The role and impact of digital capabilities on value co-creation of servitising organisations

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Abstract

Manufacturers are challenged to embrace service provision to customers to increase profitability, achieve stable revenue streams and become more competitive. The trend towards servitisation requires manufacturers to develop the digital capabilities to interact and co-create value with customers. To date, little research has been carried out to investigate the digital technologies, and the capabilities required to provide such services. Understanding the role digital capabilities play in servitisation, and how these capabilities enable value co-creation, is vital to draw a customer into a joint process. This study fills the gap by presenting a multi-level framework that characterises value co-creation for servitisation using digital capabilities.

With regards to base services, manufacturers' emphasis is on supporting product functionalities and reliability. However, advanced services are focused on helping customers' processes, and achieving outcomes. They require a higher level of customisation, than base services, demand greater intensity in customer relationships, and need an increased focus on assisting customers in their value creation process. These complexities require new capabilities for addressing dynamic customer interactions, business strategy, and resources integration.

Studies are in agreement concerning the importance of digital capabilities in this context, but provide little insight on their constituents, or how they support value co-creation. Prior studies have explored value co-creation across multiple research communities. As a result, a variety of approaches and theoretical perspectives are provided in related fields. This study examines these problems, drawing on an extensive qualitative enquiry of 15 servitising firms.

The study contributes to knowledge by developing a multilevel framework of value co-creation in servitisation, showing how identified digital capabilities enable value co-creation. The findings indicate that specific *prerequisites* are needed to understand customer demand, which *drives* stakeholders into the next level of the value co-creation process termed *service co-design,* which may lead to *strategic alignment*.

Key words: Servitisation, Value co-creation, Service-Dominant logic, Advanced Services, and Digital Capabilities

Dedication

To Michael, Munachim, Kobi and Chizitelu.

I could not have done this without your love and support.

I love you all more than words can ever express.

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I was raised to be strong, resilient and "just get on with the job." These traits saw me through many struggles during my PhD journey, but I have fallen apart many times as well. My PhD journey has been an emotional roller coaster ride, but like my mother always says "I raised you strong and you can do this." I love you mum, thank you. It has been an enlightening, exciting, challenging, and a rewarding journey for me. The process has been an everyday way of life and a journey of personal learning, involving many caring people who have supported and encouraged me all through this process. I have many happy memories filled with love and warmth, which I will cherish for the rest of my life.

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Amara Cynthia Ajaegbu

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CHAPTER 1: Introduction

Research background

Increasingly, manufacturers are applying service-based strategies to create additional value, increase profitability and provide competitive advantage, a concept portrayed as servitisation (Penttinen and Palmer 2006, Baines and Lightfoot 2014, Opresnik and Taisch 2015). Servitisation is defined as a process where manufacturers extend a traditional product-centric model to integrate a product-service model, which is more customer focused and relational in approach (Vandermerwe and Rada 1988, Windahl and Lakemond 2006, Baines, Lightfoot et al. 2009, Martinez, Bastl et al. 2010). This is a trend shared across many manufacturing industries, particularly heavy equipment manufacturers, such as the truck manufacturing industry. Additionally, research suggests that a majority of large European truck manufacturers and US manufacturers now combine products and services to increase profits as services play a notable role in industrialised economies, accountable for 70 to 80 percent of economic exchange (Neely 2008, Spohrer and Maglio 2008, Baines and Lightfoot 2013). It becomes relevant to investigate the truck manufacturing industry, which is considered to have adopted the servitisation strategy to a reasonable extent. Adoption of services (i.e., servitisation of manufacturing) is seen as a strategy to address unmet customer needs (Vandermerwe and Rada 1988).

Value co-creation

The emergence of services challenges product-based manufacturers to understand value co-creation as an enabler. This provides the foundation to understand how to engage with customers to create distinctive services and customised solutions (Bustinza, Vendrell-Herrero et al. 2017). Generally, value co-creation is defined as a process by which products, services, and experiences are developed jointly, through interaction or collaboration, to create benefits and enhance business performance between organisations and customers (Prahalad and Ramaswamy 2004). Studies in service related fields, particularly service management and service operations, argue that servitisation strategies can be largely successful if manufacturing companies engage in the co-creation of the design and delivery of services (Gronroos and Voima 2013, Galvagno and Dalli 2014, Smith, Maull et al. 2014, Sjödin, Parida et al. 2016). However, there are very few empirical studies on this topic that offer explanations

of how value is actually co-created, as these service solutions only make sense if adapted to the customers' requirements.

