only be achieved through sacrificing performance in one or more of other levels. Some of the areas in which trade-offs can exist are: quality consistency, quality specification, lead time, delivery reliability, cost, flexibility and innovativeness (Mapes, New and Szwejczewski, 1997). Skinner's (1969) aim was to demonstrate the importance of operations to corporate strategy, and how operations strategy can be used for achieving higher performances. He developed this to include the idea that each manufacturing site should focus on a few performance measures, and trade-off against others (Skinner, 1974). This means that achieving higher performance in one measure involves sacrificing higher performance in other performance measures. The concept of generic strategies was also employed by Porter (1980) to explain the fact that companies can utilize one of three generic strategies, including cost, differentiation and focus strategies. The cost strategy involves achieving lower costs than competitors and earning higher revenues through attracting customers to low-cost products. Differentiation is achieved through higher quality, dependability and delivery. These capabilities in these performance objectives can be used to create different product or service offerings to customers. A company can achieve only one of these strategies. Quality consistency, quality specification, lead time, delivery reliability, cost, flexibility and innovativeness are believed to demand trade-offs between one another (Fine and Hax, 1985; Hayes and Wheelwright, 1984; Richardson, Taylor and Gordon, 1985; Rosenfield, Shapiro and Bohn, 1985).

Performance objectives such as quality do not have a common definition. Each performance objective can explained by multiple definitions, which capture different dimensions of the objective. Garvin (1984) questioned the common definition of conformance quality used by some researchers. He looked at transcendent, product-based, user-based, manufacturing-based and value-based definitions, and identified eight dimensions of quality:

1. Performance – primary operating characteristics of a product.
2. Features – secondary characteristics supplementing the basic characteristics of a product.
3. Reliability – life of a product until its failure (first or time between different failures).
4. Conformance – how well a product is manufactured against the specifications.
5. Durability – life of a product.
6. Serviceability – speed, courtesy and competence in repair and servicing of the product.
7. Aesthetics – look, feel, sound, taste and smell of a product.

8. Perceived quality – Image, advertising and brand name, as well as the cumulative effect of customers' past experiences and word of mouth, which influence customer perception about a product.

Another important performance objective that has been researched extensively is flexibility. There are numerous methods by which to increase manufacturing flexibility, including implementation of advanced manufacturing technology, lead time and cycle time reduction, and making faster set-ups (Giffi, Roth and Seal 1990).

Brown et al. (1984) defined eight types of flexibility:

1. *Machine* – ease of set up changes for part types.
2. *Process* – ease of using multiple processes and materials for part types.
3. *Routing* – ease of rescheduling production in case of breakdown.
4. *Volume* – ability to operate in different production volumes.
5. *Expansion* – ease of expanding the production system in capacity (expansion can be done modularly).
6. *Operation* – ease of changing order of operations.
7. *Production* – number of part types that can be used.
8. *Product* – set-up change to a new product.

Sethi and Sethi (1990) added three more types of flexibility to the above list:

1. *Material Handling* – ease of moving parts and products within the production.

2. *Programme* – ability to run without supervision.
3. *Market* – ability of the manufacturing system to adapt to environmental (market) changes.

Gupta and Somers (1992) empirically tested and tried to validate 11 types of flexibility proposed by Sethi and Sethi (1990). They classified flexibility into nine measures:

1. *Machine flexibility* – switching from one operation to another without incurring costs or losing time.
2. *Material handling flexibility* – ease of moving parts from one location to another.
3. *Process flexibility* – also called mix flexibility; the ability to produce different parts without incurring costs and losing time.
4. *Routing flexibility* – ability to produce a part using different routes in a manufacturing facility.
5. *Volume flexibility* – ease of manufacturing different levels of output profitably
6. *Programme flexibility* – ability of manufacturing system to run without supervision.
7. *Product and production flexibility*: ability to produce a product without adding new processes and needing to make change-overs.
8. *Market flexibility* – ease of adapting to environmental changes (market).
9. *Expansion and market flexibility* – ease of increasing capability and capacity of manufacturing capacity.

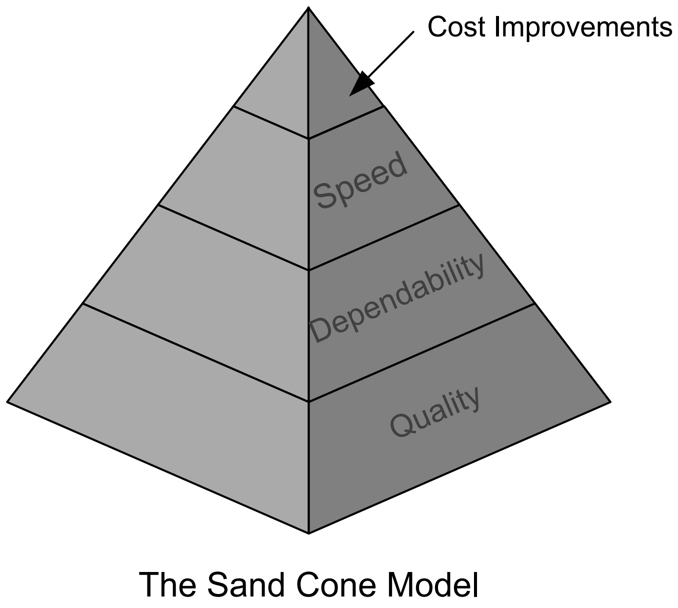
Schonberger (1986,1990) was one of the first to criticize the trade-off model, stating that some companies are able to perform simultaneously at more than one level. For instance, Japanese companies can manage to manufacture high quality products and perform at more than one level, achieving high-quality products and low cost at the same time (Schroeder, Sakakibara, Flynn and Flynn, 1991). Skinner (1974) responded to these criticisms by arguing that the relationships between performance levels should not be considered trade-offs, but rather performance relationships.

Cumulative models

Ferdows and De Meyer (1990) challenged the common wisdom of selecting one of the generic capabilities of cost efficiency, quality, dependability and flexibility. There is a trade-off between these strategies, and companies choosing one of them sacrifice others. Traditionally, the only way that a company can achieve multiple improvements in several generic strategies is operating with slack (e.g. poor layout; obsolete machinery; poor suppliers, production or scale; etc.). The cumulative model is based on the observations of Nakane (1986, cited in Ferdows and De Meyer, 1990) and Rosenzweig and Roth (2004). As stated by Nakane (1986, cited in Ferdows and De Meyer, 1990), quality improvement is the basis of all other improvements, followed by dependability, cost efficiency and flexibility improvements. Companies should achieve quality under control and improve to a certain level before they can tackle dependability. In order to achieve improvements in cost efficiency, quality and dependability need to be under control and be at a certain level. At the end of the chain is flexibility; in order to accomplish and improve flexibility, the preceding three items should be under control and at a certain level. Companies should continue to invest in all levels in order to achieve the benefits of cumulative effects. If they spend less on quality they will lose their edge in all other areas as well.

Ferdows and De Meyer (1990) used a different rank of priorities. They used quality performance as a precondition to all lasting improvements, stating that a milestone should be achieved in quality performance so that a company can start to focus on making the production process more dependable. This milestone does not mean that they have to be excellent in any single dimension, and is more or less related to operational know-how (Rosenzweig and Roth, 2004). The next improvement relates to speed, which complements the efforts in quality and dependability. At the end of the chain is cost efficiency improvements, which cannot be achieved without success in the other three areas. Ferdows and De Meyer (1990) claimed that in order to achieve marginal improvements in cost efficiency, companies should achieve higher levels of improvements in former improvement areas in increasing levels, under the condition that there is no operational slack, and the company is operating to industry standards. Ferdows and De Meyer (1990) use a “sand cone” analogy to explain this relationship (Figure 1, below).

Figure 1 Sand cone model *(adapted from Ferdows and De Meyer, 1990)*



Ferdows and De Meyer (1990) drew a distinction between achieving supremacy in one of these generic strategies and the methods to achieve them. Companies can follow many improvement initiatives to achieve their objectives. What makes every company unique is their combination of different knowledge, which is gained from different improvement initiatives. These programmes are selected from a vast amount of possible combinations, and the implementation of each improvement initiative differs across the companies. The aim is to have achievements that are sustainable.

The competitors will find it harder to spot the reasons behind supremacy in any of the generic strategies, and cannot easily imitate the effects. The manufacturing capability will be institutionalized within the organization to become the norm. In Table 1, some of the improvement initiatives that have been used by “better-than-average” companies and “worse-than-before” companies, according to Ferdows and De Meyer’s (1990), are compared.

Some similarities, such as zero defects and statistical process controls, have shown multiple impacts in more than one of the performance indicators. In another paper, De Meyer and Ferdows (1990) observed other relations between improvement initiative and expected improvements in generic strategies. Through these relations they concluded that success in manufacturing comes with investment in a wide variety of improvement programmes. Their contribution is to include the effects of cost efficiency as an indirect achievement, which can only be obtained through investment in other areas, starting from quality.

When a company invests in new technology or improvement programmes, the expected returns from that investment or programme can only be seen in the long term (more than two years later). The duration of negative effects of new technology and technology-based improvement programmes is often underestimated. Further, for technology-based programmes to succeed there is a need to implement an appropriate set of complementary improvement programmes.

Table 1 Relationship between manufacturing improvement programs and performance indicators *(adapted from Ferdows and De Meyer, 1990)*

Performance measure	Programmes emphasized by better-than-average group	Programs emphasized by worse-than-average group
Quality (conformance to design)	Giving workers more planning responsibility Zero defects Value analysis/product redesign Group technology Narrowing product lines/ standardization Vendor quality Reconditioning physical plants Flexible manufacturing systems Process statistical quality Control Quality circles	
Unit production cost	Developing new processes for existing products Process statistical quality control	Giving workers more planning responsibility Plant relocation
Inventory turnover	Zero defects Just-in-time	Capacity expansion Plant relocation Narrowing product lines/ standardization Integration of information systems across functions Reducing size of manufacturing units
Speed of new product development	Zero defects Value analysis/product redesign Developing new processes for new products Integration of information systems in manufacturing Vendor quality Improving new product introduction capability	Reducing size of manufacturing units
On-time delivery	Giving workers more planning responsibility Zero defects	
Delivery speed		Manufacturing reorganization Integration of information systems across functions
Overhead costs	Value analysis/product redesign capacity expansion Defining a manufacturing strategy Automating jobs	
Batch sizes	Manufacturing lead-time reduction Reducing set-up times Closing plants Just-in-time	

Noble (1995) conducted one of the first empirical studies on cumulative models. Her study used six different improvement levels, including: quality, dependability of the production system, quick and reliable delivery, cost, flexibility and innovation (rapid and frequent new product development). There are two added improvement areas here; the first is delivery, which has been defined as dependability of the production system, reliability of the product and dependability of delivery. Dependability of the delivery system is not the same as dependability of the production system or product. Noble (1995) added delivery after dependability because they are closely associated. Her second addition, innovation, was included for two reasons: first, Hall and Nakane (1990) mentioned innovation as a sixth capability; second, the definition of flexibility has multiple dimensions including rapid design changes, design flexibility, volume flexibility, flexibility of the production system, product customization, speed of new product development and process flexibility. Innovation can be seen as a dimension of flexibility, in terms of new product development ability; however, this is a misleading definition of innovation. There are many other forms of innovation, including organizational innovation and process innovation. In addition, the distinction between radical and incremental innovation is not emphasized in this study. In her later work, Noble (1997) emphasized six performance objectives: quality, dependability, delivery, cost, flexibility and innovation. Quality is measured by: less rework, less inspection, higher material yields, less waste, machine up-time, degree of new quality improvement ideas from the quality control staff, perceived strength of quality control function within the plant, and per cent of output reworked. This shows that the definition of quality for cumulative effect reflects several dimensions of quality, according to Garvin (1984). Noble (1997) went on to define dependability as perceived strength of maintenance, material handling, logistics, production planning, production scheduling, and production control functions and material handling improvements. This definition does not include the dimension of product dependability (reliability), which is also a quality function. Delivery is defined as quick delivery (short lead times) and reliable delivery. Cost is measured by perceived strength of inventory control function, how well the product can compete as a low-cost product, and recent productivity accomplishments in terms of material substitution, machine and line speed improvements, lower work-in-progress inventories, material shortage reductions, reductions of overhead and linking of process segments for smooth flow of products. Flexibility is defined as frequency of product mix changes, fluctuation in monthly output volume as a percentage, changes in throughput time, and products competing according to product customization and production rate flexibility. This has only a few of Gupta and Sommers' (1992) measures of flexibility. Innovation is measured according to the rapidity and the frequency of new product introduction. One major deficiency of this innovation measure is that rapidity and frequency of new product introduction are not independent from each other. Though Noble (1995) and Hall and Nakane (1990) use only one dimension of innovation to separate flexibility into process and product related dimensions, Noble (1995) defined quality using the following dimensions: percentage of rework, strength of quality control and assurance system, higher material yields, less rework, higher machine up-time, and less inspection. Dependability is defined through six factors: accomplishments in improvements in material handling, strong maintenance, strong production planning, strong production scheduling, strong production control function and fewer (in frequency) expedited orders. Strong inventory control function, lower work-in-progress inventories, reductions in overheads, accomplishments in machine and line-speed improvements, linking the process segments so that the materials/products flow smoothly (reduction in throughput time), and accomplishments in materials shortage reductions are used as factors for cost reduction. Four factors are used for flexibility: the frequency of occurrence of product mix, whether or not important product lines compete in the marketplace through product customization, fluctuations in output levels, and whether or not important product lines compete on the basis of production rate flexibility. The last improvement opportunity or capability is defined through the factors of rapidity of new product innovation and frequency of new product innovation. Noble (1995) proved empirically that the cumulative model is consistent. Different geographical regions compete at different levels and stages of the cumulative model, while companies in some countries compete through multiple capabilities, and performance differences between companies can be explained through the cumulative model (some companies are still using trade-off model to prioritise one capability while using multiple dimensions). Noble (1997) demonstrated that high-productivity firms are more likely to follow the cumulative model, compared to low productivity firms. She identified a cluster of quality, dependability and cost for high-quality firms, believing that innovation plays a crucial role in the accomplishment of outstanding labour productivity performance.

Ward, McCreery, Ritzman and Sharma (1998) studied the measurement of competitive priorities for cumulative effect studies, conducting telephone surveys to measure validity. The measures they tested include:

- Cost importance – direct production cost, productivity, capacity utilization and inventory reduction.
- Quality importance – using Garvin's (1984) dimensions (see above).
- Delivery time importance – ability to deliver according to promised schedule, delivery speed.
- Flexibility importance – using Gerwin's (1993) dimensions of flexibility (product mix, volume changeover, modification, rerouting, material and sequencing).

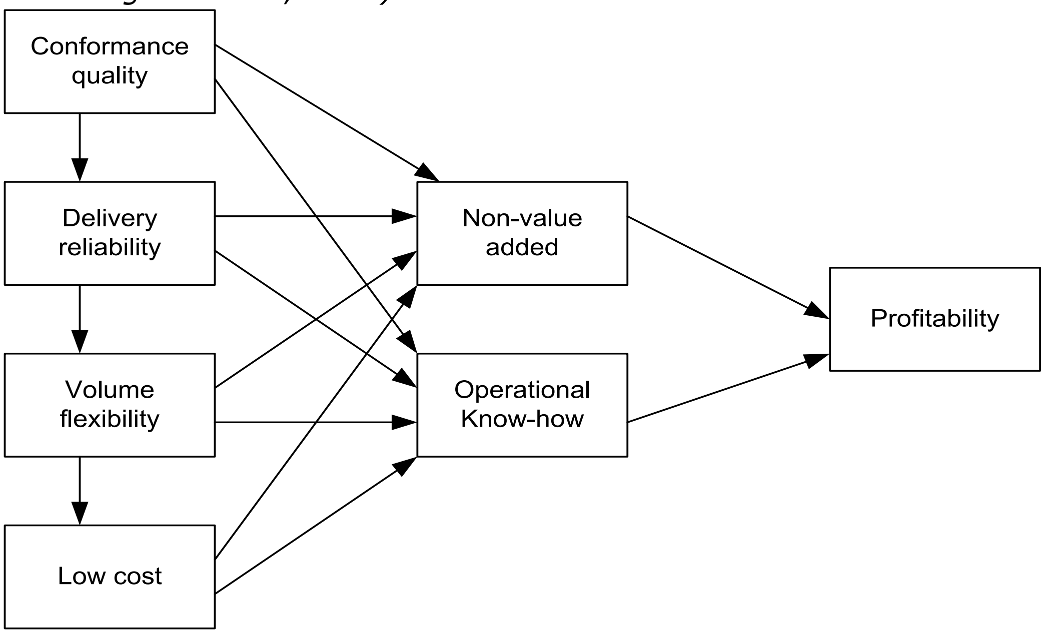
The last three of the dimensions are not included here, as the author believes them to be beyond the scope of the current study.

Mapes, New and Szwejczewski (1997) examined the effects of increased reliability.

Reliability should be achieved in terms of product, process and supplier in order to reduce unplanned delays, increase the safety of stock, and reduce scrap, rework and the need for inspection, which leads to lower costs, shorter lead times, more timely delivery and greater quality consistency. More product features, variety and innovation have negative effects of higher planning and control costs, greater risk of errors and unplanned delays. The greater amount of product features, variety and innovation has a positive effect on learning curves. Together, these will lead to higher costs, longer lead times, less reliable lead times and lower quality consistency. This study by Mapes, New and Szwejczewski (1997) differs to earlier studies, as it does not rank the priorities but instead looks at different ways in which to achieve combinative performance objectives. This is undermined by the increasing pressures of greater amounts of product variety, features and innovation, which reduce the effects of increased reliability. However, Mapes, New and Szwejczewski's (1997) study only looked at certain definitions of quality and flexibility. The study also provided mixed results, as some companies achieve multiple performance objectives and other companies operate within trade-offs.

Roth (1996, 1997) examined te cumulative effects and developed a theory of competitive progression, in order to explain the sand cone effect. This theory of competitive progression was developed further by Rosenweig and Roth (2004). This model is illustrated in Figure 2. An analysis of the model revealed support for the most combinative capabilities within this model. The unproven relationships within the model are attributed to the limitations of Rosenweig and Roth's (2004) research. It is hard to research competitive progression or a sand cone effect, as the data required is longitudinal, with cut-off points after each improvement. The path dependency of the cumulative effects, or sand cone, is hard to measure. There is a need to measure before and after each improvement initiative in order to understand these effects. Studies to date have failed to capture this type of data, and fall short of explaining all possible relationships, which leads to partial support for the sand cone effect or theory of competitive progression.

Figure 2 Competitive progression path model *(adapted from Rosenwig and Roth, 2004)*



Flynn and Flynn (2004) took a wider perspective as cumulative capabilities do not necessarily need a sequence. Further to this, they have investigated national and industry differences in sequences of cumulative capabilities, concluding that there are national differences, with Japan leading the way. Innovative industries tend to have more cumulative capabilities compared to less innovative industries, and therefore industry differences play an important role.

Hayes and Pisano (1996) responded to these efforts as a move from short-term trade-offs to a long-term view of improving resources for competitive advantage. Few efforts have tried to connect the sand cone or competitive progression theory to business performance. Paiva, Roth and Fensterseifer (2007) relate it to knowledge management, while Fynes, Voss and Burca (2005) investigate the impact of supply chain relationship dynamics on manufacturing performance through performance objectives.

These affects have been studied by multiple authors, and this has given rise to multiple lists of sequences. Some of these are displayed in Table 2. The importance of this to internationalization is observed when technology and knowledge are transferred from one location to another. Most technology and knowledge transfer is done in combination with improving some of the performance objectives. If the performance objectives have cumulative effects, then the transfer of technology or knowledge will be dependent on where each organization is in their development of these performance objectives. The trade-off model provides an easier explanation, since trade-offs will enable easier technology transfer than cumulative effects.

Table 2 Sequences of cumulative progression according to different authors

Author	Sequences in Cumulative Model					
	1st	2nd	3rd	4th	5th	6th
Nakane (1986)	Quality	Dependability	Cost	Flexibility		
De Meyer, Nakane and Ferdows (1989)	Quality	Dependability	Cost	Flexibility		
Ferdows and De Meyer (1988)	Quality	Dependability	Cost	Flexibility		
Ferdows, Miller, Nakane and Vollman (1986)	Quality	Dependability	Cost	Flexibility		
Ferdows and De Meyer (1990)	Quality	Dependability	Flexibility	Cost		
Hall (1987)	Quality	Dependability	Cost	Flexibility		
Hall and Nakane (1990)	Company Culture	Quality	Dependability	Waste Reduction	Flexibility	Innovation
Noble (1995)	Quality	Dependability	Delivery	Cost	Flexibility	Innovation
Swink, Way (1995)	Quality	Dependability	Flexibility	Cost		
Schmenner, Swink (1998)	Quality	Delivery	Cost	Flexibility		
Rosenweig, Roth (2004)	Conformance Quality	Delivery Reliability	Volume Flexibility	Low Cost		

Appendix 5 List of All Hypothesis

List of Hypotheses

Entry Mode Model
Hypothesis 1a: Technology transfer ability of the host organization will negatively affect the entry mode selection.
Hypothesis 2a: Network relationships (trust, control and commitment) negatively affect the entry mode decision.
Hypothesis 3a: Psychic distance negatively affects the network relationships (trust, control and commitment).
Hypothesis 4a (i): Operations advantage (cost advantage) positively affects the technology transfer ability.
Hypothesis 4a (ii): Operations advantage (flexibility advantage) positively affects the technology transfer ability.
Hypothesis 4a (iii): Operations advantage (quality advantage) positively affects the technology transfer ability.
Hypothesis 4a (iv): Operations advantage (delivery advantage) positively affects the technology transfer ability.
Hypothesis 5a: Innovation advantage positively affects the technology transfer ability.
Hypothesis 6a: Absorptive capacity of the receiver positively affects the entry mode decision.
Hypothesis 7a: Network relationship (trust, control and commitment) of the receiver organization negatively affects the entry mode decision.
Hypothesis 8a: Psychic distance of the receiver organization negatively affects the network relationship of the receiver organization.
Hypothesis 9a (i): Operations advantage (cost advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.
Hypothesis 9a (ii): Operations advantage (flexibility advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.
Hypothesis 9a (iii): Operations advantage (quality advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.
Hypothesis 9a (iv): Operations Advantage (Delivery Advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.
Hypothesis 10a: Innovation advantage of the receiver organization positively affects the absorptive capacity of the receiver organization.

Role of Factory Model
Hypothesis 1b: Technology transfer ability of the host organization positively affects the role of factory decision. Hypothesis 2b: Network relationship (trust, commitment and control) of the host organization positively affects the role of factory decision. Hypothesis 3b: Psychic distance of the host organization negatively affects the network relationship characteristics of the host organization. Hypothesis 4b(i): Operations advantage (cost advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization. Hypothesis 4b(ii): Operations advantage (flexibility advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization. Hypothesis 4b(iii): Operations advantage (quality advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization. Hypothesis 4b(iv): Operations advantage (delivery advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization. Hypothesis 5b: Innovation advantage of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization. Hypothesis 6b: Absorptive capacity of the receiver organization will positively affect the role of factory decision. Hypothesis 7b: Network relationship characteristics of the receiver organization will positively affect the role of factory decision. Hypothesis 8b: Psychic distance of the receiver organization negatively affects the network relationship characteristics of the receiver organization. Hypothesis 9b(i): Operations capability (cost advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization. Hypothesis 9b(ii): Operations capability (flexibility advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization. Hypothesis 9b(iii): Operations capability (quality advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization. Hypothesis 9b(iv): Operations capability (delivery advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization. Hypothesis 10b: Innovation capability of the receiver organization positively affects the absorptive capacity of the receiver organization.

Level of Internationalization Model

Hypothesis 1c: Technology transfer ability of the host organization positively affects the level of internationalization.
Hypothesis 2c: Network relationship characteristics of the host positively affect the level of internationalization.
Hypothesis 3c: Psychic distance of the host negatively affects their network relationship characteristics.
Hypothesis 4c(i): Operations advantage (cost advantage) of the host positively affects the technology transfer ability.
Hypothesis 4c(ii): Operations advantage (flexibility advantage) of the host positively affects the technology transfer ability.
Hypothesis 4c(iii): Operations advantage (quality advantage) of the host positively affects the technology transfer ability.
Hypothesis 4c(iv): Operations advantage (delivery advantage) of the host positively affects the technology transfer ability.
Hypothesis 5c: Innovation advantage of the host positively affects the technology transfer ability.
Hypothesis 6c: Absorptive capacity of the receiver organization positively affects the level of internationalization.
Hypothesis 7c: Network relationship characteristics of the receiver positively affect the level of internationalization.
Hypothesis 8c: Psychic distance of the receiver organization negatively affects their network relationship characteristics.
Hypothesis 9c(i): Operations advantage (cost advantage) of the receiver positively affects their absorptive capacity.
Hypothesis 9c(ii): Operations advantage (flexibility advantage) of the receiver positively affects their absorptive capacity.
Hypothesis 9c(iii): Operations advantage (quality advantage) of the receiver positively affects their absorptive capacity.
Hypothesis 9c(iv): Operations advantage (delivery advantage) of the receiver positively affects their absorptive capacity.
Hypothesis 10c: Innovation advantage of the receiver positively affects their absorptive capacity.

