

BARRIERS TO CAPTURING THE VALUE OF ADVANCED SERVICES AND DIGITISATION IN THE ROAD TRANSPORT INDUSTRY

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ABSTRACT

Purpose: Servitization and digitization together provide significant opportunities to raise the performance and profitability of the road transport industry. To date these opportunities are only sparsely captured and the potential economic, social and environmental value is forgone. We set out to investigate the barriers to capturing the value of servitization and digitization in the road transport industry.

Design/Methodology/Approach: The road transport industry is conceptualized as an emerging business network of increasingly interdependent organizations. We first draw on individual interviews to confirm the applicability of a network perspective before conducting an interaction-centred focus group to identify and prioritize the main barriers to value capture as a shared industry construct.

Findings: Four overarching barriers to value capture emerged: an inhibiting culture, the lack of available resources, lack of standards and the value uncertainty. The barriers are discussed together with their specific manifestations for the road transport industry.

Originality/Value: This study serves as a starting point for a longitudinal investigation into the role of servitization and digitization in the emergence of business networks and the approaches to overcoming the barriers to value capture. Implications for the literature on servitization, digital strategy and business network theory are discussed.

KEYWORDS: Servitization, advanced services, internet of things, business network

1. INTRODUCTION

In today's tightly interwoven economy changes to a firm's operational practice or business model are rarely discrete. The implications of organisational change cannot be fully grasped without considering the business network in which the organisation is embedded (Håkansson and Snehota 1989). A business network perspective adds an important theoretical lens to the investigation of the phenomena of *servitization* and *digitisation* which is referenced as a core enabler of servitization (Grubic 2014).

An important motivation for servitization and digitisation is the promise of shared value for service provider and service user (Gebauer and Friedli 2005). However, the literature on servitization is predominantly focused on individual organisations with only few studies exploring the implications from an inter-organizational perspective. Similarly, only few studies explore the implications an increased digitisation has on the wider network.

We adopt a business network perspective to investigate the barriers to capturing the value opportunities servitization and digitization provide. We focus on the road transport industry where, over the last years, new service models and digital innovation has created substantial opportunities for performance benefits although the benefits are not widely captured.

The study is based on a two-stage research process which first focused on individual stakeholders to confirm the applicability of a network perspective before focusing on the shared difficulties of capturing the benefits from these innovations. Our study contributes to an integration between the theories of servitization, digital business and business network and provides insights on the practical challenges these innovations create.

2. A DIGITAL SERVICE NETWORK PERSPECTIVE ON THE ROAD- TRANSPORT INDUSTRY

2.1 Conceptualising a business network

A business network is formally defined as a set of two or more connected business relationships (Anderson et al. 1994). Enterprises engage in such long-term relationships to achieve results which would not be possible if they would operate individually (Dean et al. 1997). 'Emergent networks' develop from the repeated interactions of individual organisations that act separately (Raab and Kenis 2009) without the intention and goal-orientation of formal networks (e.g. joint venture).

Håkansson and Johanson (1992) conceptualise networks along a triad of actors, resources and activities: actors (individuals, organizations) control resources (physical, financial, human assets) and activities; activities describe what actors do to the resources (combine, develop, exchange or create) through activities (incl. information handling). Social exchange theory (Cook and Emerson 1978), resource dependence theory (Pfeffer and Salancik 1978) and the resource-based view of the firms (Palmatier et al. 2007) are used to explore the underlying dynamics of business networks. A network perspective directs the research attention to actor relationships and the consideration of the network context and arguably provides a more realistic view of firm interactions than the market-based view does (Möller 2013).

3. CORE CHARACTERISTICS OF BUSINESS NETWORKS

Network perspectives are often employed to explore specific attributes of inter-organisational relationships (Cova et al. 2010). The present adoption of the business network perspective specifically focuses on the interdependence, coevolution and network openness (sustained by trust) to explore the particular servitization and digitization context.

Interdependence is a key-characteristic of an emerging network. Firms in a network relinquish strategic autonomy, but also gain influence over other firms and the overall network strategy (Ritter et al. 2004). The growing interdependence in an emerging business network has ambiguous implications for the individual firm. Interdependence allows the individual firm to benefit from a larger resource base and support, increased commitment, adaptation and collaboration (Hibbard et al. 2001), market certainty and a protective effect (Johanson and Vahlne 2011). But growing interdependence also create risks and concerns for the individual firm which finds itself restricted and possibly limited by its network partners (Möller and Halinen 1999).