Digitalisation and servitisation

When selling solutions in place of products, key considerations are those of meeting customers' dynamic demands, and interactions with customers in order to provide customised services (Kohtamaki and Partanen 2016). Therefore, value co-creation offers a dominant approach for the manufacturer to tackle these challenges. Nonetheless, for product manufacturers, this creates additional challenges, as co-creating value with customers necessitates the development and use of new capabilities in order to facilitate value co-creation (Baines and Lightfoot 2014, Sjödin, Parida et al. 2016). Several studies have suggested that manufacturers can rely on digitalisation as a sustainable path towards facilitating these changing and complex interactions (Parida, Sjodin et al. 2015, Cenamor, Sjodin et al. 2016, Vendrell-Herrero, Bustinza et al. 2017). Digitalisation is defined as the embedding of digital technologies into physical products to change the business model, to create new value producing opportunities and to provide new revenue (Yoo, Boland et al. 2012, Yoo 2013, Cenamor, Sjodin et al. 2016). Digitalisation plays an important role in servitisation by providing a dynamic way for manufacturers to interact with their customers, for example integrating several operations or processes to improve value co-creation opportunities (Porter and Heppelmann 2014).

The implications of digitalisation for value creation are arguably key strategic concerns in contemporary servitising organisations. The phenomenon of servitisation highlights the increased dependency on digitalisation as a viable pathway to address customers' complex and dynamic problems, Service offerings are extensively based on the use of Information Technology (IT) as an enabler and as a platform for delivering results. However, the role of these digital technologies in servitisation is under-investigated. Understanding the role, impact and capabilities of digital technology will allow servitising manufacturers to reap the potential strategic advantages of servitisation (Bharadwaj, Sawy et al. 2013, Selander, Henfridsson et al. 2013).

Digital capabilities for various services

Furthermore, a focus on digital technologies examines the capabilities information technologies provide for various services. For the purpose of this study, capability is defined as a "*complex bundles of skills and accumulated knowledge, exercised through organisational processes, that enable firms to coordinate activities and make use of their assets*" (Day 1994, p. 38). In other words, it is the manufacturer's ability to deploy resources for the desired outcome. Capabilities enable firms to carry out their business operations. Digital capability describes the advanced ability to use digital technologies to facilitate the deployment and delivery of services to create differentiation and added value (Sjödin, Parida et al. 2016).

1.1.1 The interest in services and a focus on truck manufacturing industry

Manufacturing services have increasingly advanced, from improving efficiency and product life, to help customers achieve desired results. These services are classified into a number of propositions designed to capture their nature and complexity. For the present study, a distinction is drawn using Baines and Lightfoot (2013) who distinguish between: base services as an outcome focused on product provision, intermediate services focused on products' repair and maintenance, and advanced services focused on performance of the product such as fleet management, life-cycle solutions, and outcome-based offerings. Despite this definition, the interplay between different offerings from base, through intermediate, to advanced services appears more complex, studies indicate that most organisations mainly offer base services while the majority still struggle to provide advanced services (Baines and Lightfoot 2013, Baines and Lightfoot 2014, Kowalkowski, Windahl et al. 2015, Gebauer, Saul et al. 2017, Shi, Baines et al. 2017). The base services represent a traditional product offering while the other two can be considered as servitised offerings. Therefore, for a clearer distinction of value co-creation in servitisation, the study focused on base and advanced service offerings.

Furthermore, Business to Business (B2B) services are generally underrepresented in the literature compared to Business-to-Customer (B2C) services (Prahalad and Ramaswamy 2004, Ostrom, Bitener et al. 2010). B2B services are relational in approach rather than transactional, with the intertwining of providers (in this case manufacturers), suppliers (dealers), customers (logistics companies) and other

network actors (for example, the technology provider). In line with these overlaps, various perspectives need to be understood as regards the roles and goals of the various actors.