Appendix 6

Questionnaire

RESEARCH ON INTERNATIONAL OPERATIONS of SMALL FIRMS

These are the contact details that we have for your company. Please amend if necessary.

Please indicate the average number of employees during 2005:

☐0-9 ☐10-49 ☐50-249 ☐250 and over

What was your company's annual turnover in 2005? £

1. Please indicate your motives to have international operations. *(tick more than one)*

	Insufficient domestic capacity
	Access to foreign suppliers
	Mature domestic market
	Increase in international competition
	Unfavourable domestic economy (i.e.increasing labour and energy cost)
	Closeness to major customers

	Overhead cost advantage
	Material cost advantage
	Labour cost advantage
	Innovation advantage
	Entering new markets for higher revenues

2. How long has your company been in each stage of international operations?

	Years
Occasional export activity	
Systematic export activity through independent agents	
Direct involvement in export activity through overseas sales subsidiary	
Outsourcing production to a foreign company	
License your technology for production in a foreign company	
Acquiring or merging with a foreign company	
Establishing partnerships with a foreign company for production	
Investing for production with a foreign partner to form a joint-venture	
Invest in an wholly-owned a foreign production facility	

3. Business Strategy: Please select the strategies that your company has to follow in order to satisfy customers (choose one or more than one if necessary)

	Cost Leadership		Operational Flexibility
	Innovation		Product Reliability
	Quality Leadership		Finding New Market Opportunities
	Dependable Delivery		

4. Extent of International Operations: If you do not know the exact figures, it would be helpful to write an estimate figure.

	0-19%	20-39%	40-59%	60-79%	80-100%
What is the percentage of foreign sales to total sales?					
What is the percentage of value of foreign assets to the value of total assets?					
What is the percentage of foreign employees to total employees?					
What percentage of the total range products is made in the foreign operations?					

In how many foreign countries do you have production facilities?

5- For the possible roles of the foreign operation listed below, please state which of these statements most accurately show the role you attach to your foreign operations.

Role limited just to produce items to low cost with no or limited collaboration and local autonomy	
Role limited just to produce items at low cost with more collaboration and local autonomy	
Role limited to serve specific regional markets with no or limited collaboration and local autonomy	

Role limited to serve specific regional markets with more collaboration and local autonomy	
Role limited to exploit local advantages with no or limited collaboration and local autonomy	
Role limited to exploit local advantages with more collaboration and local autonomy	

6- Can you please rate the importance of the following factors in your decision on establishing international operations?

	0- No Importance 0	1	2	3	4	5-Very High Importance 5
International knowledge of the decision maker						
Professional training of the decision maker						
Presence of someone trusted in a foreign country to gather information						
Availability of committed and trusted staff member in a foreign country						
Personal business network of the decision maker in a foreign country						
Availability of committed and trusted managers to send to a foreign country						
Availability of committed and trusted staff for technology transfer						
Ability to leave the overseas business to someone trusted						

7. Please rate the following statements according to your organisation

	0- No Importance 0	1	2	3	4	5-Very High Importance 5
The head office has significant influence on foreign production activities						
The head office has a significant influence on general business practices						
The head office decides the products to be produced & sold by a subsidiary						
The head office has a significant influence on strategy of a subsidiary						

PLEASE ANSWER THE REMAINING QUESTIONS FOR EACH OF YOUR UK OPERATIONS & FOREIGN OPERATIONS.

8. For the several alternatives for competing in an industry listed below, please rate the importance of each alternative in your primary market.

0- No Importance	1- Very Little Importance	2- Little Importance	3- Important	4- High Importance	5- Very High Importance

	Operations UK	Operations Foreign
Direct production cost		
Labour productivity		
Capacity utilisation		
Reducing inventory		
Overall factory cost		
Productivity		
High quality conformance		
High product durability		
High product reliability		
Flexibility to alternate routes in a production system		
Flexibility to produce different volumes		
Flexibility to change product design for customer requirements		
Flexibility to run processes unattended		
Flexibility to change process design		

	UK	Foreign
Short product lead time		
Promptness in solving complaints		
Conformance to functional specifications		
Ease of service product		
Short order to delivery time		
On-time delivery		
Perceived quality		
Appearance (Aesthetics)		
Material handling flexibility		
Flexibility of the process to produce many products		
Flexibility to produce many parts without setups		
Flexibility in planning operations		
Flexibility to increase capacity		
Flexibility to serve changing markets		

9. For the alternative dimensions to compete successfully listed below, please rate the importance that you attach to these alternatives.

0- No Importance	1- Very Little Importance	2- Little Importance	3- Important	4- High Importance	5- Very High Importance

	Operations UK	Operations Foreign
New customers are acquired through innovative products (increase market share)		
Innovation activity of the company results in repeating purchases by customers		
Profit earned and potential from innovation activity		
Balanced portfolio of innovative projects		
Effective and productive execution of innovative projects		
Time, budget, incentives, commitment and focus on innovation		
Level of knowledge exchange within organisation and between the organisation and its environment		
Coherent and aligned innovation strategy executed by the organisation		
Appropriate management infrastructure for effective innovation implementation		

10. For the dimensions of ability to transfer technology and knowledge listed below, please rate the importance that you attach to each dimension

0- No Importance	1- Very Little Importance	2- Little Importance	3- Important	4- High Importance	5- Very High Importance

	Operations UK	Operations Foreign
Strong belief in and acceptance of the value of technology by employees		
Successful implementation of technology transfer through following formal rules		
Cultural differences in understanding, evaluating regulatory frameworks and shared values		
Organisational similarities in structure, common problems and compensation practices		
Prior similar technological and scientific knowledge base		
Knowledge and communication competence of knowledge sharing employees		
Commitment, trust and interdependence of organisations and their employees		
Ease of codifying (in blueprints, instructions, formulas, etc…) and teaching technological knowledge		
Complexity (interdependent techniques, routines, individuals and resources) of technological knowledge		
Ability to choose tacit technological knowledge to maintain		
Ability to maintain tacit technological knowledge		
Ability to recreate maintained tacit technological knowledge		

11. Please rate the importance of the following knowledge areas that you may think was important to know before moving operations to a foreign country.

0- No Importance	1- Very Little Importance	2- Little Importance	3- Important	4- High Importance	5- Very High Importance

	Operations UK	Operations Foreign
Knowledge on foreign market: i.e. demand, supply, customer tastes, market concentration		
Knowledge on cultural differences: i.e. time keeping/ punctuality, working hours, body language		
Knowledge on business practice differences: i.e. aggressiveness, optimism, money transfer, ethics		
Knowledge on communication differences: i.e. general and business language		
Knowledge on differences in economic environment: i.e. economic development, stability, currency risk, labour productivity and cost		

Knowledge on differences in legal and political environment: i.e. bureaucracy, labour law		
Geographic Distance		

12- Please rate the importance of the business opportunity to have international operations.

0- No Importance	1- Very Little Importance	2- Little Importance	3- Important	4- High Importance	5- Very High Importance

	Operations	
	UK	Foreign
Level of business opportunity overcomes the differences in culture, language, business practices and legal		
Level of business opportunity overcomes knowledge need on foreign markets, economic environment		

13. For the stages of technological knowledge and development listed below please state which of these stages most accurately define technological knowledge and development. *__Choose Only One__*

	Operations	
	UK	Foreign
No awareness about key variables (input variables are process attributes that influence the output)		
Awareness of key input variable (vague definition of process planning or procedure)		
Measure the variables accurately (Variables can not still be controlled)		
Variables can be controlled across a range of levels (stabilise the process with respect to the mean of variables)		
Control the variables (follow a instruction consistently)		
Know-how (small changes in variables affect output, reached by running controlled experiments)		
Know-why (firm can use external research findings, scientific model of the process)		

14- For dimensions of trust and commitment in international business relations listed below, please rate each of the statement.

1- Strongly Disagree	2- Disagree	3- Neither Agree or Disagree	4- Agree	5-Strongly Agree

	Operations	
	UK	Foreign
Organisation makes in good faith efforts to behave in accordance with commitments		
Organisation is honest in whatever discussion preceded such commitments		
Organisation does not take advantage of the other partner even when opportunity is available		
Similarities in procedures for control influences across many purposes		
Similarities in reward and incentives systems have a positive effect on inter-company relations		
Each organisation can meet its objectives without affecting the other		
Goals of our organisations are consistent and compatible		

15- Please choose the most accurate description that match your organisation

	Yes	No
Are you part of a big multinational enterprise?		
Are you part of a group of small enterprises?		
None		

THANK YOU FOR YOUR HELP

Please send your completed form in the post free return envelope provided to
Banu Bozkurt, Economics and Strategy Group, Aston University, Birmingham B4 7ET
Tel: 0121 204 3268; Fax: 0121 204 3306

Appendix 7

Survey Letter 1

ASTON
BUSINESS SCHOOL

Aston University
Birmingham
B4 7ET
United Kingdom

Oktay Ozdenli
Technology and Operations Management

Office Tel: +44 (0)121 204 3219
+44 (0)121 204 3000 (Switchboard)
Office Fax: +44 (0)121 204 3326
Mobile Tel: +44 (0)7921801650
Home Tel /Fax & Ans m/c:
+44 (0)121 633 0881
E-mail: ozdenlo1@aston.ac.uk

Dear Name
Position,
Name of the company,
Address,

SURVEY OF INTERNATIONALISTION IN UK SMEs

Aston Business School (ABS) is one of the leading business schools in UK[1]. ABS has a key competency and interest in understanding of international operations of small firms. We are undertaking a survey of international operations in UK small firms, which will give crucial insights into the challenges that companies face. We have identified your company as a small firm with a non-UK based subsidiary and we would like to ask for your participation.

If you participate in this survey, you will receive a customised report on the success and issues faced by similar companies in your sector. This report will allow you to benchmark your approach to internationalisation against the experience of other organisations.

All individual survey responses will remain completely confidential.

If you would like to take part, please complete the enclosed questionnaire and return it in the pre-paid envelope. If you have any queries, then do not hesitate to contact me by email.

Yours sincerely,

Oktay Ozdenli
Technology and Operations Management
Aston Business School

[1] In the top 10% of PhD Programmes in UK

Country	Material Cost Brass	Material Cost Iron Based	Material Availability	Labour Cost/ Month	Availability of Skilled Labour	Cost of a Machine Setter	Factory Cost (Rural Rent)	Factory Cost (Urban Rent)
Turkey	1300$/tonne	250$/tonne	None but they can manufacture some rolling machines	250 Euros	Yes technician level	375 Euros	\$3/ m^2 for Istanbul	\$0.5/ m^2
Estonia	2015$/tonne	925$/tonne	None, need to import rom abroad	374 Euros	Yes technician level	N/A	3-5 Euros /m^2	1-3 Euros / m^2
Lithuania	2015$/tonee	925$/tonne	None, need to import rom abroad	450 Euros	Yes technician level	987 Euro	4 Euros/ m^2	1-2 Euros/ m^2
India	1300$/tonne+ shipemnt from Turkey	365$/tonne	Brass locally avialable bu imports from Turkey are cheaper, Iron based products are very competitive in India	50GBP	Yes technician level	100-150 GBP	4 GBP/ m^2	1-2 GBP/ m^2

UK	2015$/tonee	925$/tonne	Available		Yes technician level	1310 GBP		
Country	**Cost of Electricity**	**Cost of Water**	**Cost of Gas**	**Availability of Ports/ Customs**	**Cost of delivery**	**Customs and Quota to US**	**Setting up Cost & Ownership**	**Corporate Tax**
Turkey	4.8 p KW/hrs	0.38p for waste water only	0.05p/m3	Port of Istanbul and trucks through land	door to door 20 inch containers to UK $2000-2350, 30 days to deliver by land 0.14 GBP/kg. and takes 10-15 days.	No customs EU economic area no quota to US	$2000 % 100 foreign ownership possible	%33-43
Estonia	5 p KW/hrs	2.4 Euro/m3water and water waste	0.09 Euro/m3	Port of Tallinn is the major port. Most raw materials are carries by rail network and Estonian Air Cargo operates from Tallinn International Airport	2800 Euros for a container	Free trade agreement with all EU countries and also will join Eu in Dec 2003	2650 Euro	None
Lithuania	6.1 p KW/hrs	0.28 Euros/m3	0.17-0.34 Euros/m3	Port of Klaipeda is the major port also road transport is available	door to door 2500 Euros for 740 kg container. To Dudley for 20'	Free trade agreement with all Eu countries and also	2500 USD	%13-15 SME withholding tax %10

					gp 2625 USD and 40' gp 3350 USD	will join Eu in May 2004		
India	6-7p KW/hrs			Bombay driveport, New Delhi is 2 days away	1700 GBP for a container	%2-2.5 UK	$ 30-40	%40
UK	3p KW/hrs	0.60 GBP/m3	0.01 p/m3					%30

Country	**Personal Tax**	**Social Tax**	**VAT**	**Inflation 2000**	**Inflation 2001**	**Inflation 2002**	**GDP Growth as % 2000**	**GDP Growth as % 2001**
Turkey	%35-43	None	%18	%65	%39	%45.2	-5%	%7.4
Estonia	%26	%34	%18	%4	%5.8		%6.9	%5.4
Lithuania	%15 for porfit distribution %33	%3 for every employee	%18	%1.4	%2	%0	%3.2	%6.9
India		None in planning	Exempt Export	%6.7	%3.8	%5.4	%5.5	%6
UK	%22	%12.8	%17.5	%2.9	%0.7	%12.8	%3.08	%1.93

Country	GDP Growth as % 2002	Investment Real Growth %	Unemployment Rate %	Wages Real Growth %	Productivity Real Growth %
Turkey	%4.2		%17.9	%3	%8.5
Estonia	%4	%7	%12.8	%12.8	%4.9
Lithuania	%6.7	%8	%11	%11	%4.3
India	%4.3	%22.7	%2	%2	%4.7
UK			%1.9	%1.9	%2.1

Appendix 8

Meta Tables

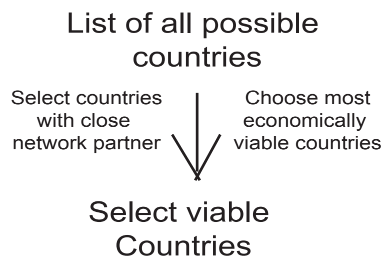
Appendix 9

All Significant Hypotheses

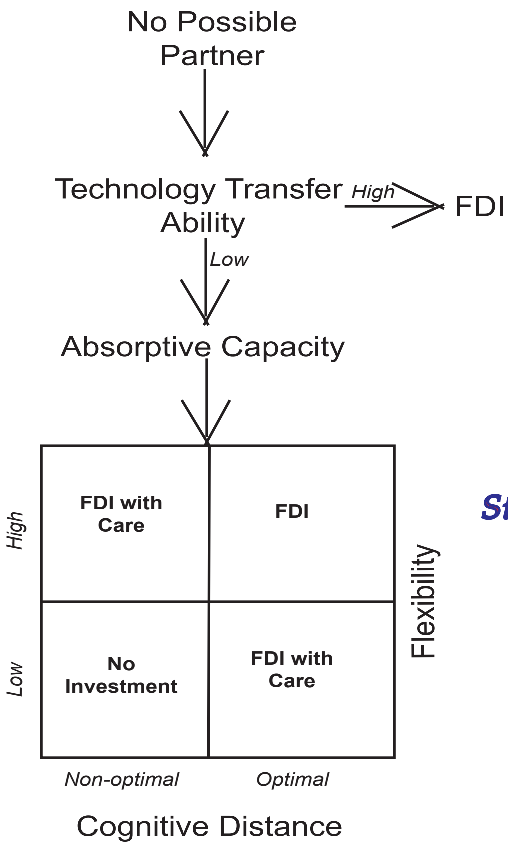
Entry Mode Model	**Sign Different**
Hypothesis 1a: Technology transfer ability of the host organization will negatively affect the entry mode selection.	
Hypothesis 2a: Network relationships (trust, control and commitment) negatively affect the entry mode decision.	*
Hypothesis 3a: Psychic distance negatively affects the network relationships (trust, control and commitment).	*
Hypothesis 4a (ii): Operations advantage (flexibility advantage) positively affects the technology transfer ability.	
Hypothesis 4a (iii): Operations advantage (quality advantage) positively affects the technology transfer ability.	
Hypothesis 4a (iv): Operations advantage (delivery advantage) positively affects the technology transfer ability.	*
Hypothesis 5a: Innovation advantage positively affects the technology transfer ability.	*
Hypothesis 6a: Absorptive capacity of the receiver positively affects the entry mode decision.	
Hypothesis 7a: Network relationship (trust, control and commitment) of the receiver organization negatively affects the entry mode decision.	*
Hypothesis 8a: Psychic distance of the receiver organization negatively affects the network relationship of the receiver organization.	*
Hypothesis 9a (ii): Operations advantage (flexibility advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	

Role of Factory Model	Sign Different
Hypothesis 1b: Technology transfer ability of the host organization positively affects the role of factory decision.	*
Hypothesis 2b: Network relationship (trust, commitment and control) of the host organization positively affects the role of factory decision.	
Hypothesis 3b: Psychic distance of the host organization negatively affects the network relationship characteristics of the host organization.	*
Hypothesis 4b(ii): Operations advantage (flexibility advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	
Hypothesis 4b(iii): Operations advantage (quality advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	
Hypothesis 4b(iv): Operations advantage (delivery advantage) of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	*
Hypothesis 5b: Innovation advantage of the host organization will positively affect the technology transfer/ absorptive capacity of the host organization.	*
Hypothesis 6b: Absorptive capacity of the receiver organization will positively affect the role of factory decision.	
Hypothesis 7b: Network relationship characteristics of the receiver organization will positively affect the role of factory decision.	
Hypothesis 8b: Psychic distance of the receiver organization negatively affects the network relationship characteristics of the receiver organization.	*
Hypothesis 9b(ii): Operations capability (flexibility advantage) of the receiver organization positively affects the absorptive capacity of the receiver organization.	

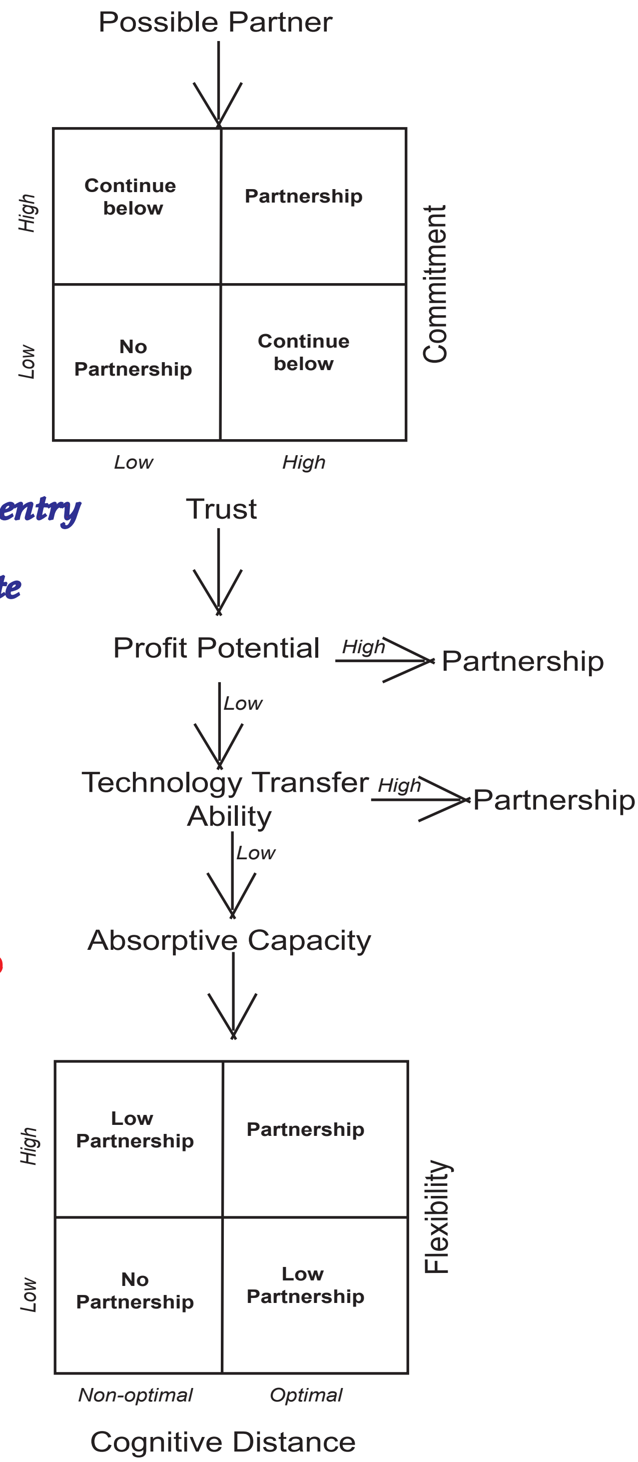
Level of Internationalization Model	Sign Different
Hypothesis 1c: Technology transfer ability of the host organization positively affects the level of internationalization.	*
Hypothesis 3c: Psychic distance of the host negatively affects their network relationship characteristics.	*
Hypothesis 4c(ii): Operations advantage (flexibility advantage) of the host positively affects the technology transfer ability.	
Hypothesis 4c(iii): Operations advantage (quality advantage) of the host positively affects the technology transfer ability.	
Hypothesis 4c(iv): Operations advantage (delivery advantage) of the host positively affects the technology transfer ability.	*
Hypothesis 6c: Absorptive capacity of the receiver organization positively affects the level of internationalization.	
Hypothesis 8c: Psychic distance of the receiver organization negatively affects their network relationship characteristics.	
Hypothesis 9c(i): Operations advantage (cost advantage) of the receiver positively affects their absorptive capacity.	*
Hypothesis 9c(ii): Operations advantage (flexibility advantage) of the receiver positively affects their absorptive capacity.	*