Coevolution is another key characteristic of an emerging business network (Eng 2005). It describes how changes that occur in a single organisation have direct implications on other network members (Blankenberg and Buenstorf 2016). For a network coevolution is critical as it removes frictions in the network and enables efficient resource transfer (Brennan and Turnbull 1999). For the individual firm coevolution involves significant learning opportunities which help adapting to fast-changing markets and technologies adding to a firm's competitiveness (Niu et al. 2012). However, such a 'guided development' may lead firms to develop their competences too narrow and their innovation may be curbed by the lack of innovative capability of others (Burgelman 2002).

Openness / Trust are two related concepts in inter-organisational relationships. 'Trust' defines an exchange partner's expectation that the other party can be relied upon, will behave as predicted, and will act fairly (Zaheer et al. 1998). 'Openness' describes a specific type of inter-organisational trust (Hart and Saunders 1997) which implies honesty of communication and willingness to share information. Trust and openness are critical enablers of business networks leading to increased coordination, improved adaptation and process efficiency (Anderson and Weitz 1989; Vickery et al. 2003). For the individual firm developing trusting relationships can be a fraught process. Trust-development requires time, continuous signalling and correct interpretation of signals (Butler 1991; Butler 1995). The ability to develop and leverage trusting relationships is linked to corporate culture (Jarratt and O'Neill 2002) which can also create an important barrier to the development of trust.

The growing interdependence, coevolution and the requirements for openness/trust create particular implications for the individual firm that is part of an emerging network. We

will next link the characteristics of the emergent network to the contexts of servitization and the digital environment.

4. SERVITIZATION AND DIGITIZATION FROM A NETWORK PERSPECTIVE

Servitization describes the process by which a manufacturer changes its business model to compete through a portfolio of integrated products and services rather than just a physical product (Baines and Lightfoot 2013). The offering where the product and the services that support the use of the product are provided together is described as ‘advanced service’. Servitization implies a switch from short term interactions to long-term ongoing relationships creating **interdependence** between service provider and consumer (Lockett et al. 2011). Spring and Arujo (2009) point to the importance of joint development and **coevolution** to design the right risk-pooling capacity among servitizing parties. Authors also highlight the need for **openness** and especially information sharing among partners in a servitization network (Bastl et al. 2012; Johnson and Mena 2008; Lockett et al. 2011). As service provisions become increasingly more complex service network approaches have been proposed specifically as suitable research frameworks (Ramos et al. 2013).

A business network perspective of digitization recognizes that IT is not only a resource *within* the firm but also a *network resource*. The Internet of Things blurs organisational boundaries (Kallinikos et al. 2013; Yoo et al. 2012) with data becoming a shared resource that defines the network (Bharadwaj et al. 2013). In digitally connected environments the activities of the individual become more important for the network (Corsaro et al. 2012) and the ambiguous implications of the network environment intensifies. Information technology extends the **interdependence** among network partners and may be used as tool for domination (Webster 1995). **Coevolution** intensifies as digital resources are easily shared and recombined to facilitate the rapid co-creation of new innovative solutions (Tilson et al. 2010). The digital context also creates implications for **openness and trust** among network partners as data openness and transparency are essential to benefit from the opportunities of real-time data (Holweg and Miemczyk 2002).

5. OUR RESEARCH

Our research focuses on the road transport industry to investigate the barriers to capturing the value opportunities servitization and digitization provide. Various stakeholders in the road transport industry actively engage in servitization and digitization initiatives. Manufacturers offer their products (e.g. truck, tyre) as part of a service package (Baines and Lightfoot 2013; F. Dalsace et al. 2012) and the adoption of digital solutions in form of telematics systems has already reached 30% of operators (Cole 2016). However, despite the opportunities servitization and digitization offers the industry still suffers from low performance levels and dwindling profitability (FTA 2015).

In order to identify the barriers to capturing the value from servitization and digitization we followed a multi-stage research method (Auramo et al. 2002). The research steps are summarized in table 1 and presented together with its findings below.

Table 1: Stages of the research

| Stage | Objective | Method |
|--------------|---|--|
| First stage | Confirming the applicability of a network perspective. | Individual interviews are used to determine to which extent value capture barriers are perceived as network-based. |
| Second stage | Identify and prioritize the barriers to value creation. | Interaction-centred focus group to identify and prioritize the main barriers. |

5.1 First stage: Confirming the network perspective

In order to confirm that a network perspective is the appropriate lens to investigate the

barriers to value capture we explored the perceptions of road transport industry stakeholders. Our focus was the perception of individual stakeholders that the difficulties of capturing value from servitization and digitization originates outside the organisational boundaries.