Digital capabilities in advanced services

However, as manufacturers add more features to their services to create added value, this places a higher emphasis on the customers use context for value co-creation, especially in advanced services. Advanced services are defined as complex, flexible offerings that build on the product capabilities to engage customers and suppliers in a relational process, in order to support the customer's outcome (Vandermerwe and Rada 1988, Martinez, Bastl et al. 2010, Baines and Lightfoot 2014, Story, Raddats et al. 2017). For instance, what one customer finds useful may be totally different from the next customer's interest. There are various examples of advanced services, such as, Finning CAT offering monitoring and diagnostic service to support customers operation and maintenance of the equipment (Westergren and Holmström 2012), Rolls-Royce's 'Power-by-the-hour' services, where payment for the servicing of the jet engine is based customers runtime in their context rather than repair (Smith, Ng et al. 2012, Green, Davies et al. 2017), and MAN's trucks and buses offering pence-per-kilo to offer maintenance support and to address customers' shipping requirements (West, Gaiardelli et al. 2018). For servitising truck manufacturers, the pay-per-use contract is a popular business model, used to provide advanced services. The manufacturers offer rental agreements or sell fleet management services, instead of selling just trucks to the customers. One customer may run a fleet of 5 to 10 vehicles in a particular area, while big customers may have considerably more vehicles carrying out different operations across the country, going from rural areas to motorways etc. Offering such services to the customer requires the integration of processes, products, and services through digital components and capabilities.

The implications of digitalisation for value creation are arguably key strategic concerns in contemporary servitising organisations. The phenomenon of servitisation highlights the increased dependency on digitalisation as a viable pathway to address customers' complex and dynamic problems. Service offerings are extensively based on the use of Information Technology (IT) as an enabler and as a platform for delivering results. However, the role of these digital technologies in servitisation is under-

investigated. Understanding the role, impact and capabilities of digital technology will allow servitising manufacturers to reap the potential strategic advantage of servitisation (Bharadwaj, Sawy et al. 2013, Selander, Henfridsson et al. 2013).

Service-Dominant logic and service system

Service-Dominant Logic (S-D logic) focuses on value co-creation achieved by customers during use (value-in-use). In line with this logic, servitisation can be considered as a service system, which incorporates manufacturer and customer resources (Spohrer and Maglio 2008), with the aim of achieving a customer's desired outcome for their context. Research in these areas emphasised the need for customer resources to be integrated into service design (Smith, Ng et al. 2012, Barnett, Parry et al. 2013, Jaakkola and Hakanen 2013). Other suggested digital capabilities enable manufacturers and customers to interact and offer opportunities to co-create value with customers (Kowalkowski, Kindstrom et al. 2013, Lerch and Gotsch 2015, Sjödin, Parida et al. 2016). These studies provided limited understanding of the constituents of digital capabilities and their impact on different service offerings for value co-creation. Therefore, understanding the implication of value co-creation within services, and identifying capabilities critical in helping manage their daily operations, could provide firms with greater insight to help them adopt strategies to provide advanced services.

The characteristics of servitisation are summarised as:

- **Combination of products and services**. Reliance on digitalisation of physical products to support services delivery (Vendrell-Herrero, Bustinza et al. 2017).

- **Information services**. Focus on information services that provide value and advantage to the customer organisations (Cenamor, Sjodin et al. 2016).

- **Relational focused**. Relational nature of exchanges between manufacturers, customers organisations and other network actors (Bastl, Johnson et al. 2012, Baines and Lightfoot 2013).

1.1.3   Highlighting the challenges of advanced services

Notwithstanding the growth in service offerings, further examination shows that most firms still largely offer base services (Gebauer, Saul et al. 2017), and most continually struggle in their effort to offer

advanced services (Baines and Lightfoot 2014, Kowalkowski, Windahl et al. 2015, Martinez, Neely et al. 2017). There are different challenges associated with advanced service offerings versus base service offerings. For base service offerings, the main focus is on supporting the functioning of the product to maximise its efficiency, up-time, etc. Advanced service offerings, however, necessitate higher levels of customisation and strong relationships with the customers, which focus on supporting customers' value creation (Gronroos and Voima 2013, Kindström and Kowalkowski 2014). Therefore, advanced service offerings entail more risks, are difficult to execute and have higher complexity (Reim, Parida et al. 2015). This requires substantial organisational transformation across multiple levels of the organisation, to enable successful service provision (Oliva and Kallenberg 2003, Ardolino, Rapaccini et al. 2017, Baines, Ziaee Bigdeli et al. 2017).