Step 1: Select possible candidate countries

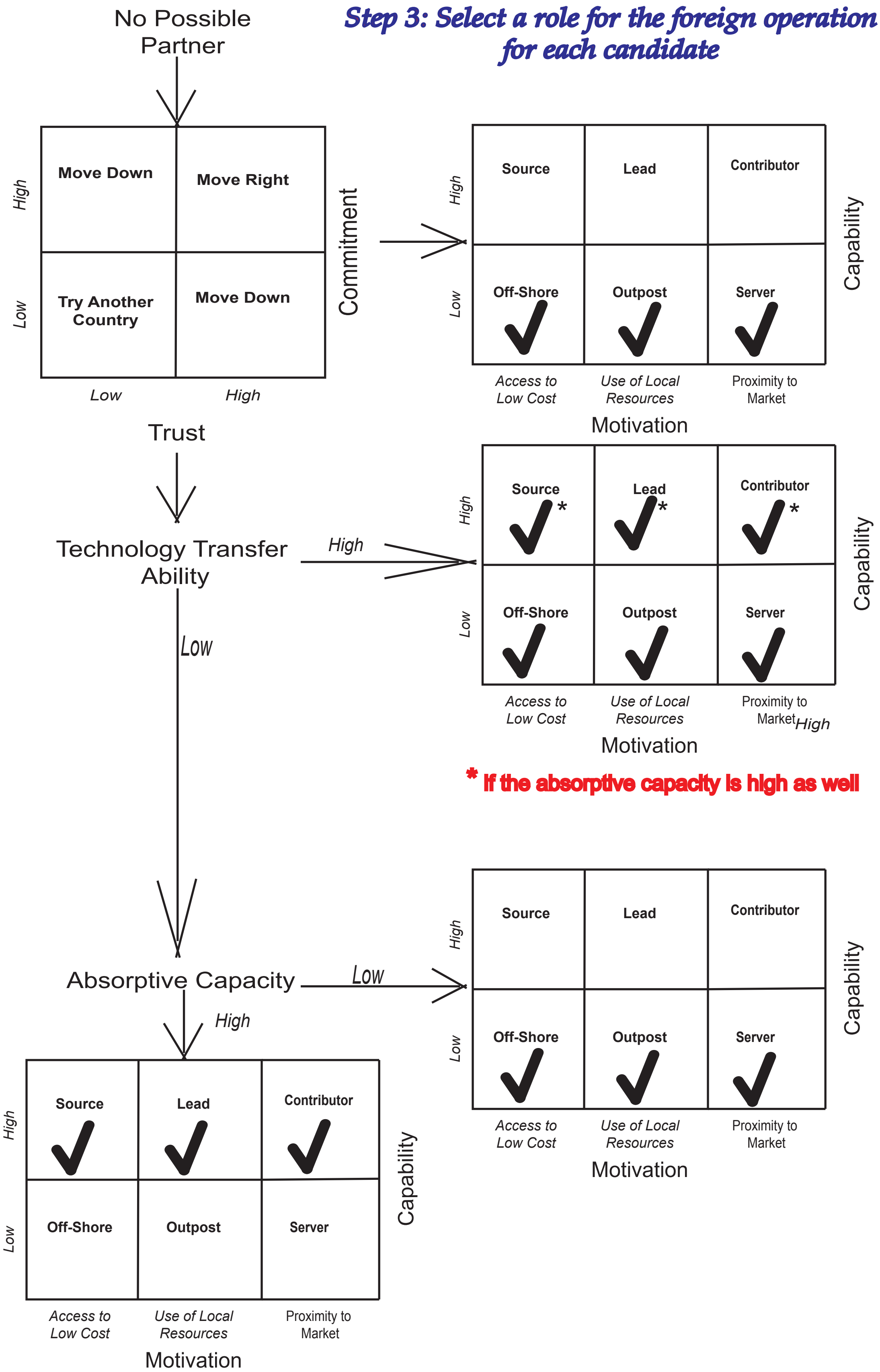


Step 2: Select an entry mode for each candidate

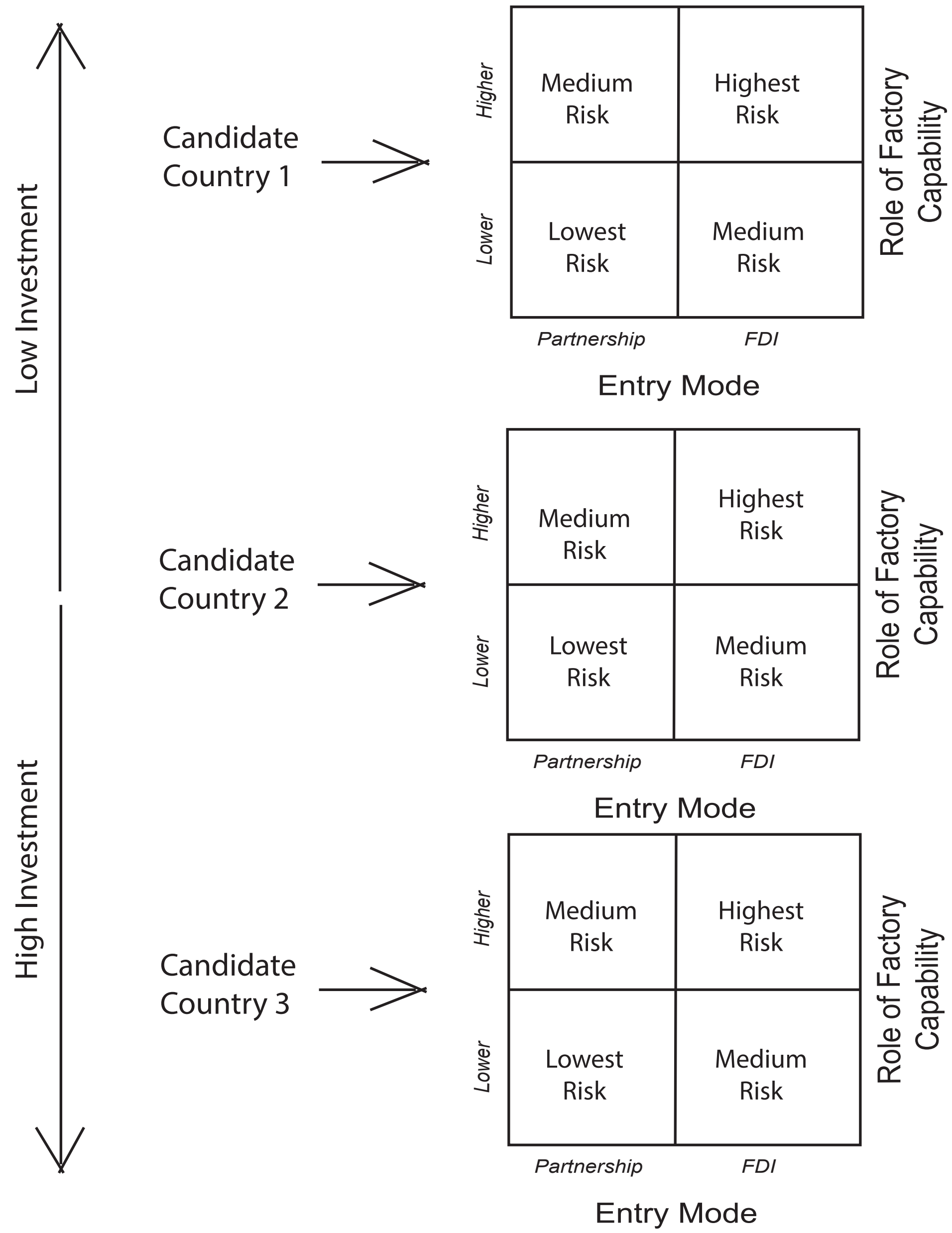


Note: FDI is any investment that requires total ownership of the foreign subsidiary while partnership is investment where ownership is shared with another company.
Low partnership is where the ownership structure is equal or below equal for the internatinalizing company, while partnership is where the host company is owns more than equal stake.

Step 3: Select a role for the foreign operation for each candidate



Step 4: Select the entry mode with least investment and risk



Choose the lowest investment and risk combination. If the profit potential is high then choose higher investment and risk. The aim is to choose the least risk while gaining most advantages from the internalization.

Appendix 11

Synthesis of Literature

Current Theories Considered	***Multinationals***	***SMEs***
<u>Eclectic Paradigm</u>	Monopolistic Advantages used to Internalise Location Advantages (Dunning, 1988, 1993, 2001) Internalisation is achieved through learning (Hill, Hwang and Kim, 1990)	Transaction Cost Economics- Asset Specificity, Behavioural and Organisational Uncertainty to select Entry Mode (Brouthers and Nakos, 2004)
(problem)	Internalisation is achieved instantly (entry mode), not dynamic, and use a shopping list	One paper distinguishing between different entry modes, but not the process of internalising location advantages.

Learning Theories	Experiential market knowledge increase the commitment to markets through learning. Internationalise to psychiclly close markets to learn easier (Johanson and Wiedersheim-Paul, 1975; Johanson and Valhne, 1977, 1990).	Speed of internationalisation and managerial characteristics that reduce psychic distance and helps companies to internationalise faster.
(problem)	Mostly export based and foreign direct investment has not been explained.	Export based and very few or no equity based internationalisation
Network Theories	Knowledge is gained from network partners (Johanson and Mattson, 1988; Johanson and Vahlne, 1990), relations with these partners are very important (Morgan and Hunt, 1994; Uzzi, 1997)	Weikl and Grotz (1999) explain that technology and knowledge transfer within networks help SMEs to innovate and use international networks
(problem)	Mostly export based studies	No network relationships

Appendix 12

Descriptive Statistics for Survey Questions

Alpha value (for confidence interval)	0.02		
Variable #1 (DM-IK)			
Count	320	*Skewness*	-0.83006
Mean	3.125	*Skewness Standard Error*	0.13587
Mean LCL	2.93487	*Kurtosis*	2.74156
Mean UCL	3.31513	*Kurtosis Standard Error*	0.26921
Variance	2.11599	*Alternative Skewness (Fisher's)*	-0.83398
Standard Deviation	1.45464	*Alternative Kurtosis (Fisher's)*	-0.24353
Mean Standard Error	0.08132	*Coefficient of Variation*	0.46549
Minimum	0.E+0	*Mean Deviation*	1.17969
Maximum	5.	*Second Moment*	2.10938
Range	5.	*Third Moment*	-2.54297
Sum	1,000.	*Fourth Moment*	12.19849
Sum Standard Error	26.02145	*Median*	4.
Total Sum Squares	3,800.	*Median Error*	0.0057
Adjusted Sum Squares	675.	*Percentile 25% (Q1)*	2.
Geometric Mean	2.87771	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.18408	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #2 (DM-PT)			
Count	320	*Skewness*	-0.63957
Mean	2.375	*Skewness Standard Error*	0.13587
Mean LCL	2.21219	*Kurtosis*	2.33333
Mean UCL	2.53781	*Kurtosis Standard Error*	0.26921
Variance	1.55172	*Alternative Skewness (Fisher's)*	-0.64259
Standard Deviation	1.24568	*Alternative Kurtosis (Fisher's)*	-0.65821
Mean Standard Error	0.06964	*Coefficient of Variation*	0.5245
Minimum	0.E+0	*Mean Deviation*	1.05469
Maximum	4.	*Second Moment*	1.54688
Range	4.	*Third Moment*	-1.23047
Sum	760.	*Fourth Moment*	5.58325
Sum Standard Error	22.28344	*Median*	3.
Total Sum Squares	2,300.	*Median Error*	0.00488
Adjusted Sum Squares	495.	*Percentile 25% (Q1)*	2.
Geometric Mean	2.23794	*Percentile 75% (Q2)*	3.
Harmonic Mean	2.57718	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #3 (DM-TS)			
Count	320	*Skewness*	-0.70853
Mean	3.3125	*Skewness Standard Error*	0.13587
Mean LCL	3.15072	*Kurtosis*	3.11529
Mean UCL	3.47428	*Kurtosis Standard Error*	0.26921
Variance	1.53213	*Alternative Skewness (Fisher's)*	-0.71187
Standard Deviation	1.23779	*Alternative Kurtosis (Fisher's)*	0.1361
Mean Standard Error	0.06919	*Coefficient of Variation*	0.37367
Minimum	0.E+0	*Mean Deviation*	1.

Maximum	5.	*Second Moment*	1.52734
Range	5.	*Third Moment*	-1.3374
Sum	1,060.	*Fourth Moment*	7.26729
Sum Standard Error	22.14232	*Median*	3.5
Total Sum Squares	4,000.	*Median Error*	0.00485
Adjusted Sum Squares	488.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.07604	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.97674	*IQR*	1.
Mode	4.	*MAD*	0.5
Variable #4 (DM-TP)			
Count	320	*Skewness*	-0.9098
Mean	3.53125	*Skewness Standard Error*	0.13587
Mean LCL	3.34046	*Kurtosis*	2.95681
Mean UCL	3.72204	*Kurtosis Standard Error*	0.26921
Variance	2.13068	*Alternative Skewness (Fisher's)*	-0.91409
Standard Deviation	1.45969	*Alternative Kurtosis (Fisher's)*	-0.02488
Mean Standard Error	0.0816	*Coefficient of Variation*	0.41336
Minimum	0.E+0	*Mean Deviation*	1.21094
Maximum	5.	*Second Moment*	2.12402
Range	5.	*Third Moment*	-2.81635
Sum	1,130.	*Fourth Moment*	13.3396
Sum Standard Error	26.11165	*Median*	4.
Total Sum Squares	4,670.	*Median Error*	0.00572
Adjusted Sum Squares	679.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.26023	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.42857	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #5 (DM-BN)			
Count	320	*Skewness*	-0.14606
Mean	2.5	*Skewness Standard Error*	0.13587
Mean LCL	2.32075	*Kurtosis*	2.24
Mean UCL	2.67925	*Kurtosis Standard Error*	0.26921
Variance	1.88088	*Alternative Skewness (Fisher's)*	-0.14675
Standard Deviation	1.37145	*Alternative Kurtosis (Fisher's)*	-0.75302
Mean Standard Error	0.07667	*Coefficient of Variation*	0.54858
Minimum	0.E+0	*Mean Deviation*	1.15625
Maximum	5.	*Second Moment*	1.875
Range	5.	*Third Moment*	-0.375
Sum	800.	*Fourth Moment*	7.875
Sum Standard Error	24.53326	*Median*	3.
Total Sum Squares	2,600.	*Median Error*	0.00537
Adjusted Sum Squares	600.	*Percentile 25% (Q1)*	2.
Geometric Mean	2.27307	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.38806	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #6 (DM-TM)			
Count	320	*Skewness*	-0.30161
Mean	2.46875	*Skewness Standard Error*	0.13587
Mean LCL	2.27796	*Kurtosis*	2.18794
Mean UCL	2.65954	*Kurtosis Standard Error*	0.26921
Variance	2.13068	*Alternative Skewness (Fisher's)*	-0.30303
Standard Deviation	1.45969	*Alternative Kurtosis (Fisher's)*	-0.8059
Mean Standard Error	0.0816	*Coefficient of Variation*	0.59127

Minimum	0.E+0	*Mean Deviation*	1.22266
Maximum	5.	*Second Moment*	2.12402
Range	5.	*Third Moment*	-0.93365
Sum	790.	*Fourth Moment*	9.87085
Sum Standard Error	26.11165	*Median*	3.
Total Sum Squares	2,630.	*Median Error*	0.00572
Adjusted Sum Squares	679.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.30205	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.84866	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #7 (DM-TT)			
Count	320	*Skewness*	-0.94145
Mean	3.03125	*Skewness Standard Error*	0.13587
Mean LCL	2.83088	*Kurtosis*	2.75608
Mean UCL	3.23162	*Kurtosis Standard Error*	0.26921
Variance	2.35012	*Alternative Skewness (Fisher's)*	-0.94589
Standard Deviation	1.53301	*Alternative Kurtosis (Fisher's)*	-0.22878
Mean Standard Error	0.0857	*Coefficient of Variation*	0.50574
Minimum	0.E+0	*Mean Deviation*	1.2168
Maximum	5.	*Second Moment*	2.34277
Range	5.	*Third Moment*	-3.37592
Sum	970.	*Fourth Moment*	15.12701
Sum Standard Error	27.4233	*Median*	4.
Total Sum Squares	3,690.	*Median Error*	0.006
Adjusted Sum Squares	749.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.85771	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.95062	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #8 (DM-M)			
Count	320	*Skewness*	-0.93777
Mean	3.4375	*Skewness Standard Error*	0.13587
Mean LCL	3.24131	*Kurtosis*	2.76924
Mean UCL	3.63369	*Kurtosis Standard Error*	0.26921
Variance	2.25313	*Alternative Skewness (Fisher's)*	-0.94219
Standard Deviation	1.50104	*Alternative Kurtosis (Fisher's)*	-0.21542
Mean Standard Error	0.08391	*Coefficient of Variation*	0.43667
Minimum	0.E+0	*Mean Deviation*	1.23828
Maximum	5.	*Second Moment*	2.24609
Range	5.	*Third Moment*	-3.15674
Sum	1,100.	*Fourth Moment*	13.97066
Sum Standard Error	26.8515	*Median*	4.
Total Sum Squares	4,500.	*Median Error*	0.00588
Adjusted Sum Squares	718.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.10657	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.09179	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #9 (HO-FP)			
Count	320	*Skewness*	-2.11863
Mean	4.28125	*Skewness Standard Error*	0.13587
Mean LCL	4.1415	*Kurtosis*	8.52432
Mean UCL	4.421	*Kurtosis Standard Error*	0.26921
Variance	1.14322	*Alternative Skewness (Fisher's)*	-2.12862
Standard Deviation	1.06922	*Alternative Kurtosis (Fisher's)*	5.63061

Mean Standard Error	0.05977	*Coefficient of Variation*	0.24974
Minimum	0.E+0	*Mean Deviation*	0.80859
Maximum	5.	*Second Moment*	1.13965
Range	5.	*Third Moment*	-2.57758
Sum	1,370.	*Fourth Moment*	11.07138
Sum Standard Error	19.1267	*Median*	5.
Total Sum Squares	6,230.	*Median Error*	0.00419
Adjusted Sum Squares	364.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.15179	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.40367	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #10 (HO-GB)			
Count	320	*Skewness*	-0.88599
Mean	3.84375	*Skewness Standard Error*	0.13587
Mean LCL	3.68642	*Kurtosis*	2.83801
Mean UCL	4.00108	*Kurtosis Standard Error*	0.26921
Variance	1.44886	*Alternative Skewness (Fisher's)*	-0.89016
Standard Deviation	1.20369	*Alternative Kurtosis (Fisher's)*	-0.14556
Mean Standard Error	0.06729	*Coefficient of Variation*	0.31315
Minimum	1.	*Mean Deviation*	0.96484
Maximum	5.	*Second Moment*	1.44434
Range	4.	*Third Moment*	-1.5379
Sum	1,230.	*Fourth Moment*	5.92039
Sum Standard Error	21.53222	*Median*	4.
Total Sum Squares	5,190.	*Median Error*	0.00471
Adjusted Sum Squares	462.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.57297	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.17881	*IQR*	2.
Mode	5.	*MAD*	1.
Variable #11 (HO-PS)			
Count	320	*Skewness*	-0.39722
Mean	3.625	*Skewness Standard Error*	0.13587
Mean LCL	3.48329	*Kurtosis*	2.4016
Mean UCL	3.76671	*Kurtosis Standard Error*	0.26921
Variance	1.17555	*Alternative Skewness (Fisher's)*	-0.39909
Standard Deviation	1.08423	*Alternative Kurtosis (Fisher's)*	-0.58887
Mean Standard Error	0.06061	*Coefficient of Variation*	0.2991
Minimum	1.	*Mean Deviation*	0.92188
Maximum	5.	*Second Moment*	1.17188
Range	4.	*Third Moment*	-0.50391
Sum	1,160.	*Fourth Moment*	3.2981
Sum Standard Error	19.39525	*Median*	4.
Total Sum Squares	4,580.	*Median Error*	0.00425
Adjusted Sum Squares	375.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.42535	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.16832	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #12 (HO-SS)			
Count	320	*Skewness*	-0.66646
Mean	4.125	*Skewness Standard Error*	0.13587
Mean LCL	4.02819	*Kurtosis*	3.41306
Mean UCL	4.22181	*Kurtosis Standard Error*	0.26921
Variance	0.54859	*Alternative Skewness (Fisher's)*	-0.66961

Standard Deviation	0.74067	*Alternative Kurtosis (Fisher's)*	0.43858
Mean Standard Error	0.0414	*Coefficient of Variation*	0.17956
Minimum	2.	*Mean Deviation*	0.54688
Maximum	5.	*Second Moment*	0.54688
Range	3.	*Third Moment*	-0.26953
Sum	1,320.	*Fourth Moment*	1.02075
Sum Standard Error	13.24948	*Median*	4.
Total Sum Squares	5,620.	*Median Error*	0.0029
Adjusted Sum Squares	175.	*Percentile 25% (Q1)*	4.
Geometric Mean	4.04874	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.95876	*IQR*	1.
Mode	4.	*MAD*	0.E+0
Variable #13 (O-DPC 1)			
Count	320	*Skewness*	-1.08783
Mean	3.59375	*Skewness Standard Error*	0.13587
Mean LCL	3.36499	*Kurtosis*	2.74628
Mean UCL	3.82251	*Kurtosis Standard Error*	0.26921
Variance	3.06328	*Alternative Skewness (Fisher's)*	-1.09296
Standard Deviation	1.75022	*Alternative Kurtosis (Fisher's)*	-0.23874
Mean Standard Error	0.09784	*Coefficient of Variation*	0.48702
Minimum	0.E+0	*Mean Deviation*	1.43359
Maximum	5.	*Second Moment*	3.05371
Range	5.	*Third Moment*	-5.80499
Sum	1,150.	*Fourth Moment*	25.60951
Sum Standard Error	31.30896	*Median*	4.
Total Sum Squares	5,110.	*Median Error*	0.00685
Adjusted Sum Squares	977.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.2393	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.85542	*IQR*	2.
Mode	5.	*MAD*	1.
Variable #14 (O-DPC 2)			
Count	320	*Skewness*	-0.67285
Mean	3.25	*Skewness Standard Error*	0.13587
Mean LCL	3.00951	*Kurtosis*	2.00514
Mean UCL	3.49049	*Kurtosis Standard Error*	0.26921
Variance	3.38558	*Alternative Skewness (Fisher's)*	-0.67603
Standard Deviation	1.83999	*Alternative Kurtosis (Fisher's)*	-0.99159
Mean Standard Error	0.10286	*Coefficient of Variation*	0.56615
Minimum	0.E+0	*Mean Deviation*	1.59375
Maximum	5.	*Second Moment*	3.375
Range	5.	*Third Moment*	-4.17188
Sum	1,040.	*Fourth Moment*	22.83984
Sum Standard Error	32.91482	*Median*	4.
Total Sum Squares	4,460.	*Median Error*	0.00721
Adjusted Sum Squares	1,080.	*Percentile 25% (Q1)*	2.
Geometric Mean	2.9031	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.66412	*IQR*	3.
Mode	5.	*MAD*	1.
Variable #15 (O-LP 1)			
Count	320	*Skewness*	-0.76793
Mean	4.15625	*Skewness Standard Error*	0.13587
Mean LCL	4.03332	*Kurtosis*	2.47408
Mean UCL	4.27918	*Kurtosis Standard Error*	0.26921
Variance	0.8846	*Alternative Skewness*	-0.77156

		(Fisher's)	
Standard Deviation	0.94053	*Alternative Kurtosis (Fisher's)*	-0.51524
Mean Standard Error	0.05258	*Coefficient of Variation*	0.22629
Minimum	2.	*Mean Deviation*	0.79102
Maximum	5.	*Second Moment*	0.88184
Range	3.	*Third Moment*	-0.63593
Sum	1,330.	*Fourth Moment*	1.92393
Sum Standard Error	16.82475	*Median*	4.
Total Sum Squares	5,810.	*Median Error*	0.00368
Adjusted Sum Squares	282.1875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.02945	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.87879	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #16 (O-LP 2)			
Count	320	*Skewness*	-1.47603
Mean	4.09375	*Skewness Standard Error*	0.13587
Mean LCL	3.93223	*Kurtosis*	4.79561
Mean UCL	4.25527	*Kurtosis Standard Error*	0.26921
Variance	1.52723	*Alternative Skewness (Fisher's)*	-1.48299
Standard Deviation	1.23581	*Alternative Kurtosis (Fisher's)*	1.84297
Mean Standard Error	0.06908	*Coefficient of Variation*	0.30188
Minimum	0.E+0	*Mean Deviation*	0.96289
Maximum	5.	*Second Moment*	1.52246
Range	5.	*Third Moment*	-2.77277
Sum	1,310.	*Fourth Moment*	11.11567
Sum Standard Error	22.10689	*Median*	5.
Total Sum Squares	5,850.	*Median Error*	0.00484
Adjusted Sum Squares	487.1875	*Percentile 25% (Q1)*	4.
Geometric Mean	3.89843	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.00835	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #17 (O-CU 1)			
Count	320	*Skewness*	-0.88341
Mean	3.71875	*Skewness Standard Error*	0.13587
Mean LCL	3.58689	*Kurtosis*	3.97293
Mean UCL	3.85061	*Kurtosis Standard Error*	0.26921
Variance	1.01783	*Alternative Skewness (Fisher's)*	-0.88758
Standard Deviation	1.00888	*Alternative Kurtosis (Fisher's)*	1.00729
Mean Standard Error	0.0564	*Coefficient of Variation*	0.27129
Minimum	1.	*Mean Deviation*	0.78906
Maximum	5.	*Second Moment*	1.01465
Range	4.	*Third Moment*	-0.90289
Sum	1,190.	*Fourth Moment*	4.09018
Sum Standard Error	18.04731	*Median*	4.
Total Sum Squares	4,750.	*Median Error*	0.00395
Adjusted Sum Squares	324.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.52036	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.20534	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #18 (O-CU 2)			
Count	320	*Skewness*	-1.06687
Mean	3.71875	*Skewness Standard Error*	0.13587
Mean LCL	3.58689	*Kurtosis*	4.13229
Mean UCL	3.85061	*Kurtosis Standard Error*	0.26921