We carried out one-to-one interviews with seven senior representatives of the UK road transport industry (incl. manufacturers, operators and technology providers). The interview questions focused on the opportunities servitization and digitization create and targeted the factors that limit the capturing of these opportunities. The interviews lasted between 20-30 minutes and intensive notes were taken for subsequent analysis. The network characteristics *interdependence*, *coevolution* and *openness/trust* are now used to discuss the specific barriers the individual representatives identified.

Interdependence underlined several of the value capture difficulties that were described. Stakeholders outlined how the development of the valuable data resource is dependent on the interaction between operators, manufacturer and technology providers. The ability to capture the digital value creation opportunity is dependent on other stakeholders providing access to the right data in the right format. The ability to access more data from the other stakeholders adds to the value that could be derived from advanced services.

Coevolution with its double-edged impact was a theme that was reflected in a number of comments. Although stakeholders benefit from exposure to new technology and data sources these external changes also create pressure to continuously adjust processes to utilize these opportunities. Conversely, the demand from other stakeholders for new functionalities and services puts a strain on the ability to consolidate existing value capture mechanisms.

Openness and trust were highlighted as essential factors for fully utilizing the opportunities of advanced services and digitization. The lack of openness and trust was identified as an important restriction on the creation of rich data resources that could be mutually exploited. IP considerations and fears over exposing potential failings to others creates an impediment to capturing the opportunities digitization provides.

The individual interviewees described how the opportunity for capturing value from advanced services and digitization is tightly linked to the activities and actions of other stakeholders. This emphasis on network-based factors provides confirmation that a network perspective is an appropriate and promising theoretical angle to explore barriers to value capture.

5.2 Second stage: Creating a network view

The second stage of the research was focused on establishing a network view on the barriers to capturing the value opportunities servitization and digitization provide. Network theory explicitly emphasizes that a balanced and shared view on the situation of a network rarely exists among individual participants (Ford et al. 2003; Henneberg et al. 2010). Interactions and exchange processes are required to stimulate the creation of a shared supra-individual view (Henneberg et al. 2010; Tsoukas 2000). In order to facilitate the required interaction and exchange process we conducted an interaction-centred focus-group (Auramo et al. 2002) involving 17 senior managers representing different stakeholder-perspectives of the road transport industry. Five academics were present to facilitate the interaction.

A structured process was used to turn the individual network pictures into a shared view on the barriers to capturing the value from advanced services and digitization in the emergent road transport network. All participants were encouraged to reflect on the factors that limit the full utilization of the opportunities advanced services and digitization provide. Participants noted these factors on individual post-it notes and successively explained them to the wider audience while placing the post-it notes on a white-board. After all participants have shared their individual perspective the participants iteratively grouped the post-it notes into major themes. This process involved important discussions in which the participants consolidated their views on the barriers to value capture. In conclusion the participants were asked to rank the major themes identified according to their relative importance. We will now outline the major themes and their individual underlying manifestations.

5.2.1 Inhibiting Culture

Culture emerged as the most frequently highlighted barrier to capturing the full value creation opportunities from servitization and digitization. Several manifestations of the cultural barrier were identified.

- **Change resistance.** Participants described how a deep-seated resistance to change across the road-transport industry limits the value creation opportunities of servitization and digitization. Capturing the full opportunity requires changes in management practices and the development of a digital vision.
- **Short-term management focus.** Short-term management objectives (“the priority is to get the load out”) were highlighted as core obstacles to capturing the value opportunities. Capturing the full value of servitization and digitization requires long-term strategic objectives that involve the development of skills and innovative capability.
- **Entrenched legacy views.** Participants described how the servitization opportunities were being held back by engrained views of the wider network. To capture the full benefits extended manufacturer-customer-relationships can provide requires an appreciation of the value-adding capabilities manufacturers can provide.
- **Challenging communication.** Participants also identified the communication with the wider network on the digitization opportunities as a critical challenge. The available digital skills and expectations significantly vary across the range of organisations which makes it difficult to jointly explore the innovation opportunities.

Culture with its specific organizational and relational implications was widely discussed as a value capture and was also identified as the most critical impediment among the emerging themes.

5.2.2 Limited Resource Availability

Conflicting resource demands also emerged as an overarching barrier to capturing the value servitization and digitization can offer.