1.1.4 Problem statement

While past research has discussed servitisation, the implications highlight the important concern for service design. This makes it difficult to provide a clear guide for successful engagement amongst servitised network partners. Thus, much work is needed to support the design of services at the inter organisational level, in order to support success in servitisation. Research into how best to design and support services has been consolidated in various fields such as service engineering, service science, service management and service marketing (Spohrer and Maglio 2008, Vargo, Maglio et al. 2008). In as much as servitisation has been discussed, there are few studies which address how best to combine service design, information systems and customer involvement. Thus, there is an opportunity to develop a comprehensive framework which considers the design and management of services alongside customer engagement.

1.2 Research problems

1.2.1 Knowledge problem: Understanding value co-creation in servitisation

Servitising manufacturers aim to tailor their value propositions to enable customer improved efficacy to realise their desired outcome (Baines, Lightfoot et al. 2009). An important foundation of service-dominant logic is the idea that service is a process of collaborative value creation, or value co-creation (Vargo and Lusch 2008b). The core concepts underlying value co-creation address the fundamental

characteristics of servitisation through its focus on customers' involvement and technology which supports the collaborative process between manufacturer and customer. Some recent studies suggest that in a service network, participants co-create value in joint sphere through direct interaction (Vargo 2008, Grönroos 2011, Gronroos and Voima 2013). The idea of value co-creation, therefore, helps to conceptualise engagement within the service network (manufacturer, customers, and other network actors) (Vargo 2008, Maglio, Vargo et al. 2009, Akaka and Vargo (2014)).

Servitisation and its challenges

Studies in servitisation have provided insight into various challenges related to servitisation. The general view of servitisation in manufacturing suggests a positive outcome, increased margins and stable revenue streams (Brady, Davies et al. 2005, Baines, Lightfoot et al. 2009, Parida, Sjodin et al. 2015). However, some authors highlight challenges, one being the service paradox (Gebauer, Fleisch et al. 2005, Gebauer and Kowalkowski 2012) which may occur due to the investment in service design and delivery failing to provide the expected result, thus it impacts returns and damages firms' viability (Neely 2008). Other studies (Kastalli and Van Looy 2013, Kindström, Kowalkowski et al. 2013), note that a service offering may be inadequate to create a performance advantage. Instead, they suggest manufacturers should engage customers in the value creation process to create adequate value from services (Ramirez 1999, Etgar 2008). With the increased prominence of servitisation and its challenges, some research, particularly from marketing and service operation, now focuses on the customer's perspective and their use context as a viable approach to mitigating the service paradox (Ng, Guo et al. 2008, Heinonen, Strandvik et al. 2010). This emergence of services and the service paradox challenges organisations to understand value co-creation (Lusch and Vargo 2006, Gronroos and Voima 2013), service innovation (Chesbrough 2003), service operations and service design (Smith, Maull et al. 2014).

Delineating the gap

Notwithstanding these recurring assertions regarding the importance of value co-creation in servitisation, only a few studies to date have examined this topic. One of the few known studies Green, Davies et al. (2017), conceptually examined two strands of servitisation in regards to value co-creation (traditional and customer co-created). Their study found that servitising manufacturers need to adopt

both goods and service-dominant logic approach to better suit their pursuit of efficiency and effectiveness. Their study is useful in regards to setting the foundations, however, a lot of questions remain, as value co-creation appears to be a somewhat abstract term, lacks theoretical clarity and, particularly, an empirical understanding of the value co-creation process within the context of servitisation is still required.

Capabilities within servitisation context

The reason for the emergence of co-creation may be attributed to the changed business landscape with services as a dominant component (Vargo and Lusch 2004, Spohrer and Maglio 2008, Ostrom, Bitener et al. 2010). Extant studies challenge organisations to understand how to engage with their customers' value creation and become value co-creators, e.g. (Gronroos 2008). As manufacturers implement a servitisation strategy, they increasingly rely on digital technologies and must develop novel capabilities to interact with customers, in order to offer personalised solutions (Kohtamaki and Partanen 2016). Past literature suggests that advanced services require the development and application of new capabilities that deviate significantly from the existing capabilities of product-oriented manufacturing firms (Ulaga and Reinartz 2011, Baines and Lightfoot 2014, Parida, Sjodin et al. 2015, Sjödin, Parida et al. 2016, Story, Raddats et al. 2017). Literature around servitisation suggests that these new capabilities help firms achieve their strategic goals of creating, delivering and capturing value (Sjödin, Parida et al. 2016, Ardolino, Rapaccini et al. 2017). Some servitisation studies posit that the capabilities required to provide base service offerings differ from the ones applicable in advanced services, as the objectives and characteristics are very different (Ulaga and Reinartz 2011, Baines and Lightfoot 2014). Prior studies show various relevant capabilities across organisational themes, for instance, customer understanding, service innovation, risk management and improved efficiency (Storbacka 2011, Raddats, Burton et al. 2015), although a comprehensive view is still missing. As such, a complete understanding of the key capabilities that support advanced service provision, and how they can be identified is still open to discussion (Baines and Lightfoot 2014, Baines, Ziaee Bigdeli et al. 2017, Story, Raddats et al. 2017).