Variance	1.01783	*Alternative Skewness (Fisher's)*	-1.0719
Standard Deviation	1.00888	*Alternative Kurtosis (Fisher's)*	1.16917
Mean Standard Error	0.0564	*Coefficient of Variation*	0.27129
Minimum	1.	*Mean Deviation*	0.76172
Maximum	5.	*Second Moment*	1.01465
Range	4.	*Third Moment*	-1.09039
Sum	1,190.	*Fourth Moment*	4.25424
Sum Standard Error	18.04731	*Median*	4.
Total Sum Squares	4,750.	*Median Error*	0.00395
Adjusted Sum Squares	324.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.51451	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.18937	*IQR*	1.
Mode	4.	*MAD*	0.5
Variable #19 (O-RI 1)			
Count	320	*Skewness*	-0.78025
Mean	3.65625	*Skewness Standard Error*	0.13587
Mean LCL	3.51507	*Kurtosis*	3.21338
Mean UCL	3.79743	*Kurtosis Standard Error*	0.26921
Variance	1.16673	*Alternative Skewness (Fisher's)*	-0.78393
Standard Deviation	1.08015	*Alternative Kurtosis (Fisher's)*	0.23574
Mean Standard Error	0.06038	*Coefficient of Variation*	0.29543
Minimum	1.	*Mean Deviation*	0.86719
Maximum	5.	*Second Moment*	1.16309
Range	4.	*Third Moment*	-0.9787
Sum	1,170.	*Fourth Moment*	4.34697
Sum Standard Error	19.32238	*Median*	4.
Total Sum Squares	4,650.	*Median Error*	0.00423
Adjusted Sum Squares	372.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.43227	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.10178	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #20 (O-RI 2)			
Count	320	*Skewness*	-0.29393
Mean	3.03125	*Skewness Standard Error*	0.13587
Mean LCL	2.85658	*Kurtosis*	2.36106
Mean UCL	3.20592	*Kurtosis Standard Error*	0.26921
Variance	1.78585	*Alternative Skewness (Fisher's)*	-0.29531
Standard Deviation	1.33636	*Alternative Kurtosis (Fisher's)*	-0.63005
Mean Standard Error	0.0747	*Coefficient of Variation*	0.44086
Minimum	0.E+0	*Mean Deviation*	1.03906
Maximum	5.	*Second Moment*	1.78027
Range	5.	*Third Moment*	-0.69818
Sum	970.	*Fourth Moment*	7.48309
Sum Standard Error	23.90551	*Median*	3.
Total Sum Squares	3,510.	*Median Error*	0.00523
Adjusted Sum Squares	569.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.73559	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.54305	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #21 (O-FC 1)			
Count	320	*Skewness*	-1.67925
Mean	3.875	*Skewness Standard Error*	0.13587
Mean LCL	3.68487	*Kurtosis*	4.99605

Mean UCL	4.06513	*Kurtosis Standard Error*	0.26921
Variance	2.11599	*Alternative Skewness (Fisher's)*	-1.68717
Standard Deviation	1.45464	*Alternative Kurtosis (Fisher's)*	2.04658
Mean Standard Error	0.08132	*Coefficient of Variation*	0.37539
Minimum	0.E+0	*Mean Deviation*	1.00781
Maximum	5.	*Second Moment*	2.10938
Range	5.	*Third Moment*	-5.14453
Sum	1,240.	*Fourth Moment*	22.22974
Sum Standard Error	26.02145	*Median*	4.
Total Sum Squares	5,480.	*Median Error*	0.0057
Adjusted Sum Squares	675.	*Percentile 25% (Q1)*	4.
Geometric Mean	3.66325	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.50704	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #22 (O-FC 2)			
Count	320	*Skewness*	-1.08321
Mean	3.71875	*Skewness Standard Error*	0.13587
Mean LCL	3.49622	*Kurtosis*	2.79699
Mean UCL	3.94128	*Kurtosis Standard Error*	0.26921
Variance	2.89871	*Alternative Skewness (Fisher's)*	-1.08832
Standard Deviation	1.70256	*Alternative Kurtosis (Fisher's)*	-0.18723
Mean Standard Error	0.09518	*Coefficient of Variation*	0.45783
Minimum	0.E+0	*Mean Deviation*	1.43164
Maximum	5.	*Second Moment*	2.88965
Range	5.	*Third Moment*	-5.32086
Sum	1,190.	*Fourth Moment*	23.35507
Sum Standard Error	30.4563	*Median*	5.
Total Sum Squares	5,350.	*Median Error*	0.00667
Adjusted Sum Squares	924.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.34996	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.66412	*IQR*	2.
Mode	5.	*MAD*	0.E+0
Variable #23 (O-P 1)			
Count	320	*Skewness*	-1.03174
Mean	4.21875	*Skewness Standard Error*	0.13587
Mean LCL	4.10664	*Kurtosis*	3.50529
Mean UCL	4.33086	*Kurtosis Standard Error*	0.26921
Variance	0.7357	*Alternative Skewness (Fisher's)*	-1.03661
Standard Deviation	0.85773	*Alternative Kurtosis (Fisher's)*	0.53227
Mean Standard Error	0.04795	*Coefficient of Variation*	0.20331
Minimum	2.	*Mean Deviation*	0.68359
Maximum	5.	*Second Moment*	0.7334
Range	3.	*Third Moment*	-0.64801
Sum	1,350.	*Fourth Moment*	1.8854
Sum Standard Error	15.34351	*Median*	4.
Total Sum Squares	5,930.	*Median Error*	0.00336
Adjusted Sum Squares	234.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.11084	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.97516	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #24 (O-P2)			
Count	320	*Skewness*	-1.53679
Mean	4.	*Skewness Standard Error*	0.13587

Mean LCL	3.82376	*Kurtosis*	4.43282
Mean UCL	4.17624	*Kurtosis Standard Error*	0.26921
Variance	1.81818	*Alternative Skewness (Fisher's)*	-1.54404
Standard Deviation	1.3484	*Alternative Kurtosis (Fisher's)*	1.47445
Mean Standard Error	0.07538	*Coefficient of Variation*	0.3371
Minimum	0.E+0	*Mean Deviation*	0.9375
Maximum	5.	*Second Moment*	1.8125
Range	5.	*Third Moment*	-3.75
Sum	1,280.	*Fourth Moment*	14.5625
Sum Standard Error	24.12091	*Median*	4.
Total Sum Squares	5,700.	*Median Error*	0.00528
Adjusted Sum Squares	580.	*Percentile 25% (Q1)*	4.
Geometric Mean	3.70105	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.52294	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #25 (O-QC 1)			
Count	320	*Skewness*	-1.453
Mean	4.46875	*Skewness Standard Error*	0.13587
Mean LCL	4.37065	*Kurtosis*	4.80176
Mean UCL	4.56685	*Kurtosis Standard Error*	0.26921
Variance	0.56328	*Alternative Skewness (Fisher's)*	-1.45985
Standard Deviation	0.75052	*Alternative Kurtosis (Fisher's)*	1.84922
Mean Standard Error	0.04196	*Coefficient of Variation*	0.16795
Minimum	2.	*Mean Deviation*	0.63086
Maximum	5.	*Second Moment*	0.56152
Range	3.	*Third Moment*	-0.61139
Sum	1,430.	*Fourth Moment*	1.51404
Sum Standard Error	13.42575	*Median*	5.
Total Sum Squares	6,570.	*Median Error*	0.00294
Adjusted Sum Squares	179.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.38919	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.28571	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #26 (O-QC 2)			
Count	320	*Skewness*	-1.33438
Mean	4.375	*Skewness Standard Error*	0.13587
Mean LCL	4.25814	*Kurtosis*	3.80969
Mean UCL	4.49186	*Kurtosis Standard Error*	0.26921
Variance	0.79937	*Alternative Skewness (Fisher's)*	-1.34068
Standard Deviation	0.89408	*Alternative Kurtosis (Fisher's)*	0.84147
Mean Standard Error	0.04998	*Coefficient of Variation*	0.20436
Minimum	2.	*Mean Deviation*	0.74219
Maximum	5.	*Second Moment*	0.79688
Range	3.	*Third Moment*	-0.94922
Sum	1,400.	*Fourth Moment*	2.41919
Sum Standard Error	15.99373	*Median*	5.
Total Sum Squares	6,380.	*Median Error*	0.0035
Adjusted Sum Squares	255.	*Percentile 25% (Q1)*	4.
Geometric Mean	4.2567	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.10256	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #27 (O-PD 1)			
Count	320	*Skewness*	-0.67751

Mean	4.09375	*Skewness Standard Error*	0.13587
Mean LCL	3.97413	*Kurtosis*	2.50084
Mean UCL	4.21337	*Kurtosis Standard Error*	0.26921
Variance	0.83758	*Alternative Skewness (Fisher's)*	-0.6807
Standard Deviation	0.91519	*Alternative Kurtosis (Fisher's)*	-0.48807
Mean Standard Error	0.05116	*Coefficient of Variation*	0.22356
Minimum	2.	*Mean Deviation*	0.73633
Maximum	5.	*Second Moment*	0.83496
Range	3.	*Third Moment*	-0.51691
Sum	1,310.	*Fourth Moment*	1.74348
Sum Standard Error	16.37147	*Median*	4.
Total Sum Squares	5,630.	*Median Error*	0.00358
Adjusted Sum Squares	267.1875	*Percentile 25% (Q1)*	4.
Geometric Mean	3.97365	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.83234	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #28 (O-PD 2)			
Count	320	*Skewness*	-1.15428
Mean	3.84375	*Skewness Standard Error*	0.13587
Mean LCL	3.67335	*Kurtosis*	3.74599
Mean UCL	4.01415	*Kurtosis Standard Error*	0.26921
Variance	1.69965	*Alternative Skewness (Fisher's)*	-1.15972
Standard Deviation	1.30371	*Alternative Kurtosis (Fisher's)*	0.77676
Mean Standard Error	0.07288	*Coefficient of Variation*	0.33918
Minimum	0.E+0	*Mean Deviation*	1.02734
Maximum	5.	*Second Moment*	1.69434
Range	5.	*Third Moment*	-2.54572
Sum	1,230.	*Fourth Moment*	10.75389
Sum Standard Error	23.32139	*Median*	4.
Total Sum Squares	5,270.	*Median Error*	0.00511
Adjusted Sum Squares	542.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.59797	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.54898	*IQR*	2.
Mode	5.	*MAD*	1.
Variable #29 (O-PR 1)			
Count	320	*Skewness*	-0.66048
Mean	4.375	*Skewness Standard Error*	0.13587
Mean LCL	4.28389	*Kurtosis*	2.26119
Mean UCL	4.46611	*Kurtosis Standard Error*	0.26921
Variance	0.48589	*Alternative Skewness (Fisher's)*	-0.6636
Standard Deviation	0.69706	*Alternative Kurtosis (Fisher's)*	-0.7315
Mean Standard Error	0.03897	*Coefficient of Variation*	0.15933
Minimum	3.	*Mean Deviation*	0.625
Maximum	5.	*Second Moment*	0.48438
Range	2.	*Third Moment*	-0.22266
Sum	1,400.	*Fourth Moment*	0.53052
Sum Standard Error	12.4694	*Median*	4.5
Total Sum Squares	6,280.	*Median Error*	0.00273
Adjusted Sum Squares	155.	*Percentile 25% (Q1)*	4.
Geometric Mean	4.31417	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.24779	*IQR*	1.
Mode	5.	*MAD*	0.5
Variable #30 (O-PR 2)			

Count	320	*Skewness*	-1.40953
Mean	4.21875	*Skewness Standard Error*	0.13587
Mean LCL	4.08893	*Kurtosis*	4.73012
Mean UCL	4.34857	*Kurtosis Standard Error*	0.26921
Variance	0.98648	*Alternative Skewness (Fisher's)*	-1.41617
Standard Deviation	0.99322	*Alternative Kurtosis (Fisher's)*	1.77645
Mean Standard Error	0.05552	*Coefficient of Variation*	0.23543
Minimum	1.	*Mean Deviation*	0.78125
Maximum	5.	*Second Moment*	0.9834
Range	4.	*Third Moment*	-1.37457
Sum	1,350.	*Fourth Moment*	4.57437
Sum Standard Error	17.76722	*Median*	4.5
Total Sum Squares	6,010.	*Median Error*	0.00389
Adjusted Sum Squares	314.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.04274	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.75	*IQR*	1.
Mode	5.	*MAD*	0.5
Variable #31 (O-AR 1)			
Count	320	*Skewness*	-0.39079
Mean	3.03125	*Skewness Standard Error*	0.13587
Mean LCL	2.85968	*Kurtosis*	2.9039
Mean UCL	3.20282	*Kurtosis Standard Error*	0.26921
Variance	1.72316	*Alternative Skewness (Fisher's)*	-0.39264
Standard Deviation	1.31269	*Alternative Kurtosis (Fisher's)*	-0.07863
Mean Standard Error	0.07338	*Coefficient of Variation*	0.43305
Minimum	0.E+0	*Mean Deviation*	0.97852
Maximum	5.	*Second Moment*	1.71777
Range	5.	*Third Moment*	-0.87982
Sum	970.	*Fourth Moment*	8.56866
Sum Standard Error	23.48213	*Median*	3.
Total Sum Squares	3,490.	*Median Error*	0.00514
Adjusted Sum Squares	549.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.83114	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #32 (O-AR 2)			
Count	320	*Skewness*	-0.38643
Mean	2.8125	*Skewness Standard Error*	0.13587
Mean LCL	2.62045	*Kurtosis*	2.60483
Mean UCL	3.00455	*Kurtosis Standard Error*	0.26921
Variance	2.15909	*Alternative Skewness (Fisher's)*	-0.38825
Standard Deviation	1.46938	*Alternative Kurtosis (Fisher's)*	-0.38243
Mean Standard Error	0.08214	*Coefficient of Variation*	0.52245
Minimum	0.E+0	*Mean Deviation*	1.12109
Maximum	5.	*Second Moment*	2.15234
Range	5.	*Third Moment*	-1.22021
Sum	900.	*Fourth Moment*	12.06709
Sum Standard Error	26.28515	*Median*	3.
Total Sum Squares	3,220.	*Median Error*	0.00576
Adjusted Sum Squares	688.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.62927	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.2	*IQR*	2.
Mode	3.	*MAD*	1.

Variable #33 (O-DV 1)			
Count	320	*Skewness*	-0.33047
Mean	3.375	*Skewness Standard Error*	0.13587
Mean LCL	3.21551	*Kurtosis*	2.26892
Mean UCL	3.53449	*Kurtosis Standard Error*	0.26921
Variance	1.48903	*Alternative Skewness (Fisher's)*	-0.33203
Standard Deviation	1.22026	*Alternative Kurtosis (Fisher's)*	-0.72365
Mean Standard Error	0.06821	*Coefficient of Variation*	0.36156
Minimum	1.	*Mean Deviation*	1.02344
Maximum	5.	*Second Moment*	1.48438
Range	4.	*Third Moment*	-0.59766
Sum	1,080.	*Fourth Moment*	4.99927
Sum Standard Error	21.82863	*Median*	3.
Total Sum Squares	4,120.	*Median Error*	0.00478
Adjusted Sum Squares	475.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.09132	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.72727	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #34 (O-DV 2)			
Count	320	*Skewness*	-0.27372
Mean	3.0625	*Skewness Standard Error*	0.13587
Mean LCL	2.86631	*Kurtosis*	2.19085
Mean UCL	3.25869	*Kurtosis Standard Error*	0.26921
Variance	2.25313	*Alternative Skewness (Fisher's)*	-0.27501
Standard Deviation	1.50104	*Alternative Kurtosis (Fisher's)*	-0.80295
Mean Standard Error	0.08391	*Coefficient of Variation*	0.49014
Minimum	0.E+0	*Mean Deviation*	1.20313
Maximum	5.	*Second Moment*	2.24609
Range	5.	*Third Moment*	-0.92139
Sum	980.	*Fourth Moment*	11.05269
Sum Standard Error	26.8515	*Median*	3.
Total Sum Squares	3,720.	*Median Error*	0.00588
Adjusted Sum Squares	718.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.75825	*Percentile 75% (Q2)*	5.
Harmonic Mean	2.75862	*IQR*	3.
Mode	3.	*MAD*	1.
Variable #35 (O-C 1)			
Count	320	*Skewness*	-1.22834
Mean	3.96875	*Skewness Standard Error*	0.13587
Mean LCL	3.80681	*Kurtosis*	4.20911
Mean UCL	4.13069	*Kurtosis Standard Error*	0.26921
Variance	1.53507	*Alternative Skewness (Fisher's)*	-1.23413
Standard Deviation	1.23898	*Alternative Kurtosis (Fisher's)*	1.2472
Mean Standard Error	0.06926	*Coefficient of Variation*	0.31218
Minimum	0.E+0	*Mean Deviation*	0.98047
Maximum	5.	*Second Moment*	1.53027
Range	5.	*Third Moment*	-2.32526
Sum	1,270.	*Fourth Moment*	9.85663
Sum Standard Error	22.16354	*Median*	4.
Total Sum Squares	5,530.	*Median Error*	0.00485
Adjusted Sum Squares	489.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.77594	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.87879	*IQR*	2.

Mode	5.	*MAD*	1.
Variable #36 (O-C 2)			
Count	320	*Skewness*	-0.64059
Mean	3.3125	*Skewness Standard Error*	0.13587
Mean LCL	3.0993	*Kurtosis*	2.31278
Mean UCL	3.5257	*Kurtosis Standard Error*	0.26921
Variance	2.66066	*Alternative Skewness (Fisher's)*	-0.64361
Standard Deviation	1.63115	*Alternative Kurtosis (Fisher's)*	-0.6791
Mean Standard Error	0.09118	*Coefficient of Variation*	0.49242
Minimum	0.E+0	*Mean Deviation*	1.375
Maximum	5.	*Second Moment*	2.65234
Range	5.	*Third Moment*	-2.76709
Sum	1,060.	*Fourth Moment*	16.27022
Sum Standard Error	29.17894	*Median*	3.5
Total Sum Squares	4,360.	*Median Error*	0.00639
Adjusted Sum Squares	848.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.99462	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.27087	*IQR*	3.
Mode	5.	*MAD*	1.5
Variable #37 (O-PUA 1)			
Count	320	*Skewness*	-0.11728
Mean	2.28125	*Skewness Standard Error*	0.13587
Mean LCL	2.06606	*Kurtosis*	1.72271
Mean UCL	2.49644	*Kurtosis Standard Error*	0.26921
Variance	2.71062	*Alternative Skewness (Fisher's)*	-0.11783
Standard Deviation	1.6464	*Alternative Kurtosis (Fisher's)*	-1.27848
Mean Standard Error	0.09204	*Coefficient of Variation*	0.72171
Minimum	0.E+0	*Mean Deviation*	1.42383
Maximum	5.	*Second Moment*	2.70215
Range	5.	*Third Moment*	-0.52094
Sum	730.	*Fourth Moment*	12.57858
Sum Standard Error	29.45162	*Median*	2.
Total Sum Squares	2,530.	*Median Error*	0.00645
Adjusted Sum Squares	864.6875	*Percentile 25% (Q1)*	1.
Geometric Mean	2.16073	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.34495	*IQR*	3.
Mode	#N/A	*MAD*	2.
Variable #38 (O-PUA 2)			
Count	320	*Skewness*	0.2753
Mean	1.96875	*Skewness Standard Error*	0.13587
Mean LCL	1.75796	*Kurtosis*	2.02265
Mean UCL	2.17954	*Kurtosis Standard Error*	0.26921
Variance	2.6009	*Alternative Skewness (Fisher's)*	0.2766
Standard Deviation	1.61273	*Alternative Kurtosis (Fisher's)*	-0.97381
Mean Standard Error	0.09015	*Coefficient of Variation*	0.81916
Minimum	0.E+0	*Mean Deviation*	1.34961
Maximum	5.	*Second Moment*	2.59277
Range	5.	*Third Moment*	1.14935
Sum	630.	*Fourth Moment*	13.59723
Sum Standard Error	28.84941	*Median*	2.
Total Sum Squares	2,070.	*Median Error*	0.00632
Adjusted Sum Squares	829.6875	*Percentile 25% (Q1)*	0.E+0
Geometric Mean	1.90056	*Percentile 75% (Q2)*	3.

Harmonic Mean	2.97214	*IQR*	3.
Mode	0.E+0	*MAD*	1.
Variable #39 (O-CPD 1)			
Count	320	*Skewness*	-0.32994
Mean	2.96875	*Skewness Standard Error*	0.13587
Mean LCL	2.74562	*Kurtosis*	1.91751
Mean UCL	3.19188	*Kurtosis Standard Error*	0.26921
Variance	2.91438	*Alternative Skewness (Fisher's)*	-0.33149
Standard Deviation	1.70716	*Alternative Kurtosis (Fisher's)*	-1.08061
Mean Standard Error	0.09543	*Coefficient of Variation*	0.57504
Minimum	0.E+0	*Mean Deviation*	1.41406
Maximum	5.	*Second Moment*	2.90527
Range	5.	*Third Moment*	-1.63385
Sum	950.	*Fourth Moment*	16.18499
Sum Standard Error	30.53853	*Median*	3.
Total Sum Squares	3,750.	*Median Error*	0.00669
Adjusted Sum Squares	929.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.65002	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.0094	*IQR*	3.
Mode	5.	*MAD*	1.5
Variable #40 (O-CPD 2)			
Count	320	*Skewness*	-0.06856
Mean	2.5625	*Skewness Standard Error*	0.13587
Mean LCL	2.34557	*Kurtosis*	1.83345
Mean UCL	2.77943	*Kurtosis Standard Error*	0.26921
Variance	2.7547	*Alternative Skewness (Fisher's)*	-0.06889
Standard Deviation	1.65973	*Alternative Kurtosis (Fisher's)*	-1.16599
Mean Standard Error	0.09278	*Coefficient of Variation*	0.6477
Minimum	0.E+0	*Mean Deviation*	1.4375
Maximum	5.	*Second Moment*	2.74609
Range	5.	*Third Moment*	-0.31201
Sum	820.	*Fourth Moment*	13.82613
Sum Standard Error	29.69014	*Median*	2.5
Total Sum Squares	2,980.	*Median Error*	0.0065
Adjusted Sum Squares	878.75	*Percentile 25% (Q1)*	1.
Geometric Mean	2.3041	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.74286	*IQR*	3.
Mode	2.	*MAD*	1.5
Variable #41 (O-SPC 1)			
Count	320	*Skewness*	-1.98348
Mean	3.90625	*Skewness Standard Error*	0.13587
Mean LCL	3.72593	*Kurtosis*	7.25262
Mean UCL	4.08657	*Kurtosis Standard Error*	0.26921
Variance	1.90341	*Alternative Skewness (Fisher's)*	-1.99283
Standard Deviation	1.37964	*Alternative Kurtosis (Fisher's)*	4.3388
Mean Standard Error	0.07712	*Coefficient of Variation*	0.35319
Minimum	-1.	*Mean Deviation*	0.94727
Maximum	5.	*Second Moment*	1.89746
Range	6.	*Third Moment*	-5.18427
Sum	1,250.	*Fourth Moment*	26.11201
Sum Standard Error	24.67977	*Median*	4.
Total Sum Squares	5,490.	*Median Error*	0.0054
Adjusted Sum Squares	607.1875	*Percentile 25% (Q1)*	3.