- **Competing financial resource demands.** Participants described how demands from other business areas are regularly prioritized as more urgent in the funding distribution process. Without the necessary investment in technology and management capability the ability to utilize the full opportunities of digitization is restricted.
- **Limited analytical resource availability.** The participants also described how the organisations lacked the analytical resources to fully utilize the access to valuable data-resources. The analytical capability is critical for effectively utilizing and innovating with the opportunities digitization and servitization provides.
- **Limited analytical support provision.** Although very well-developed analytical capabilities are available within the emerging network the support needs across the network are too extensive and too diverse to be able to provide the support that is required to fully utilize the servitization and digitization opportunities.

Though a large number of comments described how the limited resource availability constrains the value capture opportunities, participants did not rank it as a critical barrier. While the limited resource availability is widely discussed it does not seem to be an irresolvable barrier.

5.2.3 Lack of Standards

A lack of widely accepted data standards was also identified as an overarching barrier to capturing the full value from servitization and digitization.

- **Limited integration opportunities.** The emerging network involves a diversity of applications which do not follow a common data standard. This lack of standards creates a significant effort for data integration and limits the innovative use of available data.

- **Parameter incongruence.** The underlying parameters that are digitally captured can differ widely with the thresholds and units of measurement used. This incongruence constrains the ability to coherently interpret data from different sources.
- **Divergent access levels.** Further, providers of comparable products differ widely in the level of data access that is granted and the extent of data they are prepared to share. Such varying levels of access to critical data limits the ability to fully utilize the digitization opportunities.

The lack of shared standards for data and measurement was ranked as the second most important barrier to capturing the full value opportunities servitization and digitization provide.

5.2.5 Value uncertainty

The uncertainty over the benefits that could be captured also emerged as an overarching barrier to the full exploitation of the servitization and digitization opportunities.

- **Diversity of business practices.** A variety of business practices are used in the emerging network which necessarily results in different levels of benefits that can be created through servitization and digitization. The uncertainty over the return of investment limits the commitment to exploiting the opportunities.
- **Uncertainty in value recognition.** Participants also described how they are hesitating to specify the benefit they draw from the shared resources. An underlying uncertainty among network partners on how the value from servitization and digitization should be shared limits an open recognition of the benefits captured.

The difficulty of judging the value creation potential creates an important barrier to fully engage with these innovations.

The above themes represent the network view of the most important barriers that limit the utilization of the full potential servitization and digitization can provide. Further value creation barriers such as the difficulty of understanding the business and technology risks were identified by the participants but were not prioritized as important.

6. DISCUSSION & CONCLUSION

The study set out to explore the barriers to capturing the value opportunities from servitization and digitization. We adopted a business network perspective to accommodate the specific inter-organizational implications these innovations create. Four overarching barriers emerged: an inhibiting culture, the lack of available resources, lack of standards and the value uncertainty. Industry-specific manifestations of these barriers were provided to illustrate their range of implications.

Several limitations need to be pointed out to fully consider the findings and its wider implications. The use of focus groups puts a particular emphasis on the range of participants involved. Although we sought to involve a wide range of perspectives we cannot exclude that a different range of participants would create a different dynamic with implications for the research findings. Further, the study is based on the road transport industry which is at an early stage of servitization and digitization. Industries with more mature approaches to servitization and digitization would likely create a different range of barriers.

Notwithstanding, our focus on the business network to investigate the impediments to capture value from advanced services creates interesting implications for the servitization literature. Studies exploring the factors that limit the servitization benefits are largely focused on the individual service provider or user. We extend this narrow focus by pointing towards the wider business network and its implications for capturing the full potential of servitization. Future servitization research should be sensitive to the interdependency between the servitizing company and the wider network in which it is embedded.

The adoption of a network- focus also contributes to the emerging digitization literature. We highlight how the value digitization can create is dependent on factors that lie far beyond

the technology or consideration of the individual company. Industry culture, lack of standards and expertise and the remaining uncertainty are factors that require a focus on the wider business network to understand and address their implications. It would be a very promising area of research to specifically examine how the IoT development is held back by these and other factors.

Our research also provides an important contribution to the mature business network theory which specifically highlights the 'emerging network' as an important case. The adoption of servitization and digitization will lead to a proliferation of informal business networks which require a dedicated research focus to understand their particular network characteristics and implications.

The research focused on the case of the road transport industry as an emerging business network where servitization and digitization offer considerable potential for value creation. This study served as a starting point for a longitudinal investigation into the development of this business network and the approaches to overcome the barriers to creating value from servitization and digitization.

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