Geometric Mean	3.77112	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.97409	*IQR*	2.
Mode	5.	*MAD*	1.
Variable #42 (O-SPC 2)			
Count	320	*Skewness*	-1.03736
Mean	3.25	*Skewness Standard Error*	0.13587
Mean LCL	3.04826	*Kurtosis*	3.60596
Mean UCL	3.45174	*Kurtosis Standard Error*	0.26921
Variance	2.38245	*Alternative Skewness (Fisher's)*	-1.04226
Standard Deviation	1.54352	*Alternative Kurtosis (Fisher's)*	0.63452
Mean Standard Error	0.08629	*Coefficient of Variation*	0.47493
Minimum	-1.	*Mean Deviation*	1.1875
Maximum	5.	*Second Moment*	2.375
Range	6.	*Third Moment*	-3.79688
Sum	1,040.	*Fourth Moment*	20.33984
Sum Standard Error	27.61127	*Median*	3.5
Total Sum Squares	4,140.	*Median Error*	0.00605
Adjusted Sum Squares	760.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.0524	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.92638	*IQR*	1.
Mode	#N/A	*MAD*	0.5
Variable #43 (O-PS 1)			
Count	320	*Skewness*	-0.86026
Mean	4.46875	*Skewness Standard Error*	0.13587
Mean LCL	4.38226	*Kurtosis*	2.61176
Mean UCL	4.55524	*Kurtosis Standard Error*	0.26921
Variance	0.43789	*Alternative Skewness (Fisher's)*	-0.86432
Standard Deviation	0.66173	*Alternative Kurtosis (Fisher's)*	-0.37539
Mean Standard Error	0.03699	*Coefficient of Variation*	0.14808
Minimum	3.	*Mean Deviation*	0.59766
Maximum	5.	*Second Moment*	0.43652
Range	2.	*Third Moment*	-0.24811
Sum	1,430.	*Fourth Moment*	0.49768
Sum Standard Error	11.83746	*Median*	5.
Total Sum Squares	6,530.	*Median Error*	0.00259
Adjusted Sum Squares	139.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.41427	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.35374	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #44 (O-PS 2)			
Count	320	*Skewness*	-1.76348
Mean	4.09375	*Skewness Standard Error*	0.13587
Mean LCL	3.9425	*Kurtosis*	6.12657
Mean UCL	4.245	*Kurtosis Standard Error*	0.26921
Variance	1.33915	*Alternative Skewness (Fisher's)*	-1.7718
Standard Deviation	1.15721	*Alternative Kurtosis (Fisher's)*	3.19496
Mean Standard Error	0.06469	*Coefficient of Variation*	0.28268
Minimum	0.E+0	*Mean Deviation*	0.79297
Maximum	5.	*Second Moment*	1.33496
Range	5.	*Third Moment*	-2.72003
Sum	1,310.	*Fourth Moment*	10.91829
Sum Standard Error	20.70089	*Median*	4.
Total Sum Squares	5,790.	*Median Error*	0.00453

Adjusted Sum Squares	427.1875	*Percentile 25% (Q1)*	4.
Geometric Mean	3.92209	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.0592	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #45 (O-CFS 1)			
Count	320	*Skewness*	-2.41427
Mean	4.0625	*Skewness Standard Error*	0.13587
Mean LCL	3.90576	*Kurtosis*	10.49289
Mean UCL	4.21924	*Kurtosis Standard Error*	0.26921
Variance	1.43809	*Alternative Skewness (Fisher's)*	-2.42565
Standard Deviation	1.1992	*Alternative Kurtosis (Fisher's)*	7.63029
Mean Standard Error	0.06704	*Coefficient of Variation*	0.29519
Minimum	-1.	*Mean Deviation*	0.76172
Maximum	5.	*Second Moment*	1.43359
Range	6.	*Third Moment*	-4.14404
Sum	1,300.	*Fourth Moment*	21.5649
Sum Standard Error	21.45199	*Median*	4.
Total Sum Squares	5,740.	*Median Error*	0.0047
Adjusted Sum Squares	458.75	*Percentile 25% (Q1)*	4.
Geometric Mean	3.95905	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.78803	*IQR*	1.
Mode	#N/A	*MAD*	1.
Variable #46 (O-CFS 2)			
Count	320	*Skewness*	-2.1433
Mean	4.	*Skewness Standard Error*	0.13587
Mean LCL	3.83967	*Kurtosis*	9.16667
Mean UCL	4.16033	*Kurtosis Standard Error*	0.26921
Variance	1.5047	*Alternative Skewness (Fisher's)*	-2.15341
Standard Deviation	1.22666	*Alternative Kurtosis (Fisher's)*	6.2831
Mean Standard Error	0.06857	*Coefficient of Variation*	0.30667
Minimum	-1.	*Mean Deviation*	0.8125
Maximum	5.	*Second Moment*	1.5
Range	6.	*Third Moment*	-3.9375
Sum	1,280.	*Fourth Moment*	20.625
Sum Standard Error	21.94322	*Median*	4.
Total Sum Squares	5,600.	*Median Error*	0.0048
Adjusted Sum Squares	480.	*Percentile 25% (Q1)*	4.
Geometric Mean	3.8885	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.67153	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #47 (O-ES 1)			
Count	320	*Skewness*	-1.12046
Mean	3.28125	*Skewness Standard Error*	0.13587
Mean LCL	3.08699	*Kurtosis*	3.80952
Mean UCL	3.47551	*Kurtosis Standard Error*	0.26921
Variance	2.20905	*Alternative Skewness (Fisher's)*	-1.12574
Standard Deviation	1.48629	*Alternative Kurtosis (Fisher's)*	0.8413
Mean Standard Error	0.08309	*Coefficient of Variation*	0.45296
Minimum	-1.	*Mean Deviation*	1.13867
Maximum	5.	*Second Moment*	2.20215
Range	6.	*Third Moment*	-3.66156
Sum	1,050.	*Fourth Moment*	18.47409
Sum Standard Error	26.58753	*Median*	4.

Total Sum Squares	4,150.	*Median Error*	0.00582
Adjusted Sum Squares	704.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.03119	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.38624	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #48 (O-ES 2)			
Count	320	*Skewness*	-0.81423
Mean	3.03125	*Skewness Standard Error*	0.13587
Mean LCL	2.82046	*Kurtosis*	2.73389
Mean UCL	3.24204	*Kurtosis Standard Error*	0.26921
Variance	2.6009	*Alternative Skewness (Fisher's)*	-0.81807
Standard Deviation	1.61273	*Alternative Kurtosis (Fisher's)*	-0.25133
Mean Standard Error	0.09015	*Coefficient of Variation*	0.53203
Minimum	-1.	*Mean Deviation*	1.28125
Maximum	5.	*Second Moment*	2.59277
Range	6.	*Third Moment*	-3.39935
Sum	970.	*Fourth Moment*	18.37848
Sum Standard Error	28.84941	*Median*	3.5
Total Sum Squares	3,770.	*Median Error*	0.00632
Adjusted Sum Squares	829.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.75015	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.17355	*IQR*	2.
Mode	4.	*MAD*	0.5
Variable #49 (O-DT 1)			
Count	320	*Skewness*	-0.49853
Mean	3.9375	*Skewness Standard Error*	0.13587
Mean LCL	3.81101	*Kurtosis*	2.21223
Mean UCL	4.06399	*Kurtosis Standard Error*	0.26921
Variance	0.93652	*Alternative Skewness (Fisher's)*	-0.50088
Standard Deviation	0.96774	*Alternative Kurtosis (Fisher's)*	-0.78123
Mean Standard Error	0.0541	*Coefficient of Variation*	0.24578
Minimum	2.	*Mean Deviation*	0.77344
Maximum	5.	*Second Moment*	0.93359
Range	3.	*Third Moment*	-0.44971
Sum	1,260.	*Fourth Moment*	1.92818
Sum Standard Error	17.31146	*Median*	4.
Total Sum Squares	5,260.	*Median Error*	0.00379
Adjusted Sum Squares	298.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.80033	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.64326	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #50 (O-DT 2)			
Count	320	*Skewness*	-0.71614
Mean	3.59375	*Skewness Standard Error*	0.13587
Mean LCL	3.43728	*Kurtosis*	3.50989
Mean UCL	3.75022	*Kurtosis Standard Error*	0.26921
Variance	1.43319	*Alternative Skewness (Fisher's)*	-0.71951
Standard Deviation	1.19716	*Alternative Kurtosis (Fisher's)*	0.53694
Mean Standard Error	0.06692	*Coefficient of Variation*	0.33312
Minimum	0.E+0	*Mean Deviation*	0.99414
Maximum	5.	*Second Moment*	1.42871
Range	5.	*Third Moment*	-1.22296
Sum	1,150.	*Fourth Moment*	7.16444

Sum Standard Error	21.41543	*Median*	4.
Total Sum Squares	4,590.	*Median Error*	0.00469
Adjusted Sum Squares	457.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.41845	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.50365	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #51 (O-OTD 1)			
Count	320	*Skewness*	-0.25198
Mean	4.5625	*Skewness Standard Error*	0.13587
Mean LCL	4.49756	*Kurtosis*	1.06349
Mean UCL	4.62744	*Kurtosis Standard Error*	0.26921
Variance	0.24687	*Alternative Skewness (Fisher's)*	-0.25316
Standard Deviation	0.49686	*Alternative Kurtosis (Fisher's)*	-1.94812
Mean Standard Error	0.02778	*Coefficient of Variation*	0.1089
Minimum	4.	*Mean Deviation*	0.49219
Maximum	5.	*Second Moment*	0.24609
Range	1.	*Third Moment*	-0.03076
Sum	1,460.	*Fourth Moment*	0.06441
Sum Standard Error	8.88802	*Median*	5.
Total Sum Squares	6,740.	*Median Error*	0.00195
Adjusted Sum Squares	78.75	*Percentile 25% (Q1)*	4.
Geometric Mean	4.53494	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.50704	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #52 (O-OTD-2)			
Count	320	*Skewness*	-2.27274
Mean	4.28125	*Skewness Standard Error*	0.13587
Mean LCL	4.1415	*Kurtosis*	8.97546
Mean UCL	4.421	*Kurtosis Standard Error*	0.26921
Variance	1.14322	*Alternative Skewness (Fisher's)*	-2.28346
Standard Deviation	1.06922	*Alternative Kurtosis (Fisher's)*	6.08888
Mean Standard Error	0.05977	*Coefficient of Variation*	0.24974
Minimum	0.E+0	*Mean Deviation*	0.76367
Maximum	5.	*Second Moment*	1.13965
Range	5.	*Third Moment*	-2.76508
Sum	1,370.	*Fourth Moment*	11.65732
Sum Standard Error	19.1267	*Median*	5.
Total Sum Squares	6,230.	*Median Error*	0.00419
Adjusted Sum Squares	364.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.14489	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.37358	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #53 (O-PQ1)			
Count	320	*Skewness*	-1.60128
Mean	4.8125	*Skewness Standard Error*	0.13587
Mean LCL	4.7614	*Kurtosis*	3.5641
Mean UCL	4.8636	*Kurtosis Standard Error*	0.26921
Variance	0.15282	*Alternative Skewness (Fisher's)*	-1.60883
Standard Deviation	0.39092	*Alternative Kurtosis (Fisher's)*	0.592
Mean Standard Error	0.02185	*Coefficient of Variation*	0.08123
Minimum	4.	*Mean Deviation*	0.30469
Maximum	5.	*Second Moment*	0.15234
Range	1.	*Third Moment*	-0.09521

Sum	1,540.	*Fourth Moment*	0.08272
Sum Standard Error	6.99306	*Median*	5.
Total Sum Squares	7,460.	*Median Error*	0.00153
Adjusted Sum Squares	48.75	*Percentile 25% (Q1)*	5.
Geometric Mean	4.79512	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.77612	*IQR*	0.E+0
Mode	5.	*MAD*	0.E+0
Variable #54 (O-PQ2)			
Count	320	*Skewness*	-1.91582
Mean	4.59375	*Skewness Standard Error*	0.13587
Mean LCL	4.49634	*Kurtosis*	6.0682
Mean UCL	4.69116	*Kurtosis Standard Error*	0.26921
Variance	0.55545	*Alternative Skewness (Fisher's)*	-1.92485
Standard Deviation	0.74528	*Alternative Kurtosis (Fisher's)*	3.13568
Mean Standard Error	0.04166	*Coefficient of Variation*	0.16224
Minimum	2.	*Mean Deviation*	0.58398
Maximum	5.	*Second Moment*	0.55371
Range	3.	*Third Moment*	-0.78937
Sum	1,470.	*Fourth Moment*	1.86049
Sum Standard Error	13.33203	*Median*	5.
Total Sum Squares	6,930.	*Median Error*	0.00292
Adjusted Sum Squares	177.1875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.51334	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.40367	*IQR*	1.
Mode	5.	*MAD*	0.E+0
Variable #55 (O-A1)			
Count	320	*Skewness*	-1.41661
Mean	3.65625	*Skewness Standard Error*	0.13587
Mean LCL	3.48429	*Kurtosis*	5.64744
Mean UCL	3.82821	*Kurtosis Standard Error*	0.26921
Variance	1.731	*Alternative Skewness (Fisher's)*	-1.4233
Standard Deviation	1.31567	*Alternative Kurtosis (Fisher's)*	2.70826
Mean Standard Error	0.07355	*Coefficient of Variation*	0.35984
Minimum	-1.	*Mean Deviation*	1.01367
Maximum	5.	*Second Moment*	1.72559
Range	6.	*Third Moment*	-3.21112
Sum	1,170.	*Fourth Moment*	16.81608
Sum Standard Error	23.53547	*Median*	4.
Total Sum Squares	4,830.	*Median Error*	0.00515
Adjusted Sum Squares	552.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.499	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.01674	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #56 (O-A2)			
Count	320	*Skewness*	-1.36931
Mean	3.75	*Skewness Standard Error*	0.13587
Mean LCL	3.57075	*Kurtosis*	5.21667
Mean UCL	3.92925	*Kurtosis Standard Error*	0.26921
Variance	1.88088	*Alternative Skewness (Fisher's)*	-1.37576
Standard Deviation	1.37145	*Alternative Kurtosis (Fisher's)*	2.27068
Mean Standard Error	0.07667	*Coefficient of Variation*	0.36572
Minimum	-1.	*Mean Deviation*	1.07813
Maximum	5.	*Second Moment*	1.875

Range	6.	*Third Moment*	-3.51563
Sum	1,200.	*Fourth Moment*	18.33984
Sum Standard Error	24.53326	*Median*	4.
Total Sum Squares	5,100.	*Median Error*	0.00537
Adjusted Sum Squares	600.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.57297	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.09382	*IQR*	2.
Mode	5.	*MAD*	1.
Variable #57 (O-MH1)			
Count	320	*Skewness*	-1.07191
Mean	2.96875	*Skewness Standard Error*	0.13587
Mean LCL	2.77657	*Kurtosis*	3.68007
Mean UCL	3.16093	*Kurtosis Standard Error*	0.26921
Variance	2.16203	*Alternative Skewness (Fisher's)*	-1.07697
Standard Deviation	1.47038	*Alternative Kurtosis (Fisher's)*	0.7098
Mean Standard Error	0.0822	*Coefficient of Variation*	0.49529
Minimum	-1.	*Mean Deviation*	1.04688
Maximum	5.	*Second Moment*	2.15527
Range	6.	*Third Moment*	-3.39166
Sum	950.	*Fourth Moment*	17.09466
Sum Standard Error	26.30303	*Median*	3.
Total Sum Squares	3,510.	*Median Error*	0.00576
Adjusted Sum Squares	689.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	2.85306	*Percentile 75% (Q2)*	4.
Harmonic Mean	4.12017	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #58 (O-MH2)			
Count	320	*Skewness*	-0.86321
Mean	2.6875	*Skewness Standard Error*	0.13587
Mean LCL	2.504	*Kurtosis*	3.44632
Mean UCL	2.871	*Kurtosis Standard Error*	0.26921
Variance	1.971	*Alternative Skewness (Fisher's)*	-0.86728
Standard Deviation	1.40392	*Alternative Kurtosis (Fisher's)*	0.47236
Mean Standard Error	0.07848	*Coefficient of Variation*	0.52239
Minimum	-1.	*Mean Deviation*	1.05469
Maximum	5.	*Second Moment*	1.96484
Range	6.	*Third Moment*	-2.37744
Sum	860.	*Fourth Moment*	13.30489
Sum Standard Error	25.11416	*Median*	3.
Total Sum Squares	2,940.	*Median Error*	0.0055
Adjusted Sum Squares	628.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.58433	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.52941	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #59 (O-PMP 1)			
Count	320	*Skewness*	-0.72971
Mean	2.96875	*Skewness Standard Error*	0.13587
Mean LCL	2.75544	*Kurtosis*	2.65883
Mean UCL	3.18206	*Kurtosis Standard Error*	0.26921
Variance	2.6636	*Alternative Skewness (Fisher's)*	-0.73315
Standard Deviation	1.63205	*Alternative Kurtosis (Fisher's)*	-0.32757
Mean Standard Error	0.09123	*Coefficient of Variation*	0.54974
Minimum	-1.	*Mean Deviation*	1.35156

Maximum	5.	*Second Moment*	2.65527
Range	6.	*Third Moment*	-3.15729
Sum	950.	*Fourth Moment*	18.74603
Sum Standard Error	29.19505	*Median*	3.5
Total Sum Squares	3,670.	*Median Error*	0.00639
Adjusted Sum Squares	849.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.76479	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.72816	*IQR*	2.
Mode	4.	*MAD*	1.5
Variable #60 (O-PMP 2)			
Count	320	*Skewness*	-0.51678
Mean	2.8125	*Skewness Standard Error*	0.13587
Mean LCL	2.58709	*Kurtosis*	2.26326
Mean UCL	3.03791	*Kurtosis Standard Error*	0.26921
Variance	2.97414	*Alternative Skewness (Fisher's)*	-0.51921
Standard Deviation	1.72457	*Alternative Kurtosis (Fisher's)*	-0.7294
Mean Standard Error	0.09641	*Coefficient of Variation*	0.61318
Minimum	-1.	*Mean Deviation*	1.42188
Maximum	5.	*Second Moment*	2.96484
Range	6.	*Third Moment*	-2.63818
Sum	900.	*Fourth Moment*	19.89473
Sum Standard Error	30.85003	*Median*	3.
Total Sum Squares	3,480.	*Median Error*	0.00675
Adjusted Sum Squares	948.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.59516	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.64326	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #61 (O-NS1)			
Count	320	*Skewness*	-0.44838
Mean	2.625	*Skewness Standard Error*	0.13587
Mean LCL	2.40364	*Kurtosis*	2.1943
Mean UCL	2.84636	*Kurtosis Standard Error*	0.26921
Variance	2.86834	*Alternative Skewness (Fisher's)*	-0.45049
Standard Deviation	1.69362	*Alternative Kurtosis (Fisher's)*	-0.79944
Mean Standard Error	0.09468	*Coefficient of Variation*	0.64519
Minimum	-1.	*Mean Deviation*	1.42188
Maximum	5.	*Second Moment*	2.85938
Range	6.	*Third Moment*	-2.16797
Sum	840.	*Fourth Moment*	17.94067
Sum Standard Error	30.29634	*Median*	3.
Total Sum Squares	3,120.	*Median Error*	0.00663
Adjusted Sum Squares	915.	*Percentile 25% (Q1)*	2.
Geometric Mean	2.47284	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.85542	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #62 (O-NS2)			
Count	320	*Skewness*	-0.12618
Mean	2.1875	*Skewness Standard Error*	0.13587
Mean LCL	1.97683	*Kurtosis*	2.04582
Mean UCL	2.39817	*Kurtosis Standard Error*	0.26921
Variance	2.59796	*Alternative Skewness (Fisher's)*	-0.12677
Standard Deviation	1.61182	*Alternative Kurtosis (Fisher's)*	-0.95028
Mean Standard Error	0.0901	*Coefficient of Variation*	0.73683

Minimum	-1.	*Mean Deviation*	1.33594
Maximum	5.	*Second Moment*	2.58984
Range	6.	*Third Moment*	-0.52588
Sum	700.	*Fourth Moment*	13.72188
Sum Standard Error	28.83311	*Median*	2.
Total Sum Squares	2,360.	*Median Error*	0.00631
Adjusted Sum Squares	828.75	*Percentile 25% (Q1)*	1.
Geometric Mean	2.09551	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.23232	*IQR*	3.
Mode	2.	*MAD*	1.
Variable #63 (O-PO1)			
Count	320	*Skewness*	-1.34996
Mean	3.375	*Skewness Standard Error*	0.13587
Mean LCL	3.1766	*Kurtosis*	4.19922
Mean UCL	3.5734	*Kurtosis Standard Error*	0.26921
Variance	2.30408	*Alternative Skewness (Fisher's)*	-1.35632
Standard Deviation	1.51792	*Alternative Kurtosis (Fisher's)*	1.23716
Mean Standard Error	0.08485	*Coefficient of Variation*	0.44975
Minimum	-1.	*Mean Deviation*	1.15625
Maximum	5.	*Second Moment*	2.29688
Range	6.	*Third Moment*	-4.69922
Sum	1,080.	*Fourth Moment*	22.15356
Sum Standard Error	27.15334	*Median*	4.
Total Sum Squares	4,380.	*Median Error*	0.00595
Adjusted Sum Squares	735.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.18224	*Percentile 75% (Q2)*	4.
Harmonic Mean	4.15584	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #64 (O-PO2)			
Count	320	*Skewness*	-0.87503
Mean	3.0625	*Skewness Standard Error*	0.13587
Mean LCL	2.86092	*Kurtosis*	3.15597
Mean UCL	3.26408	*Kurtosis Standard Error*	0.26921
Variance	2.37853	*Alternative Skewness (Fisher's)*	-0.87916
Standard Deviation	1.54225	*Alternative Kurtosis (Fisher's)*	0.17742
Mean Standard Error	0.08621	*Coefficient of Variation*	0.50359
Minimum	-1.	*Mean Deviation*	1.19141
Maximum	5.	*Second Moment*	2.37109
Range	6.	*Third Moment*	-3.19482
Sum	980.	*Fourth Moment*	17.74312
Sum Standard Error	27.58856	*Median*	3.
Total Sum Squares	3,760.	*Median Error*	0.00604
Adjusted Sum Squares	758.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.84621	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.49091	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #65 (O-IC 1)			
Count	320	*Skewness*	-0.72799
Mean	3.6875	*Skewness Standard Error*	0.13587
Mean LCL	3.55891	*Kurtosis*	3.22282
Mean UCL	3.81609	*Kurtosis Standard Error*	0.26921
Variance	0.96787	*Alternative Skewness (Fisher's)*	-0.73143
Standard Deviation	0.9838	*Alternative Kurtosis (Fisher's)*	0.24533

Mean Standard Error	0.055	*Coefficient of Variation*	0.26679
Minimum	1.	*Mean Deviation*	0.78516
Maximum	5.	*Second Moment*	0.96484
Range	4.	*Third Moment*	-0.68994
Sum	1,180.	*Fourth Moment*	3.0002
Sum Standard Error	17.5988	*Median*	4.
Total Sum Squares	4,660.	*Median Error*	0.00385
Adjusted Sum Squares	308.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.51451	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.27087	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #66 (O-IC2)			
Count	320	*Skewness*	-0.86499
Mean	3.5625	*Skewness Standard Error*	0.13587
Mean LCL	3.39907	*Kurtosis*	3.3871
Mean UCL	3.72593	*Kurtosis Standard Error*	0.26921
Variance	1.56348	*Alternative Skewness (Fisher's)*	-0.86907
Standard Deviation	1.25039	*Alternative Kurtosis (Fisher's)*	0.4122
Mean Standard Error	0.0699	*Coefficient of Variation*	0.35099
Minimum	0.E+0	*Mean Deviation*	1.01953
Maximum	5.	*Second Moment*	1.55859
Range	5.	*Third Moment*	-1.68311
Sum	1,140.	*Fourth Moment*	8.22798
Sum Standard Error	22.36769	*Median*	4.
Total Sum Squares	4,560.	*Median Error*	0.0049
Adjusted Sum Squares	498.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.33964	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.30465	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #67 (O-SCM 1)			
Count	320	*Skewness*	-1.152
Mean	3.75	*Skewness Standard Error*	0.13587
Mean LCL	3.58636	*Kurtosis*	3.9568
Mean UCL	3.91364	*Kurtosis Standard Error*	0.26921
Variance	1.5674	*Alternative Skewness (Fisher's)*	-1.15743
Standard Deviation	1.25196	*Alternative Kurtosis (Fisher's)*	0.99091
Mean Standard Error	0.06999	*Coefficient of Variation*	0.33386
Minimum	0.E+0	*Mean Deviation*	0.96875
Maximum	5.	*Second Moment*	1.5625
Range	5.	*Third Moment*	-2.25
Sum	1,200.	*Fourth Moment*	9.66016
Sum Standard Error	22.3957	*Median*	4.
Total Sum Squares	5,000.	*Median Error*	0.0049
Adjusted Sum Squares	500.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.52348	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.49091	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #68 (O-SCM 2)			
Count	320	*Skewness*	-0.55238
Mean	3.75	*Skewness Standard Error*	0.13587
Mean LCL	3.5965	*Kurtosis*	2.19628
Mean UCL	3.9035	*Kurtosis Standard Error*	0.26921
Variance	1.37931	*Alternative Skewness (Fisher's)*	-0.55499

Standard Deviation	1.17444	Alternative Kurtosis (Fisher's)	-0.79743
Mean Standard Error	0.06565	Coefficient of Variation	0.31318
Minimum	1.	Mean Deviation	1.
Maximum	5.	Second Moment	1.375
Range	4.	Third Moment	-0.89063
Sum	1,200.	Fourth Moment	4.15234
Sum Standard Error	21.00903	Median	4.
Total Sum Squares	4,940.	Median Error	0.0046
Adjusted Sum Squares	440.	Percentile 25% (Q1)	3.
Geometric Mean	3.51639	Percentile 75% (Q2)	5.
Harmonic Mean	3.21608	IQR	2.
Mode	5.	MAD	1.
Variable #69 (InCus1)			
Count	320	Skewness	-1.2178
Mean	3.75	Skewness Standard Error	0.13587
Mean LCL	3.61115	Kurtosis	5.67593
Mean UCL	3.88885	Kurtosis Standard Error	0.26921
Variance	1.12853	Alternative Skewness (Fisher's)	-1.22354
Standard Deviation	1.06232	Alternative Kurtosis (Fisher's)	2.7372
Mean Standard Error	0.05939	Coefficient of Variation	0.28329
Minimum	0.E+0	Mean Deviation	0.8125
Maximum	5.	Second Moment	1.125
Range	5.	Third Moment	-1.45313
Sum	1,200.	Fourth Moment	7.18359
Sum Standard Error	19.00338	Median	4.
Total Sum Squares	4,860.	Median Error	0.00416
Adjusted Sum Squares	360.	Percentile 25% (Q1)	3.
Geometric Mean	3.62262	Percentile 75% (Q2)	5.
Harmonic Mean	3.79447	IQR	2.
Mode	4.	MAD	1.
Variable #70 (InCus2)			
Count	320	Skewness	-0.78148
Mean	3.6875	Skewness Standard Error	0.13587
Mean LCL	3.52572	Kurtosis	3.37652
Mean UCL	3.84928	Kurtosis Standard Error	0.26921
Variance	1.53213	Alternative Skewness (Fisher's)	-0.78516
Standard Deviation	1.23779	Alternative Kurtosis (Fisher's)	0.40145
Mean Standard Error	0.06919	Coefficient of Variation	0.33567
Minimum	0.E+0	Mean Deviation	1.03906
Maximum	5.	Second Moment	1.52734
Range	5.	Third Moment	-1.4751
Sum	1,180.	Fourth Moment	7.87666
Sum Standard Error	22.14232	Median	4.
Total Sum Squares	4,840.	Median Error	0.00485
Adjusted Sum Squares	488.75	Percentile 25% (Q1)	3.
Geometric Mean	3.49777	Percentile 75% (Q2)	5.
Harmonic Mean	3.57542	IQR	2.
Mode	5.	MAD	1.
Variable #71 (InPur1)			
Count	320	Skewness	-1.77538
Mean	3.75	Skewness Standard Error	0.13587
Mean LCL	3.62755	Kurtosis	8.68878
Mean UCL	3.87245	Kurtosis Standard Error	0.26921
Variance	0.87774	Alternative Skewness	-1.78375

		(Fisher's)	
Standard Deviation	0.93688	Alternative Kurtosis (Fisher's)	5.79766
Mean Standard Error	0.05237	Coefficient of Variation	0.24983
Minimum	0.E+0	Mean Deviation	0.65625
Maximum	5.	Second Moment	0.875
Range	5.	Third Moment	-1.45313
Sum	1,200.	Fourth Moment	6.65234
Sum Standard Error	16.75941	Median	4.
Total Sum Squares	4,780.	Median Error	0.00367
Adjusted Sum Squares	280.	Percentile 25% (Q1)	3.
Geometric Mean	3.65804	Percentile 75% (Q2)	4.
Harmonic Mean	3.87879	IQR	1.
Mode	4.	MAD	0.E+0
Variable #72 (InPur2)			
Count	320	Skewness	-1.2316
Mean	3.75	Skewness Standard Error	0.13587
Mean LCL	3.60735	Kurtosis	5.28809
Mean UCL	3.89265	Kurtosis Standard Error	0.26921
Variance	1.19122	Alternative Skewness (Fisher's)	-1.23741
Standard Deviation	1.09143	Alternative Kurtosis (Fisher's)	2.34323
Mean Standard Error	0.06101	Coefficient of Variation	0.29105
Minimum	0.E+0	Mean Deviation	0.82813
Maximum	5.	Second Moment	1.1875
Range	5.	Third Moment	-1.59375
Sum	1,200.	Fourth Moment	7.45703
Sum Standard Error	19.52412	Median	4.
Total Sum Squares	4,880.	Median Error	0.00427
Adjusted Sum Squares	380.	Percentile 25% (Q1)	3.
Geometric Mean	3.60931	Percentile 75% (Q2)	5.
Harmonic Mean	3.75734	IQR	2.
Mode	4.	MAD	1.
Variable #73 (InPro1)			
Count	320	Skewness	-1.49103
Mean	3.90625	Skewness Standard Error	0.13587
Mean LCL	3.76602	Kurtosis	6.29119
Mean UCL	4.04648	Kurtosis Standard Error	0.26921
Variance	1.15106	Alternative Skewness (Fisher's)	-1.49806
Standard Deviation	1.07287	Alternative Kurtosis (Fisher's)	3.36219
Mean Standard Error	0.05998	Coefficient of Variation	0.27466
Minimum	0.E+0	Mean Deviation	0.75977
Maximum	5.	Second Moment	1.14746
Range	5.	Third Moment	-1.8327
Sum	1,250.	Fourth Moment	8.2834
Sum Standard Error	19.19215	Median	4.
Total Sum Squares	5,250.	Median Error	0.0042
Adjusted Sum Squares	367.1875	Percentile 25% (Q1)	3.
Geometric Mean	3.77392	Percentile 75% (Q2)	5.
Harmonic Mean	3.95876	IQR	2.
Mode	4.	MAD	1.
Variable #74 (InPro2)			
Count	320	Skewness	-0.98842
Mean	3.625	Skewness Standard Error	0.13587
Mean LCL	3.48329	Kurtosis	4.8592
Mean UCL	3.76671	Kurtosis Standard Error	0.26921

Variance	1.17555	*Alternative Skewness (Fisher's)*	-0.99308
Standard Deviation	1.08423	*Alternative Kurtosis (Fisher's)*	1.90757
Mean Standard Error	0.06061	*Coefficient of Variation*	0.2991
Minimum	0.E+0	*Mean Deviation*	0.85938
Maximum	5.	*Second Moment*	1.17188
Range	5.	*Third Moment*	-1.25391
Sum	1,160.	*Fourth Moment*	6.6731
Sum Standard Error	19.39525	*Median*	4.
Total Sum Squares	4,580.	*Median Error*	0.00425
Adjusted Sum Squares	375.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.48885	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.62949	*IQR*	1.
Mode	#N/A	*MAD*	1.
Variable #75 (InBal1)			
Count	320	*Skewness*	-0.70128
Mean	3.34375	*Skewness Standard Error*	0.13587
Mean LCL	3.19518	*Kurtosis*	3.85056
Mean UCL	3.49232	*Kurtosis Standard Error*	0.26921
Variance	1.29212	*Alternative Skewness (Fisher's)*	-0.70459
Standard Deviation	1.13672	*Alternative Kurtosis (Fisher's)*	0.88299
Mean Standard Error	0.06354	*Coefficient of Variation*	0.33995
Minimum	0.E+0	*Mean Deviation*	0.88672
Maximum	5.	*Second Moment*	1.28809
Range	5.	*Third Moment*	-1.02521
Sum	1,070.	*Fourth Moment*	6.38871
Sum Standard Error	20.3342	*Median*	3.
Total Sum Squares	3,990.	*Median Error*	0.00445
Adjusted Sum Squares	412.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.16662	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.17355	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #76 (InBal2)			
Count	320	*Skewness*	-0.63712
Mean	3.375	*Skewness Standard Error*	0.13587
Mean LCL	3.20893	*Kurtosis*	3.06881
Mean UCL	3.54107	*Kurtosis Standard Error*	0.26921
Variance	1.61442	*Alternative Skewness (Fisher's)*	-0.64012
Standard Deviation	1.2706	*Alternative Kurtosis (Fisher's)*	0.08888
Mean Standard Error	0.07103	*Coefficient of Variation*	0.37647
Minimum	0.E+0	*Mean Deviation*	1.02344
Maximum	5.	*Second Moment*	1.60938
Range	5.	*Third Moment*	-1.30078
Sum	1,080.	*Fourth Moment*	7.94849
Sum Standard Error	22.72915	*Median*	3.
Total Sum Squares	4,160.	*Median Error*	0.00498
Adjusted Sum Squares	515.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.13074	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.02839	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #77 (InProj1)			
Count	320	*Skewness*	-1.01295
Mean	3.53125	*Skewness Standard Error*	0.13587
Mean LCL	3.38133	*Kurtosis*	4.30281

Mean UCL	3.68117	*Kurtosis Standard Error*	0.26921
Variance	1.31563	*Alternative Skewness (Fisher's)*	-1.01772
Standard Deviation	1.14701	*Alternative Kurtosis (Fisher's)*	1.34239
Mean Standard Error	0.06412	*Coefficient of Variation*	0.32482
Minimum	0.E+0	*Mean Deviation*	0.90234
Maximum	5.	*Second Moment*	1.31152
Range	5.	*Third Moment*	-1.52142
Sum	1,130.	*Fourth Moment*	7.40124
Sum Standard Error	20.51836	*Median*	4.
Total Sum Squares	4,410.	*Median Error*	0.00449
Adjusted Sum Squares	419.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.34768	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.35664	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #78 (InProj2)			
Count	320	*Skewness*	-0.80281
Mean	3.28125	*Skewness Standard Error*	0.13587
Mean LCL	3.1013	*Kurtosis*	3.05584
Mean UCL	3.4612	*Kurtosis Standard Error*	0.26921
Variance	1.89557	*Alternative Skewness (Fisher's)*	-0.8066
Standard Deviation	1.3768	*Alternative Kurtosis (Fisher's)*	0.07571
Mean Standard Error	0.07697	*Coefficient of Variation*	0.4196
Minimum	0.E+0	*Mean Deviation*	1.09375
Maximum	5.	*Second Moment*	1.88965
Range	5.	*Third Moment*	-2.08539
Sum	1,050.	*Fourth Moment*	10.91171
Sum Standard Error	24.62891	*Median*	3.5
Total Sum Squares	4,050.	*Median Error*	0.00539
Adjusted Sum Squares	604.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.03119	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.13725	*IQR*	1.
Mode	4.	*MAD*	0.5
Variable #79 (InCom1)			
Count	320	*Skewness*	-0.82954
Mean	3.34375	*Skewness Standard Error*	0.13587
Mean LCL	3.19518	*Kurtosis*	3.77993
Mean UCL	3.49232	*Kurtosis Standard Error*	0.26921
Variance	1.29212	*Alternative Skewness (Fisher's)*	-0.83345
Standard Deviation	1.13672	*Alternative Kurtosis (Fisher's)*	0.81124
Mean Standard Error	0.06354	*Coefficient of Variation*	0.33995
Minimum	0.E+0	*Mean Deviation*	0.90625
Maximum	5.	*Second Moment*	1.28809
Range	5.	*Third Moment*	-1.21271
Sum	1,070.	*Fourth Moment*	6.27153
Sum Standard Error	20.3342	*Median*	3.5
Total Sum Squares	3,990.	*Median Error*	0.00445
Adjusted Sum Squares	412.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.16135	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.15789	*IQR*	1.
Mode	4.	*MAD*	0.5
Variable #80 (InCom2)			
Count	320	*Skewness*	-0.64582
Mean	3.15625	*Skewness Standard Error*	0.13587

Mean LCL	2.97667	*Kurtosis*	2.76649
Mean UCL	3.33583	*Kurtosis Standard Error*	0.26921
Variance	1.88774	*Alternative Skewness (Fisher's)*	-0.64886
Standard Deviation	1.37395	*Alternative Kurtosis (Fisher's)*	-0.21822
Mean Standard Error	0.07681	*Coefficient of Variation*	0.43531
Minimum	0.E+0	*Mean Deviation*	1.10352
Maximum	5.	*Second Moment*	1.88184
Range	5.	*Third Moment*	-1.66718
Sum	1,010.	*Fourth Moment*	9.79698
Sum Standard Error	24.57794	*Median*	3.
Total Sum Squares	3,790.	*Median Error*	0.00538
Adjusted Sum Squares	602.1875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.90853	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #81 (InKnow1)			
Count	320	*Skewness*	-0.93915
Mean	3.5	*Skewness Standard Error*	0.13587
Mean LCL	3.35364	*Kurtosis*	4.04
Mean UCL	3.64636	*Kurtosis Standard Error*	0.26921
Variance	1.25392	*Alternative Skewness (Fisher's)*	-0.94358
Standard Deviation	1.11979	*Alternative Kurtosis (Fisher's)*	1.07542
Mean Standard Error	0.0626	*Coefficient of Variation*	0.31994
Minimum	0.E+0	*Mean Deviation*	0.90625
Maximum	5.	*Second Moment*	1.25
Range	5.	*Third Moment*	-1.3125
Sum	1,120.	*Fourth Moment*	6.3125
Sum Standard Error	20.03132	*Median*	4.
Total Sum Squares	4,320.	*Median Error*	0.00439
Adjusted Sum Squares	400.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.34212	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.42857	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #82 (InKnow2)			
Count	320	*Skewness*	-0.77727
Mean	3.4375	*Skewness Standard Error*	0.13587
Mean LCL	3.27738	*Kurtosis*	3.25999
Mean UCL	3.59762	*Kurtosis Standard Error*	0.26921
Variance	1.50078	*Alternative Skewness (Fisher's)*	-0.78094
Standard Deviation	1.22506	*Alternative Kurtosis (Fisher's)*	0.28309
Mean Standard Error	0.06848	*Coefficient of Variation*	0.35638
Minimum	0.E+0	*Mean Deviation*	1.00781
Maximum	5.	*Second Moment*	1.49609
Range	5.	*Third Moment*	-1.42236
Sum	1,100.	*Fourth Moment*	7.29683
Sum Standard Error	21.91462	*Median*	4.
Total Sum Squares	4,260.	*Median Error*	0.0048
Adjusted Sum Squares	478.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.22282	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.18937	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #83 (InStr1)			
Count	320	*Skewness*	-1.2065

Mean	3.59375	*Skewness Standard Error*	0.13587
Mean LCL	3.45937	*Kurtosis*	5.65382
Mean UCL	3.72813	*Kurtosis Standard Error*	0.26921
Variance	1.05701	*Alternative Skewness (Fisher's)*	-1.21219
Standard Deviation	1.02811	*Alternative Kurtosis (Fisher's)*	2.71475
Mean Standard Error	0.05747	*Coefficient of Variation*	0.28608
Minimum	0.E+0	*Mean Deviation*	0.79492
Maximum	5.	*Second Moment*	1.05371
Range	5.	*Third Moment*	-1.30499
Sum	1,150.	*Fourth Moment*	6.27748
Sum Standard Error	18.39143	*Median*	4.
Total Sum Squares	4,470.	*Median Error*	0.00403
Adjusted Sum Squares	337.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.4716	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.62264	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #84 (InStr2)			
Count	320	*Skewness*	-0.78001
Mean	3.3125	*Skewness Standard Error*	0.13587
Mean LCL	3.16821	*Kurtosis*	4.08016
Mean UCL	3.45679	*Kurtosis Standard Error*	0.26921
Variance	1.21865	*Alternative Skewness (Fisher's)*	-0.78369
Standard Deviation	1.10393	*Alternative Kurtosis (Fisher's)*	1.11621
Mean Standard Error	0.06171	*Coefficient of Variation*	0.33326
Minimum	0.E+0	*Mean Deviation*	0.85156
Maximum	5.	*Second Moment*	1.21484
Range	5.	*Third Moment*	-1.04443
Sum	1,060.	*Fourth Moment*	6.02168
Sum Standard Error	19.74762	*Median*	3.
Total Sum Squares	3,900.	*Median Error*	0.00432
Adjusted Sum Squares	388.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.14461	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.15789	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #85 (InInf1)			
Count	320	*Skewness*	-1.40177
Mean	3.65625	*Skewness Standard Error*	0.13587
Mean LCL	3.52287	*Kurtosis*	6.14104
Mean UCL	3.78963	*Kurtosis Standard Error*	0.26921
Variance	1.04134	*Alternative Skewness (Fisher's)*	-1.40838
Standard Deviation	1.02046	*Alternative Kurtosis (Fisher's)*	3.20966
Mean Standard Error	0.05705	*Coefficient of Variation*	0.2791
Minimum	0.E+0	*Mean Deviation*	0.76367
Maximum	5.	*Second Moment*	1.03809
Range	5.	*Third Moment*	-1.4826
Sum	1,170.	*Fourth Moment*	6.61772
Sum Standard Error	18.25456	*Median*	4.
Total Sum Squares	4,610.	*Median Error*	0.004
Adjusted Sum Squares	332.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.53459	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.69231	*IQR*	1.
Mode	4.	*MAD*	0.5
Variable #86 (InInf2)			

Count	320	*Skewness*	-0.92778
Mean	3.25	*Skewness Standard Error*	0.13587
Mean LCL	3.08312	*Kurtosis*	3.54882
Mean UCL	3.41688	*Kurtosis Standard Error*	0.26921
Variance	1.63009	*Alternative Skewness (Fisher's)*	-0.93216
Standard Deviation	1.27675	*Alternative Kurtosis (Fisher's)*	0.57648
Mean Standard Error	0.07137	*Coefficient of Variation*	0.39285
Minimum	0.E+0	*Mean Deviation*	1.
Maximum	5.	*Second Moment*	1.625
Range	5.	*Third Moment*	-1.92188
Sum	1,040.	*Fourth Moment*	9.37109
Sum Standard Error	22.83922	*Median*	3.5
Total Sum Squares	3,900.	*Median Error*	0.005
Adjusted Sum Squares	520.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.05466	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.26531	*IQR*	1.
Mode	4.	*MAD*	0.5
Variable #87 (TTVal1)			
Count	320	*Skewness*	-1.59664
Mean	3.8125	*Skewness Standard Error*	0.13587
Mean LCL	3.68391	*Kurtosis*	7.69167
Mean UCL	3.94109	*Kurtosis Standard Error*	0.26921
Variance	0.96787	*Alternative Skewness (Fisher's)*	-1.60417
Standard Deviation	0.9838	*Alternative Kurtosis (Fisher's)*	4.7848
Mean Standard Error	0.055	*Coefficient of Variation*	0.25805
Minimum	0.E+0	*Mean Deviation*	0.69531
Maximum	5.	*Second Moment*	0.96484
Range	5.	*Third Moment*	-1.51318
Sum	1,220.	*Fourth Moment*	7.16035
Sum Standard Error	17.5988	*Median*	4.
Total Sum Squares	4,960.	*Median Error*	0.00385
Adjusted Sum Squares	308.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.70942	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.92638	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #88 (TTVal2)			
Count	320	*Skewness*	-1.61723
Mean	3.71875	*Skewness Standard Error*	0.13587
Mean LCL	3.58689	*Kurtosis*	6.79587
Mean UCL	3.85061	*Kurtosis Standard Error*	0.26921
Variance	1.01783	*Alternative Skewness (Fisher's)*	-1.62485
Standard Deviation	1.00888	*Alternative Kurtosis (Fisher's)*	3.87484
Mean Standard Error	0.0564	*Coefficient of Variation*	0.27129
Minimum	0.E+0	*Mean Deviation*	0.7168
Maximum	5.	*Second Moment*	1.01465
Range	5.	*Third Moment*	-1.65289
Sum	1,190.	*Fourth Moment*	6.99643
Sum Standard Error	18.04731	*Median*	4.
Total Sum Squares	4,750.	*Median Error*	0.00395
Adjusted Sum Squares	324.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.59871	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.76471	*IQR*	1.
Mode	4.	*MAD*	0.E+0

Variable #89 (TTImp1)			
Count	320	*Skewness*	-0.98954
Mean	3.28125	*Skewness Standard Error*	0.13587
Mean LCL	3.15351	*Kurtosis*	5.08213
Mean UCL	3.40899	*Kurtosis Standard Error*	0.26921
Variance	0.95513	*Alternative Skewness (Fisher's)*	-0.99421
Standard Deviation	0.97731	*Alternative Kurtosis (Fisher's)*	2.13402
Mean Standard Error	0.05463	*Coefficient of Variation*	0.29785
Minimum	0.E+0	*Mean Deviation*	0.75391
Maximum	5.	*Second Moment*	0.95215
Range	5.	*Third Moment*	-0.91937
Sum	1,050.	*Fourth Moment*	4.60739
Sum Standard Error	17.48264	*Median*	3.
Total Sum Squares	3,750.	*Median Error*	0.00383
Adjusted Sum Squares	304.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.16896	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.28767	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #90 (TTImp2)			
Count	320	*Skewness*	-0.67616
Mean	3.40625	*Skewness Standard Error*	0.13587
Mean LCL	3.28009	*Kurtosis*	3.48434
Mean UCL	3.53241	*Kurtosis Standard Error*	0.26921
Variance	0.93162	*Alternative Skewness (Fisher's)*	-0.67935
Standard Deviation	0.96521	*Alternative Kurtosis (Fisher's)*	0.51099
Mean Standard Error	0.05396	*Coefficient of Variation*	0.28336
Minimum	1.	*Mean Deviation*	0.78125
Maximum	5.	*Second Moment*	0.92871
Range	4.	*Third Moment*	-0.60516
Sum	1,090.	*Fourth Moment*	3.00526
Sum Standard Error	17.26613	*Median*	3.5
Total Sum Squares	4,010.	*Median Error*	0.00378
Adjusted Sum Squares	297.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.21996	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.94931	*IQR*	1.
Mode	4.	*MAD*	0.5
Variable #91 (TTCul1)			
Count	320	*Skewness*	-0.72485
Mean	3.125	*Skewness Standard Error*	0.13587
Mean LCL	2.96219	*Kurtosis*	3.5479
Mean UCL	3.28781	*Kurtosis Standard Error*	0.26921
Variance	1.55172	*Alternative Skewness (Fisher's)*	-0.72826
Standard Deviation	1.24568	*Alternative Kurtosis (Fisher's)*	0.57555
Mean Standard Error	0.06964	*Coefficient of Variation*	0.39862
Minimum	0.E+0	*Mean Deviation*	0.90625
Maximum	5.	*Second Moment*	1.54688
Range	5.	*Third Moment*	-1.39453
Sum	1,000.	*Fourth Moment*	8.4895
Sum Standard Error	22.28344	*Median*	3.
Total Sum Squares	3,620.	*Median Error*	0.00488
Adjusted Sum Squares	495.	*Percentile 25% (Q1)*	3.
Geometric Mean	2.94677	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.15789	*IQR*	1.

Mode	3.	*MAD*	1.
Variable #92 (TTCul2)			
Count	320	*Skewness*	-0.90055
Mean	3.4375	*Skewness Standard Error*	0.13587
Mean LCL	3.28421	*Kurtosis*	3.71371
Mean UCL	3.59079	*Kurtosis Standard Error*	0.26921
Variance	1.37539	*Alternative Skewness (Fisher's)*	-0.9048
Standard Deviation	1.17277	*Alternative Kurtosis (Fisher's)*	0.74398
Mean Standard Error	0.06556	*Coefficient of Variation*	0.34117
Minimum	0.E+0	*Mean Deviation*	0.94531
Maximum	5.	*Second Moment*	1.37109
Range	5.	*Third Moment*	-1.4458
Sum	1,100.	*Fourth Moment*	6.9814
Sum Standard Error	20.97917	*Median*	4.
Total Sum Squares	4,220.	*Median Error*	0.00459
Adjusted Sum Squares	438.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.24123	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.22689	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #93 (TTOrg1)			
Count	320	*Skewness*	-0.51514
Mean	2.71875	*Skewness Standard Error*	0.13587
Mean LCL	2.54485	*Kurtosis*	2.65462
Mean UCL	2.89265	*Kurtosis Standard Error*	0.26921
Variance	1.77018	*Alternative Skewness (Fisher's)*	-0.51757
Standard Deviation	1.33048	*Alternative Kurtosis (Fisher's)*	-0.33185
Mean Standard Error	0.07438	*Coefficient of Variation*	0.48937
Minimum	0.E+0	*Mean Deviation*	1.05664
Maximum	5.	*Second Moment*	1.76465
Range	5.	*Third Moment*	-1.20758
Sum	870.	*Fourth Moment*	8.26645
Sum Standard Error	23.80037	*Median*	3.
Total Sum Squares	2,930.	*Median Error*	0.00521
Adjusted Sum Squares	564.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.51966	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.74678	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #94 (TTOrg2)			
Count	320	*Skewness*	-0.32811
Mean	2.6875	*Skewness Standard Error*	0.13587
Mean LCL	2.51607	*Kurtosis*	2.38113
Mean UCL	2.85893	*Kurtosis Standard Error*	0.26921
Variance	1.72022	*Alternative Skewness (Fisher's)*	-0.32966
Standard Deviation	1.31157	*Alternative Kurtosis (Fisher's)*	-0.60967
Mean Standard Error	0.07332	*Coefficient of Variation*	0.48803
Minimum	0.E+0	*Mean Deviation*	1.07813
Maximum	5.	*Second Moment*	1.71484
Range	5.	*Third Moment*	-0.73682
Sum	860.	*Fourth Moment*	7.00215
Sum Standard Error	23.4621	*Median*	3.
Total Sum Squares	2,860.	*Median Error*	0.00514
Adjusted Sum Squares	548.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.43463	*Percentile 75% (Q2)*	4.

Harmonic Mean	2.403	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #95 (TTPri1)			
Count	320	*Skewness*	-1.29973
Mean	2.9375	*Skewness Standard Error*	0.13587
Mean LCL	2.78076	*Kurtosis*	3.87854
Mean UCL	3.09424	*Kurtosis Standard Error*	0.26921
Variance	1.43809	*Alternative Skewness (Fisher's)*	-1.30586
Standard Deviation	1.1992	*Alternative Kurtosis (Fisher's)*	0.91141
Mean Standard Error	0.06704	*Coefficient of Variation*	0.40824
Minimum	0.E+0	*Mean Deviation*	0.84766
Maximum	4.	*Second Moment*	1.43359
Range	4.	*Third Moment*	-2.23096
Sum	940.	*Fourth Moment*	7.97115
Sum Standard Error	21.45199	*Median*	3.
Total Sum Squares	3,220.	*Median Error*	0.0047
Adjusted Sum Squares	458.75	*Percentile 25% (Q1)*	3.
Geometric Mean	2.8043	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.25424	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #96 (TTPri2)			
Count	320	*Skewness*	-0.89824
Mean	3.03125	*Skewness Standard Error*	0.13587
Mean LCL	2.86604	*Kurtosis*	3.22639
Mean UCL	3.19646	*Kurtosis Standard Error*	0.26921
Variance	1.59777	*Alternative Skewness (Fisher's)*	-0.90247
Standard Deviation	1.26403	*Alternative Kurtosis (Fisher's)*	0.24895
Mean Standard Error	0.07066	*Coefficient of Variation*	0.417
Minimum	0.E+0	*Mean Deviation*	0.91211
Maximum	5.	*Second Moment*	1.59277
Range	5.	*Third Moment*	-1.8056
Sum	970.	*Fourth Moment*	8.18512
Sum Standard Error	22.61162	*Median*	3.
Total Sum Squares	3,450.	*Median Error*	0.00495
Adjusted Sum Squares	509.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	2.80788	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.86996	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #97 (TTKnow1)			
Count	320	*Skewness*	-0.08084
Mean	3.8125	*Skewness Standard Error*	0.13587
Mean LCL	3.71196	*Kurtosis*	2.43415
Mean UCL	3.91304	*Kurtosis Standard Error*	0.26921
Variance	0.59169	*Alternative Skewness (Fisher's)*	-0.08122
Standard Deviation	0.76922	*Alternative Kurtosis (Fisher's)*	-0.55581
Mean Standard Error	0.043	*Coefficient of Variation*	0.20176
Minimum	2.	*Mean Deviation*	0.62109
Maximum	5.	*Second Moment*	0.58984
Range	3.	*Third Moment*	-0.03662
Sum	1,220.	*Fourth Moment*	0.84688
Sum Standard Error	13.76015	*Median*	4.
Total Sum Squares	4,840.	*Median Error*	0.00301
Adjusted Sum Squares	188.75	*Percentile 25% (Q1)*	3.

Geometric Mean	3.73061	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.64326	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #98 (TTKnow2)			
Count	320	*Skewness*	-0.08714
Mean	3.84375	*Skewness Standard Error*	0.13587
Mean LCL	3.73969	*Kurtosis*	2.28134
Mean UCL	3.94781	*Kurtosis Standard Error*	0.26921
Variance	0.63382	*Alternative Skewness (Fisher's)*	-0.08755
Standard Deviation	0.79613	*Alternative Kurtosis (Fisher's)*	-0.71103
Mean Standard Error	0.0445	*Coefficient of Variation*	0.20712
Minimum	2.	*Mean Deviation*	0.64258
Maximum	5.	*Second Moment*	0.63184
Range	3.	*Third Moment*	-0.04376
Sum	1,230.	*Fourth Moment*	0.91075
Sum Standard Error	14.24153	*Median*	4.
Total Sum Squares	4,930.	*Median Error*	0.00312
Adjusted Sum Squares	202.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.75672	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.66412	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #99 (TTCom1)			
Count	320	*Skewness*	-2.0574
Mean	3.8125	*Skewness Standard Error*	0.13587
Mean LCL	3.69253	*Kurtosis*	9.93707
Mean UCL	3.93247	*Kurtosis Standard Error*	0.26921
Variance	0.84248	*Alternative Skewness (Fisher's)*	-2.0671
Standard Deviation	0.91787	*Alternative Kurtosis (Fisher's)*	7.06568
Mean Standard Error	0.05131	*Coefficient of Variation*	0.24075
Minimum	0.E+0	*Mean Deviation*	0.59375
Maximum	5.	*Second Moment*	0.83984
Range	5.	*Third Moment*	-1.5835
Sum	1,220.	*Fourth Moment*	7.00899
Sum Standard Error	16.41927	*Median*	4.
Total Sum Squares	4,920.	*Median Error*	0.00359
Adjusted Sum Squares	268.75	*Percentile 25% (Q1)*	4.
Geometric Mean	3.72441	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.95876	*IQR*	0.E+0
Mode	4.	*MAD*	0.E+0
Variable #100 (TTCom2)			
Count	320	*Skewness*	-1.7608
Mean	3.9375	*Skewness Standard Error*	0.13587
Mean LCL	3.80685	*Kurtosis*	8.10219
Mean UCL	4.06815	*Kurtosis Standard Error*	0.26921
Variance	0.99922	*Alternative Skewness (Fisher's)*	-1.7691
Standard Deviation	0.99961	*Alternative Kurtosis (Fisher's)*	5.20181
Mean Standard Error	0.05588	*Coefficient of Variation*	0.25387
Minimum	0.E+0	*Mean Deviation*	0.65625
Maximum	5.	*Second Moment*	0.99609
Range	5.	*Third Moment*	-1.75049
Sum	1,260.	*Fourth Moment*	8.03902
Sum Standard Error	17.88153	*Median*	4.
Total Sum Squares	5,280.	*Median Error*	0.00392

Adjusted Sum Squares	318.75	*Percentile 25% (Q1)*	4.
Geometric Mean	3.82976	*Percentile 75% (Q2)*	5.
Harmonic Mean	4.0592	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #101 (TTCod1)			
Count	320	*Skewness*	-0.933
Mean	3.375	*Skewness Standard Error*	0.13587
Mean LCL	3.23329	*Kurtosis*	4.51787
Mean UCL	3.51671	*Kurtosis Standard Error*	0.26921
Variance	1.17555	*Alternative Skewness (Fisher's)*	-0.9374
Standard Deviation	1.08423	*Alternative Kurtosis (Fisher's)*	1.56084
Mean Standard Error	0.06061	*Coefficient of Variation*	0.32125
Minimum	0.E+0	*Mean Deviation*	0.83594
Maximum	5.	*Second Moment*	1.17188
Range	5.	*Third Moment*	-1.18359
Sum	1,080.	*Fourth Moment*	6.20435
Sum Standard Error	19.39525	*Median*	3.
Total Sum Squares	4,020.	*Median Error*	0.00425
Adjusted Sum Squares	375.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.21347	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.23777	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #102 (TTCod2)			
Count	320	*Skewness*	-0.85958
Mean	3.46875	*Skewness Standard Error*	0.13587
Mean LCL	3.31883	*Kurtosis*	4.09843
Mean UCL	3.61867	*Kurtosis Standard Error*	0.26921
Variance	1.31563	*Alternative Skewness (Fisher's)*	-0.86364
Standard Deviation	1.14701	*Alternative Kurtosis (Fisher's)*	1.13477
Mean Standard Error	0.06412	*Coefficient of Variation*	0.33067
Minimum	0.E+0	*Mean Deviation*	0.90625
Maximum	5.	*Second Moment*	1.31152
Range	5.	*Third Moment*	-1.29108
Sum	1,110.	*Fourth Moment*	7.04968
Sum Standard Error	20.51836	*Median*	3.5
Total Sum Squares	4,270.	*Median Error*	0.00449
Adjusted Sum Squares	419.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.28803	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.29897	*IQR*	1.
Mode	3.	*MAD*	0.5
Variable #103 (TTCox1)			
Count	320	*Skewness*	-0.87368
Mean	3.40625	*Skewness Standard Error*	0.13587
Mean LCL	3.27187	*Kurtosis*	4.8939
Mean UCL	3.54063	*Kurtosis Standard Error*	0.26921
Variance	1.05701	*Alternative Skewness (Fisher's)*	-0.8778
Standard Deviation	1.02811	*Alternative Kurtosis (Fisher's)*	1.94281
Mean Standard Error	0.05747	*Coefficient of Variation*	0.30183
Minimum	0.E+0	*Mean Deviation*	0.80664
Maximum	5.	*Second Moment*	1.05371
Range	5.	*Third Moment*	-0.94501
Sum	1,090.	*Fourth Moment*	5.43373
Sum Standard Error	18.39143	*Median*	3.

Total Sum Squares	4,050.	*Median Error*	0.00403
Adjusted Sum Squares	337.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.28384	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.4103	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #104 (TTCox2)			
Count	320	*Skewness*	-0.78001
Mean	3.3125	*Skewness Standard Error*	0.13587
Mean LCL	3.16821	*Kurtosis*	4.08016
Mean UCL	3.45679	*Kurtosis Standard Error*	0.26921
Variance	1.21865	*Alternative Skewness (Fisher's)*	-0.78369
Standard Deviation	1.10393	*Alternative Kurtosis (Fisher's)*	1.11621
Mean Standard Error	0.06171	*Coefficient of Variation*	0.33326
Minimum	0.E+0	*Mean Deviation*	0.85156
Maximum	5.	*Second Moment*	1.21484
Range	5.	*Third Moment*	-1.04443
Sum	1,060.	*Fourth Moment*	6.02168
Sum Standard Error	19.74762	*Median*	3.
Total Sum Squares	3,900.	*Median Error*	0.00432
Adjusted Sum Squares	388.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.14461	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.15789	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #105 (TTTac1)			
Count	320	*Skewness*	-1.10338
Mean	2.8125	*Skewness Standard Error*	0.13587
Mean LCL	2.67584	*Kurtosis*	4.06425
Mean UCL	2.94916	*Kurtosis Standard Error*	0.26921
Variance	1.09326	*Alternative Skewness (Fisher's)*	-1.10858
Standard Deviation	1.04559	*Alternative Kurtosis (Fisher's)*	1.10005
Mean Standard Error	0.05845	*Coefficient of Variation*	0.37177
Minimum	0.E+0	*Mean Deviation*	0.76953
Maximum	4.	*Second Moment*	1.08984
Range	4.	*Third Moment*	-1.25537
Sum	900.	*Fourth Moment*	4.82735
Sum Standard Error	18.7041	*Median*	3.
Total Sum Squares	2,880.	*Median Error*	0.0041
Adjusted Sum Squares	348.75	*Percentile 25% (Q1)*	2.
Geometric Mean	2.69531	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.90909	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #106 (TTTac2)			
Count	320	*Skewness*	-0.45805
Mean	2.78125	*Skewness Standard Error*	0.13587
Mean LCL	2.62521	*Kurtosis*	3.15989
Mean UCL	2.93729	*Kurtosis Standard Error*	0.26921
Variance	1.42535	*Alternative Skewness (Fisher's)*	-0.46021
Standard Deviation	1.19388	*Alternative Kurtosis (Fisher's)*	0.1814
Mean Standard Error	0.06674	*Coefficient of Variation*	0.42926
Minimum	0.E+0	*Mean Deviation*	0.91211
Maximum	5.	*Second Moment*	1.4209
Range	5.	*Third Moment*	-0.77582
Sum	890.	*Fourth Moment*	6.37967

Sum Standard Error	21.3568	*Median*	3.
Total Sum Squares	2,930.	*Median Error*	0.00468
Adjusted Sum Squares	454.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.60767	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.72727	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #107 (TTMain1)			
Count	320	*Skewness*	-0.91369
Mean	3.09375	*Skewness Standard Error*	0.13587
Mean LCL	2.96138	*Kurtosis*	4.14328
Mean UCL	3.22612	*Kurtosis Standard Error*	0.26921
Variance	1.02567	*Alternative Skewness (Fisher's)*	-0.91799
Standard Deviation	1.01275	*Alternative Kurtosis (Fisher's)*	1.18033
Mean Standard Error	0.05661	*Coefficient of Variation*	0.32735
Minimum	0.E+0	*Mean Deviation*	0.74219
Maximum	5.	*Second Moment*	1.02246
Range	5.	*Third Moment*	-0.94464
Sum	990.	*Fourth Moment*	4.33149
Sum Standard Error	18.11665	*Median*	3.
Total Sum Squares	3,390.	*Median Error*	0.00397
Adjusted Sum Squares	327.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	2.94895	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.96754	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #108 (TTMain2)			
Count	320	*Skewness*	-1.00043
Mean	2.90625	*Skewness Standard Error*	0.13587
Mean LCL	2.73507	*Kurtosis*	4.11757
Mean UCL	3.07743	*Kurtosis Standard Error*	0.26921
Variance	1.71532	*Alternative Skewness (Fisher's)*	-1.00515
Standard Deviation	1.3097	*Alternative Kurtosis (Fisher's)*	1.15421
Mean Standard Error	0.07321	*Coefficient of Variation*	0.45065
Minimum	-1.	*Mean Deviation*	0.94727
Maximum	5.	*Second Moment*	1.70996
Range	6.	*Third Moment*	-2.237
Sum	930.	*Fourth Moment*	12.03962
Sum Standard Error	23.42868	*Median*	3.
Total Sum Squares	3,250.	*Median Error*	0.00513
Adjusted Sum Squares	547.1875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.74771	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.15271	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #109 (TTRec1)			
Count	320	*Skewness*	-0.68746
Mean	3.15625	*Skewness Standard Error*	0.13587
Mean LCL	3.0249	*Kurtosis*	4.25882
Mean UCL	3.2876	*Kurtosis Standard Error*	0.26921
Variance	1.00999	*Alternative Skewness (Fisher's)*	-0.6907
Standard Deviation	1.00498	*Alternative Kurtosis (Fisher's)*	1.2977
Mean Standard Error	0.05618	*Coefficient of Variation*	0.31841
Minimum	0.E+0	*Mean Deviation*	0.75781
Maximum	5.	*Second Moment*	1.00684
Range	5.	*Third Moment*	-0.69452

Sum	1,010.	*Fourth Moment*	4.31724
Sum Standard Error	17.97769	*Median*	3.
Total Sum Squares	3,510.	*Median Error*	0.00394
Adjusted Sum Squares	322.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.03461	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.12704	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #110 (TTRec2)			
Count	320	*Skewness*	-0.59851
Mean	3.0625	*Skewness Standard Error*	0.13587
Mean LCL	2.92389	*Kurtosis*	3.70077
Mean UCL	3.20111	*Kurtosis Standard Error*	0.26921
Variance	1.12461	*Alternative Skewness (Fisher's)*	-0.60133
Standard Deviation	1.06048	*Alternative Kurtosis (Fisher's)*	0.73083
Mean Standard Error	0.05928	*Coefficient of Variation*	0.34628
Minimum	0.E+0	*Mean Deviation*	0.76953
Maximum	5.	*Second Moment*	1.12109
Range	5.	*Third Moment*	-0.71045
Sum	980.	*Fourth Moment*	4.65132
Sum Standard Error	18.97036	*Median*	3.
Total Sum Squares	3,360.	*Median Error*	0.00415
Adjusted Sum Squares	358.75	*Percentile 25% (Q1)*	3.
Geometric Mean	2.90595	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.91351	*IQR*	1.
Mode	3.	*MAD*	1.
Variable #111 (PDFM1)			
Count	320	*Skewness*	-0.70193
Mean	3.84375	*Skewness Standard Error*	0.13587
Mean LCL	3.70838	*Kurtosis*	3.01833
Mean UCL	3.97912	*Kurtosis Standard Error*	0.26921
Variance	1.07269	*Alternative Skewness (Fisher's)*	-0.70524
Standard Deviation	1.03571	*Alternative Kurtosis (Fisher's)*	0.03761
Mean Standard Error	0.0579	*Coefficient of Variation*	0.26945
Minimum	1.	*Mean Deviation*	0.83008
Maximum	5.	*Second Moment*	1.06934
Range	4.	*Third Moment*	-0.77618
Sum	1,230.	*Fourth Moment*	3.4514
Sum Standard Error	18.52728	*Median*	4.
Total Sum Squares	5,070.	*Median Error*	0.00406
Adjusted Sum Squares	342.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.66	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.39823	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #112 (PDFM2)			
Count	320	*Skewness*	-0.72831
Mean	3.90625	*Skewness Standard Error*	0.13587
Mean LCL	3.76602	*Kurtosis*	2.85567
Mean UCL	4.04648	*Kurtosis Standard Error*	0.26921
Variance	1.15106	*Alternative Skewness (Fisher's)*	-0.73174
Standard Deviation	1.07287	*Alternative Kurtosis (Fisher's)*	-0.12763
Mean Standard Error	0.05998	*Coefficient of Variation*	0.27466
Minimum	1.	*Mean Deviation*	0.87305
Maximum	5.	*Second Moment*	1.14746

Range	4.	*Third Moment*	-0.8952
Sum	1,250.	*Fourth Moment*	3.75996
Sum Standard Error	19.19215	*Median*	4.
Total Sum Squares	5,250.	*Median Error*	0.0042
Adjusted Sum Squares	367.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.7114	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.4347	*IQR*	2.
Mode	5.	*MAD*	1.
Variable #113 (PDCD1)			
Count	320	*Skewness*	-0.69996
Mean	3.71875	*Skewness Standard Error*	0.13587
Mean LCL	3.58689	*Kurtosis*	3.08507
Mean UCL	3.85061	*Kurtosis Standard Error*	0.26921
Variance	1.01783	*Alternative Skewness (Fisher's)*	-0.70326
Standard Deviation	1.00888	*Alternative Kurtosis (Fisher's)*	0.1054
Mean Standard Error	0.0564	*Coefficient of Variation*	0.27129
Minimum	1.	*Mean Deviation*	0.80664
Maximum	5.	*Second Moment*	1.01465
Range	4.	*Third Moment*	-0.71539
Sum	1,190.	*Fourth Moment*	3.17611
Sum Standard Error	18.04731	*Median*	4.
Total Sum Squares	4,750.	*Median Error*	0.00395
Adjusted Sum Squares	324.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.5391	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.28767	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #114 (PDCD2)			
Count	320	*Skewness*	-1.11915
Mean	3.96875	*Skewness Standard Error*	0.13587
Mean LCL	3.83997	*Kurtosis*	4.08921
Mean UCL	4.09753	*Kurtosis Standard Error*	0.26921
Variance	0.97081	*Alternative Skewness (Fisher's)*	-1.12443
Standard Deviation	0.9853	*Alternative Kurtosis (Fisher's)*	1.12541
Mean Standard Error	0.05508	*Coefficient of Variation*	0.24826
Minimum	1.	*Mean Deviation*	0.67383
Maximum	5.	*Second Moment*	0.96777
Range	4.	*Third Moment*	-1.06549
Sum	1,270.	*Fourth Moment*	3.82989
Sum Standard Error	17.6255	*Median*	4.
Total Sum Squares	5,350.	*Median Error*	0.00386
Adjusted Sum Squares	309.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	3.79401	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.52294	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #115 (PDBPO1)			
Count	320	*Skewness*	-0.54364
Mean	3.875	*Skewness Standard Error*	0.13587
Mean LCL	3.75814	*Kurtosis*	2.6286
Mean UCL	3.99186	*Kurtosis Standard Error*	0.26921
Variance	0.79937	*Alternative Skewness (Fisher's)*	-0.5462
Standard Deviation	0.89408	*Alternative Kurtosis (Fisher's)*	-0.35828
Mean Standard Error	0.04998	*Coefficient of Variation*	0.23073
Minimum	2.	*Mean Deviation*	0.67969

Maximum	5.	*Second Moment*	0.79688
Range	3.	*Third Moment*	-0.38672
Sum	1,240.	*Fourth Moment*	1.66919
Sum Standard Error	15.99373	*Median*	4.
Total Sum Squares	5,060.	*Median Error*	0.0035
Adjusted Sum Squares	255.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.75526	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.61582	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #116 (PDBPO2)			
Count	320	*Skewness*	-0.67598
Mean	4.03125	*Skewness Standard Error*	0.13587
Mean LCL	3.92034	*Kurtosis*	2.94241
Mean UCL	4.14216	*Kurtosis Standard Error*	0.26921
Variance	0.72002	*Alternative Skewness (Fisher's)*	-0.67917
Standard Deviation	0.84854	*Alternative Kurtosis (Fisher's)*	-0.03951
Mean Standard Error	0.04743	*Coefficient of Variation*	0.21049
Minimum	2.	*Mean Deviation*	0.60547
Maximum	5.	*Second Moment*	0.71777
Range	3.	*Third Moment*	-0.41107
Sum	1,290.	*Fourth Moment*	1.51593
Sum Standard Error	15.17918	*Median*	4.
Total Sum Squares	5,430.	*Median Error*	0.00332
Adjusted Sum Squares	229.6875	*Percentile 25% (Q1)*	4.
Geometric Mean	3.92652	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.80198	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #117 (PDCom1)			
Count	320	*Skewness*	-0.27514
Mean	3.8125	*Skewness Standard Error*	0.13587
Mean LCL	3.68815	*Kurtosis*	2.08056
Mean UCL	3.93685	*Kurtosis Standard Error*	0.26921
Variance	0.90517	*Alternative Skewness (Fisher's)*	-0.27644
Standard Deviation	0.95141	*Alternative Kurtosis (Fisher's)*	-0.91498
Mean Standard Error	0.05319	*Coefficient of Variation*	0.24955
Minimum	2.	*Mean Deviation*	0.79688
Maximum	5.	*Second Moment*	0.90234
Range	3.	*Third Moment*	-0.23584
Sum	1,220.	*Fourth Moment*	1.69405
Sum Standard Error	17.01926	*Median*	4.
Total Sum Squares	4,940.	*Median Error*	0.00373
Adjusted Sum Squares	288.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.68091	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.53591	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #118 (PDCom2)			
Count	320	*Skewness*	-0.46142
Mean	3.9375	*Skewness Standard Error*	0.13587
Mean LCL	3.82443	*Kurtosis*	2.52967
Mean UCL	4.05057	*Kurtosis Standard Error*	0.26921
Variance	0.74843	*Alternative Skewness (Fisher's)*	-0.4636
Standard Deviation	0.86512	*Alternative Kurtosis (Fisher's)*	-0.45877
Mean Standard Error	0.04836	*Coefficient of Variation*	0.21971

Minimum	2.	*Mean Deviation*	0.65234
Maximum	5.	*Second Moment*	0.74609
Range	3.	*Third Moment*	-0.29736
Sum	1,260.	*Fourth Moment*	1.40816
Sum Standard Error	15.47574	*Median*	4.
Total Sum Squares	5,200.	*Median Error*	0.00339
Adjusted Sum Squares	238.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.82976	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.70656	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #119 (PDEE1)			
Count	320	*Skewness*	-0.33305
Mean	3.71875	*Skewness Standard Error*	0.13587
Mean LCL	3.58689	*Kurtosis*	2.03785
Mean UCL	3.85061	*Kurtosis Standard Error*	0.26921
Variance	1.01783	*Alternative Skewness (Fisher's)*	-0.33462
Standard Deviation	1.00888	*Alternative Kurtosis (Fisher's)*	-0.95837
Mean Standard Error	0.0564	*Coefficient of Variation*	0.27129
Minimum	2.	*Mean Deviation*	0.85156
Maximum	5.	*Second Moment*	1.01465
Range	3.	*Third Moment*	-0.34039
Sum	1,190.	*Fourth Moment*	2.09799
Sum Standard Error	18.04731	*Median*	4.
Total Sum Squares	4,750.	*Median Error*	0.00395
Adjusted Sum Squares	324.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.56386	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.39223	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #120 (PDEE2)			
Count	320	*Skewness*	-0.62361
Mean	3.875	*Skewness Standard Error*	0.13587
Mean LCL	3.74106	*Kurtosis*	2.28581
Mean UCL	4.00894	*Kurtosis Standard Error*	0.26921
Variance	1.05016	*Alternative Skewness (Fisher's)*	-0.62655
Standard Deviation	1.02477	*Alternative Kurtosis (Fisher's)*	-0.70649
Mean Standard Error	0.05729	*Coefficient of Variation*	0.26446
Minimum	2.	*Mean Deviation*	0.80469
Maximum	5.	*Second Moment*	1.04688
Range	3.	*Third Moment*	-0.66797
Sum	1,240.	*Fourth Moment*	2.50513
Sum Standard Error	18.33167	*Median*	4.
Total Sum Squares	5,140.	*Median Error*	0.00401
Adjusted Sum Squares	335.	*Percentile 25% (Q1)*	3.
Geometric Mean	3.71271	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.52294	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #121 (PDLP1)			
Count	320	*Skewness*	-0.27414
Mean	3.59375	*Skewness Standard Error*	0.13587
Mean LCL	3.47191	*Kurtosis*	2.21521
Mean UCL	3.71559	*Kurtosis Standard Error*	0.26921
Variance	0.86893	*Alternative Skewness (Fisher's)*	-0.27543
Standard Deviation	0.93216	*Alternative Kurtosis (Fisher's)*	-0.7782

Mean Standard Error	0.05211	*Coefficient of Variation*	0.25938
Minimum	2.	*Mean Deviation*	0.79492
Maximum	5.	*Second Moment*	0.86621
Range	3.	*Third Moment*	-0.22101
Sum	1,150.	*Fourth Moment*	1.66212
Sum Standard Error	16.67502	*Median*	4.
Total Sum Squares	4,410.	*Median Error*	0.00365
Adjusted Sum Squares	277.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.45885	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.31034	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #122 (PDLP2)			
Count	320	*Skewness*	-0.44614
Mean	3.84375	*Skewness Standard Error*	0.13587
Mean LCL	3.72526	*Kurtosis*	2.44497
Mean UCL	3.96224	*Kurtosis Standard Error*	0.26921
Variance	0.8219	*Alternative Skewness (Fisher's)*	-0.44824
Standard Deviation	0.90659	*Alternative Kurtosis (Fisher's)*	-0.54481
Mean Standard Error	0.05068	*Coefficient of Variation*	0.23586
Minimum	2.	*Mean Deviation*	0.71484
Maximum	5.	*Second Moment*	0.81934
Range	3.	*Third Moment*	-0.33087
Sum	1,230.	*Fourth Moment*	1.64134
Sum Standard Error	16.21756	*Median*	4.
Total Sum Squares	4,990.	*Median Error*	0.00355
Adjusted Sum Squares	262.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.72165	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.58209	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #123 (PDGD1)			
Count	320	*Skewness*	-0.39744
Mean	2.65625	*Skewness Standard Error*	0.13587
Mean LCL	2.51133	*Kurtosis*	2.30976
Mean UCL	2.80117	*Kurtosis Standard Error*	0.26921
Variance	1.22943	*Alternative Skewness (Fisher's)*	-0.39931
Standard Deviation	1.1088	*Alternative Kurtosis (Fisher's)*	-0.68216
Mean Standard Error	0.06198	*Coefficient of Variation*	0.41743
Minimum	0.E+0	*Mean Deviation*	0.94922
Maximum	4.	*Second Moment*	1.22559
Range	4.	*Third Moment*	-0.53925
Sum	850.	*Fourth Moment*	3.4694
Sum Standard Error	19.83474	*Median*	3.
Total Sum Squares	2,650.	*Median Error*	0.00434
Adjusted Sum Squares	392.1875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.44447	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.32727	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #124 (PDGD2)			
Count	320	*Skewness*	-0.13878
Mean	2.90625	*Skewness Standard Error*	0.13587
Mean LCL	2.74808	*Kurtosis*	1.84138
Mean UCL	3.06442	*Kurtosis Standard Error*	0.26921
Variance	1.46454	*Alternative Skewness (Fisher's)*	-0.13943

Standard Deviation	1.21018	*Alternative Kurtosis (Fisher's)*	-1.15794
Mean Standard Error	0.06765	*Coefficient of Variation*	0.41641
Minimum	1.	*Mean Deviation*	1.04883
Maximum	5.	*Second Moment*	1.45996
Range	4.	*Third Moment*	-0.24481
Sum	930.	*Fourth Moment*	3.92488
Sum Standard Error	21.64837	*Median*	3.
Total Sum Squares	3,170.	*Median Error*	0.00474
Adjusted Sum Squares	467.1875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.60232	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.26148	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #125 (OPCul1)			
Count	320	*Skewness*	-0.61839
Mean	3.71875	*Skewness Standard Error*	0.13587
Mean LCL	3.57154	*Kurtosis*	2.89051
Mean UCL	3.86596	*Kurtosis Standard Error*	0.26921
Variance	1.26861	*Alternative Skewness (Fisher's)*	-0.6213
Standard Deviation	1.12633	*Alternative Kurtosis (Fisher's)*	-0.09224
Mean Standard Error	0.06296	*Coefficient of Variation*	0.30288
Minimum	1.	*Mean Deviation*	0.94141
Maximum	5.	*Second Moment*	1.26465
Range	4.	*Third Moment*	-0.87946
Sum	1,190.	*Fourth Moment*	4.62289
Sum Standard Error	20.14835	*Median*	4.
Total Sum Squares	4,830.	*Median Error*	0.00441
Adjusted Sum Squares	404.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.48627	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.14754	*IQR*	2.
Mode	3.	*MAD*	1.
Variable #126 (OPCul2)			
Count	320	*Skewness*	-0.53716
Mean	3.90625	*Skewness Standard Error*	0.13587
Mean LCL	3.77388	*Kurtosis*	2.88781
Mean UCL	4.03862	*Kurtosis Standard Error*	0.26921
Variance	1.02567	*Alternative Skewness (Fisher's)*	-0.53969
Standard Deviation	1.01275	*Alternative Kurtosis (Fisher's)*	-0.09497
Mean Standard Error	0.05661	*Coefficient of Variation*	0.25926
Minimum	1.	*Mean Deviation*	0.86133
Maximum	5.	*Second Moment*	1.02246
Range	4.	*Third Moment*	-0.55536
Sum	1,250.	*Fourth Moment*	3.01899
Sum Standard Error	18.11665	*Median*	4.
Total Sum Squares	5,210.	*Median Error*	0.00397
Adjusted Sum Squares	327.1875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.73882	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.49727	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #127 (OPKnow1)			
Count	320	*Skewness*	-0.50728
Mean	3.59375	*Skewness Standard Error*	0.13587
Mean LCL	3.44791	*Kurtosis*	2.76516
Mean UCL	3.73959	*Kurtosis Standard Error*	0.26921
Variance	1.2451	*Alternative Skewness*	-0.50967

		(Fisher's)	
Standard Deviation	1.11584	Alternative Kurtosis (Fisher's)	-0.21956
Mean Standard Error	0.06238	Coefficient of Variation	0.31049
Minimum	1.	Mean Deviation	0.93164
Maximum	5.	Second Moment	1.24121
Range	4.	Third Moment	-0.70148
Sum	1,150.	Fourth Moment	4.26002
Sum Standard Error	19.96078	Median	4.
Total Sum Squares	4,530.	Median Error	0.00437
Adjusted Sum Squares	397.1875	Percentile 25% (Q1)	3.
Geometric Mean	3.36432	Percentile 75% (Q2)	5.
Harmonic Mean	3.04279	IQR	2.
Mode	3.	MAD	1.
Variable #128 (OPKnow2)			
Count	320	Skewness	-0.34721
Mean	3.71875	Skewness Standard Error	0.13587
Mean LCL	3.579	Kurtosis	2.46103
Mean UCL	3.8585	Kurtosis Standard Error	0.26921
Variance	1.14322	Alternative Skewness (Fisher's)	-0.34885
Standard Deviation	1.06922	Alternative Kurtosis (Fisher's)	-0.5285
Mean Standard Error	0.05977	Coefficient of Variation	0.28752
Minimum	1.	Mean Deviation	0.92383
Maximum	5.	Second Moment	1.13965
Range	4.	Third Moment	-0.42242
Sum	1,190.	Fourth Moment	3.19638
Sum Standard Error	19.1267	Median	4.
Total Sum Squares	4,790.	Median Error	0.00419
Adjusted Sum Squares	364.6875	Percentile 25% (Q1)	3.
Geometric Mean	3.53072	Percentile 75% (Q2)	5.
Harmonic Mean	3.28205	IQR	2.
Mode	3.	MAD	1.
Variable #129 (KC1)			
Count	320	Skewness	0.11383
Mean	4.9375	Skewness Standard Error	0.13587
Mean LCL	4.76145	Kurtosis	1.70874
Mean UCL	5.11355	Kurtosis Standard Error	0.26921
Variance	1.81426	Alternative Skewness (Fisher's)	0.11436
Standard Deviation	1.34695	Alternative Kurtosis (Fisher's)	-1.29268
Mean Standard Error	0.0753	Coefficient of Variation	0.2728
Minimum	3.	Mean Deviation	1.19141
Maximum	7.	Second Moment	1.80859
Range	4.	Third Moment	0.27686
Sum	1,580.	Fourth Moment	5.58931
Sum Standard Error	24.0949	Median	5.
Total Sum Squares	8,380.	Median Error	0.00528
Adjusted Sum Squares	578.75	Percentile 25% (Q1)	4.
Geometric Mean	4.74952	Percentile 75% (Q2)	6.
Harmonic Mean	4.56212	IQR	2.
Mode	4.	MAD	1.
Variable #130 (KC2)			
Count	320	Skewness	-0.35606
Mean	4.90625	Skewness Standard Error	0.13587
Mean LCL	4.72008	Kurtosis	2.2102
Mean UCL	5.09242	Kurtosis Standard Error	0.26921

Variance	2.0288	Alternative Skewness (Fisher's)	-0.35774
Standard Deviation	1.42436	Alternative Kurtosis (Fisher's)	-0.7833
Mean Standard Error	0.07962	Coefficient of Variation	0.29032
Minimum	2.	Mean Deviation	1.17969
Maximum	7.	Second Moment	2.02246
Range	5.	Third Moment	-1.02411
Sum	1,570.	Fourth Moment	9.04048
Sum Standard Error	25.47972	Median	5.
Total Sum Squares	8,350.	Median Error	0.00558
Adjusted Sum Squares	647.1875	Percentile 25% (Q1)	4.
Geometric Mean	4.66372	Percentile 75% (Q2)	6.
Harmonic Mean	4.3807	IQR	2.
Mode	6.	MAD	1.
Variable #131 (TCGF1)			
Count	320	Skewness	0.E+0
Mean	4.25	Skewness Standard Error	0.13587
Mean LCL	4.17682	Kurtosis	2.6
Mean UCL	4.32318	Kurtosis Standard Error	0.26921
Variance	0.31348	Alternative Skewness (Fisher's)	0.E+0
Standard Deviation	0.55989	Alternative Kurtosis (Fisher's)	-0.38733
Mean Standard Error	0.0313	Coefficient of Variation	0.13174
Minimum	3.	Mean Deviation	0.46875
Maximum	5.	Second Moment	0.3125
Range	2.	Third Moment	0.E+0
Sum	1,360.	Fourth Moment	0.25391
Sum Standard Error	10.01566	Median	4.
Total Sum Squares	5,880.	Median Error	0.00219
Adjusted Sum Squares	100.	Percentile 25% (Q1)	4.
Geometric Mean	4.21246	Percentile 75% (Q2)	5.
Harmonic Mean	4.17391	IQR	1.
Mode	4.	MAD	0.E+0
Variable #132 (TCGF2)			
Count	320	Skewness	-0.73001
Mean	4.125	Skewness Standard Error	0.13587
Mean LCL	4.03389	Kurtosis	4.05931
Mean UCL	4.21611	Kurtosis Standard Error	0.26921
Variance	0.48589	Alternative Skewness (Fisher's)	-0.73345
Standard Deviation	0.69706	Alternative Kurtosis (Fisher's)	1.09504
Mean Standard Error	0.03897	Coefficient of Variation	0.16898
Minimum	2.	Mean Deviation	0.49219
Maximum	5.	Second Moment	0.48438
Range	3.	Third Moment	-0.24609
Sum	1,320.	Fourth Moment	0.95239
Sum Standard Error	12.4694	Median	4.
Total Sum Squares	5,600.	Median Error	0.00273
Adjusted Sum Squares	155.	Percentile 25% (Q1)	4.
Geometric Mean	4.05691	Percentile 75% (Q2)	5.
Harmonic Mean	3.97516	IQR	1.
Mode	4.	MAD	0.E+0
Variable #133 (TCHon1)			
Count	320	Skewness	-0.53106
Mean	4.09375	Skewness Standard Error	0.13587
Mean LCL	3.98841	Kurtosis	2.62587

Mean UCL	4.19909	*Kurtosis Standard Error*	0.26921
Variance	0.64949	*Alternative Skewness (Fisher's)*	-0.53357
Standard Deviation	0.80591	*Alternative Kurtosis (Fisher's)*	-0.36105
Mean Standard Error	0.04505	*Coefficient of Variation*	0.19686
Minimum	2.	*Mean Deviation*	0.62305
Maximum	5.	*Second Moment*	0.64746
Range	3.	*Third Moment*	-0.27667
Sum	1,310.	*Fourth Moment*	1.10078
Sum Standard Error	14.41655	*Median*	4.
Total Sum Squares	5,570.	*Median Error*	0.00316
Adjusted Sum Squares	207.1875	*Percentile 25% (Q1)*	4.
Geometric Mean	4.00442	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.90244	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #134 (TCHon2)			
Count	320	*Skewness*	-0.77427
Mean	4.125	*Skewness Standard Error*	0.13587
Mean LCL	4.00814	*Kurtosis*	2.77624
Mean UCL	4.24186	*Kurtosis Standard Error*	0.26921
Variance	0.79937	*Alternative Skewness (Fisher's)*	-0.77792
Standard Deviation	0.89408	*Alternative Kurtosis (Fisher's)*	-0.20831
Mean Standard Error	0.04998	*Coefficient of Variation*	0.21675
Minimum	2.	*Mean Deviation*	0.71094
Maximum	5.	*Second Moment*	0.79688
Range	3.	*Third Moment*	-0.55078
Sum	1,320.	*Fourth Moment*	1.76294
Sum Standard Error	15.99373	*Median*	4.
Total Sum Squares	5,700.	*Median Error*	0.0035
Adjusted Sum Squares	255.	*Percentile 25% (Q1)*	4.
Geometric Mean	4.00953	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.87097	*IQR*	1.
Mode	5.	*MAD*	1.
Variable #135 (TCAdv1)			
Count	320	*Skewness*	-1.30512
Mean	3.8125	*Skewness Standard Error*	0.13587
Mean LCL	3.66821	*Kurtosis*	5.37444
Mean UCL	3.95679	*Kurtosis Standard Error*	0.26921
Variance	1.21865	*Alternative Skewness (Fisher's)*	-1.31128
Standard Deviation	1.10393	*Alternative Kurtosis (Fisher's)*	2.43095
Mean Standard Error	0.06171	*Coefficient of Variation*	0.28955
Minimum	0.E+0	*Mean Deviation*	0.82031
Maximum	5.	*Second Moment*	1.21484
Range	5.	*Third Moment*	-1.74756
Sum	1,220.	*Fourth Moment*	7.93184
Sum Standard Error	19.74762	*Median*	4.
Total Sum Squares	5,040.	*Median Error*	0.00432
Adjusted Sum Squares	388.75	*Percentile 25% (Q1)*	3.
Geometric Mean	3.66739	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.8171	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #136 (TCAdv2)			
Count	320	*Skewness*	-1.16331
Mean	3.71875	*Skewness Standard Error*	0.13587

Mean LCL	3.55764	*Kurtosis*	4.05553
Mean UCL	3.87986	*Kurtosis Standard Error*	0.26921
Variance	1.5194	*Alternative Skewness (Fisher's)*	-1.1688
Standard Deviation	1.23264	*Alternative Kurtosis (Fisher's)*	1.0912
Mean Standard Error	0.06891	*Coefficient of Variation*	0.33147
Minimum	0.E+0	*Mean Deviation*	0.94922
Maximum	5.	*Second Moment*	1.51465
Range	5.	*Third Moment*	-2.16852
Sum	1,190.	*Fourth Moment*	9.30404
Sum Standard Error	22.0501	*Median*	4.
Total Sum Squares	4,910.	*Median Error*	0.00483
Adjusted Sum Squares	484.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.499	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.47197	*IQR*	2.
Mode	4.	*MAD*	1.
Variable #137 (TCProc1)			
Count	320	*Skewness*	-1.13058
Mean	3.46875	*Skewness Standard Error*	0.13587
Mean LCL	3.32245	*Kurtosis*	4.39593
Mean UCL	3.61505	*Kurtosis Standard Error*	0.26921
Variance	1.25294	*Alternative Skewness (Fisher's)*	-1.13591
Standard Deviation	1.11935	*Alternative Kurtosis (Fisher's)*	1.43697
Mean Standard Error	0.06257	*Coefficient of Variation*	0.32269
Minimum	0.E+0	*Mean Deviation*	0.88086
Maximum	5.	*Second Moment*	1.24902
Range	5.	*Third Moment*	-1.57819
Sum	1,110.	*Fourth Moment*	6.85791
Sum Standard Error	20.0235	*Median*	4.
Total Sum Squares	4,250.	*Median Error*	0.00438
Adjusted Sum Squares	399.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.28919	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.29331	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #138 (TCProc2)			
Count	320	*Skewness*	-1.13058
Mean	3.46875	*Skewness Standard Error*	0.13587
Mean LCL	3.32245	*Kurtosis*	4.39593
Mean UCL	3.61505	*Kurtosis Standard Error*	0.26921
Variance	1.25294	*Alternative Skewness (Fisher's)*	-1.13591
Standard Deviation	1.11935	*Alternative Kurtosis (Fisher's)*	1.43697
Mean Standard Error	0.06257	*Coefficient of Variation*	0.32269
Minimum	0.E+0	*Mean Deviation*	0.88086
Maximum	5.	*Second Moment*	1.24902
Range	5.	*Third Moment*	-1.57819
Sum	1,110.	*Fourth Moment*	6.85791
Sum Standard Error	20.0235	*Median*	4.
Total Sum Squares	4,250.	*Median Error*	0.00438
Adjusted Sum Squares	399.6875	*Percentile 25% (Q1)*	3.
Geometric Mean	3.28919	*Percentile 75% (Q2)*	4.
Harmonic Mean	3.29331	*IQR*	1.
Mode	4.	*MAD*	1.
Variable #139 (TCRew1)			
Count	320	*Skewness*	0.27068

Mean	3.09375	*Skewness Standard Error*	0.13587
Mean LCL	2.95352	*Kurtosis*	2.16144
Mean UCL	3.23398	*Kurtosis Standard Error*	0.26921
Variance	1.15106	*Alternative Skewness (Fisher's)*	0.27195
Standard Deviation	1.07287	*Alternative Kurtosis (Fisher's)*	-0.83282
Mean Standard Error	0.05998	*Coefficient of Variation*	0.34679
Minimum	1.	*Mean Deviation*	0.87305
Maximum	5.	*Second Moment*	1.14746
Range	4.	*Third Moment*	0.3327
Sum	990.	*Fourth Moment*	2.8459
Sum Standard Error	19.19215	*Median*	3.
Total Sum Squares	3,430.	*Median Error*	0.0042
Adjusted Sum Squares	367.1875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.89897	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.69285	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #140 (TCRew2)			
Count	320	*Skewness*	-0.62002
Mean	2.90625	*Skewness Standard Error*	0.13587
Mean LCL	2.74473	*Kurtosis*	4.32036
Mean UCL	3.06777	*Kurtosis Standard Error*	0.26921
Variance	1.52723	*Alternative Skewness (Fisher's)*	-0.62295
Standard Deviation	1.23581	*Alternative Kurtosis (Fisher's)*	1.36021
Mean Standard Error	0.06908	*Coefficient of Variation*	0.42523
Minimum	-1.	*Mean Deviation*	0.92969
Maximum	5.	*Second Moment*	1.52246
Range	6.	*Third Moment*	-1.16473
Sum	930.	*Fourth Moment*	10.01411
Sum Standard Error	22.10689	*Median*	3.
Total Sum Squares	3,190.	*Median Error*	0.00484
Adjusted Sum Squares	487.1875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.75678	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.99532	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #141 (TCObj1)			
Count	320	*Skewness*	-0.4211
Mean	3.03125	*Skewness Standard Error*	0.13587
Mean LCL	2.89838	*Kurtosis*	2.43085
Mean UCL	3.16412	*Kurtosis Standard Error*	0.26921
Variance	1.0335	*Alternative Skewness (Fisher's)*	-0.42309
Standard Deviation	1.01661	*Alternative Kurtosis (Fisher's)*	-0.55916
Mean Standard Error	0.05683	*Coefficient of Variation*	0.33538
Minimum	1.	*Mean Deviation*	0.78906
Maximum	5.	*Second Moment*	1.03027
Range	4.	*Third Moment*	-0.44037
Sum	970.	*Fourth Moment*	2.58026
Sum Standard Error	18.18574	*Median*	3.
Total Sum Squares	3,270.	*Median Error*	0.00398
Adjusted Sum Squares	329.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.81355	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.53633	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #142 (TCObj2)			

Count	320	*Skewness*	-0.4211
Mean	3.03125	*Skewness Standard Error*	0.13587
Mean LCL	2.89838	*Kurtosis*	2.43085
Mean UCL	3.16412	*Kurtosis Standard Error*	0.26921
Variance	1.0335	*Alternative Skewness (Fisher's)*	-0.42309
Standard Deviation	1.01661	*Alternative Kurtosis (Fisher's)*	-0.55916
Mean Standard Error	0.05683	*Coefficient of Variation*	0.33538
Minimum	1.	*Mean Deviation*	0.78906
Maximum	5.	*Second Moment*	1.03027
Range	4.	*Third Moment*	-0.44037
Sum	970.	*Fourth Moment*	2.58026
Sum Standard Error	18.18574	*Median*	3.
Total Sum Squares	3,270.	*Median Error*	0.00398
Adjusted Sum Squares	329.6875	*Percentile 25% (Q1)*	2.
Geometric Mean	2.81355	*Percentile 75% (Q2)*	4.
Harmonic Mean	2.53633	*IQR*	2.
Mode	#N/A	*MAD*	1.
Variable #143 (TCGoal1)			
Count	320	*Skewness*	-0.62464
Mean	4.0625	*Skewness Standard Error*	0.13587
Mean LCL	3.9703	*Kurtosis*	3.72974
Mean UCL	4.1547	*Kurtosis Standard Error*	0.26921
Variance	0.49765	*Alternative Skewness (Fisher's)*	-0.62759
Standard Deviation	0.70544	*Alternative Kurtosis (Fisher's)*	0.76026
Mean Standard Error	0.03944	*Coefficient of Variation*	0.17365
Minimum	2.	*Mean Deviation*	0.46875
Maximum	5.	*Second Moment*	0.49609
Range	3.	*Third Moment*	-0.21826
Sum	1,300.	*Fourth Moment*	0.91792
Sum Standard Error	12.61934	*Median*	4.
Total Sum Squares	5,440.	*Median Error*	0.00276
Adjusted Sum Squares	158.75	*Percentile 25% (Q1)*	4.
Geometric Mean	3.99267	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.91039	*IQR*	1.
Mode	4.	*MAD*	0.E+0
Variable #144 (TCGoal2)			
Count	320	*Skewness*	-0.62464
Mean	4.0625	*Skewness Standard Error*	0.13587
Mean LCL	3.9703	*Kurtosis*	3.72974
Mean UCL	4.1547	*Kurtosis Standard Error*	0.26921
Variance	0.49765	*Alternative Skewness (Fisher's)*	-0.62759
Standard Deviation	0.70544	*Alternative Kurtosis (Fisher's)*	0.76026
Mean Standard Error	0.03944	*Coefficient of Variation*	0.17365
Minimum	2.	*Mean Deviation*	0.46875
Maximum	5.	*Second Moment*	0.49609
Range	3.	*Third Moment*	-0.21826
Sum	1,300.	*Fourth Moment*	0.91792
Sum Standard Error	12.61934	*Median*	4.
Total Sum Squares	5,440.	*Median Error*	0.00276
Adjusted Sum Squares	158.75	*Percentile 25% (Q1)*	4.
Geometric Mean	3.99267	*Percentile 75% (Q2)*	5.
Harmonic Mean	3.91039	*IQR*	1.
Mode	4.	*MAD*	0.E+0