Servitisation literature suggests that digital capability is one key capability that firms providing advanced services must develop (Kowalkowski, Kindstrom et al. 2013, Porter and Heppelmann 2014,

Lerch and Gotsch 2015, Sjödin, Parida et al. 2016). Nevertheless, there are gaps in the knowledge of the key resources and skills that are needed to develop such digital capability or how this capability can support manufacturing firms who are providing advanced services to customers with different needs. Despite the growing awareness of the importance of digital capability in servitisation, both practitioners and scholars struggle to grasp what the capability actually entails (Bustinza, Vendrell-Herrero et al. 2017).

1.2.2   Practical Problem

Some manufacturers adopt advanced services, a special case of servitisation, to sell guarantees of product/service reliability and availability. This brings many challenges, because customers transfer risks to manufacturers. The most fundamental risks are non-availability of product performance, an immediacy of service, and response to service needs. Capturing real-time operational data and health and location information about field products, through digital technologies, can help alleviate these risks. Hence, advanced service offerings are achievable by enabling connected product functionalities, integration of services, and other support processes, i.e., using digitalisation (Lerch and Gotsch 2015). However, very little research shows the underlying mechanisms of digitalisation in practice and the capabilities required to address the challenges associated with advanced services. This implies "*a lack of awareness or appreciation of the information and communication technologies that are enabling many product-centric service offerings to occur in practice*" (Lightfoot, Baines et al. 2013, pp. 1421). Therefore, there is a need for an empirical examination to enhance understanding. This study takes a case based approach to analyse how digital capabilities enable value co-creation in a B2B context.

1.3   Research objective

Three key considerations in servitisation are the emphasis on interaction with customers, immediacy of service, and proactive responsiveness. Extant studies agree that digital capabilities facilitate servitisation of manufacturing (Kindström and Kowalkowski 2009, Lerch and Gotsch 2015, Vendrell-Herrero, Bustinza et al. 2017), as digital technology is seen as a viable means of addressing complex and dynamic customer interactions through the integration of operational processes (Porter and Heppelmann 2014, Lerch and Gotsch 2015, Parida, Sjodin et al. 2015).

Some contemporary studies have examined value co-creation mostly from a provider's perspective and failed to include the customers view (Bustinza, Parry et al. 2013, Green, Davies et al. 2017, Vendrell-Herrero, Bustinza et al. 2017). The present study aims to provide new empirical evidence regarding value co-creation within a servitised context. It looks into the customer context and offers a view of the service networks spanning across customers, manufacturers and other service partners (dealers and technology partners). This study draws upon SD logic to make sense of these dynamics.

The expected contributions from this study lie within the areas of exploration, analysis and explanation, i.e., addressing "what" and "how" questions (Gregor 2006). The objective includes explaining and providing a better understanding of digital capability in an empirical setting, showing how digital capabilities, in particular, support various service offerings and analysing how this enables value co-creation in practice. To achieve this and to provide such insight, the study aims to address specific gaps related to service provision. Three research questions have been formulated to guide the research.

RQ1   What are the digital capabilities necessary for supporting servitised offerings?

   RQ1a: How are these digital capabilities combined for various service offerings?

RQ2   How is value co-creation manifested in servitisation based on existing theoretical attributes?

Following this research purpose and research questions, this study aims to understand the digital capability and value co-creation within servitised businesses by conceptualising both the empirical and theoretical sides of co-creation as shown in Figure 1.1 below. This study contributes to the servitisation literature by identifying digital capabilities necessary for servitisation. Furthermore, it contributes to service operations research by conceptualising a framework which delineates attributes of value co-creation from related service fields, combined with empirical findings from servitised case studies.

1.3.1   Theoretical and practical gaps.

Figure 1.1: Research objectives in relations to knowledge and practical gap
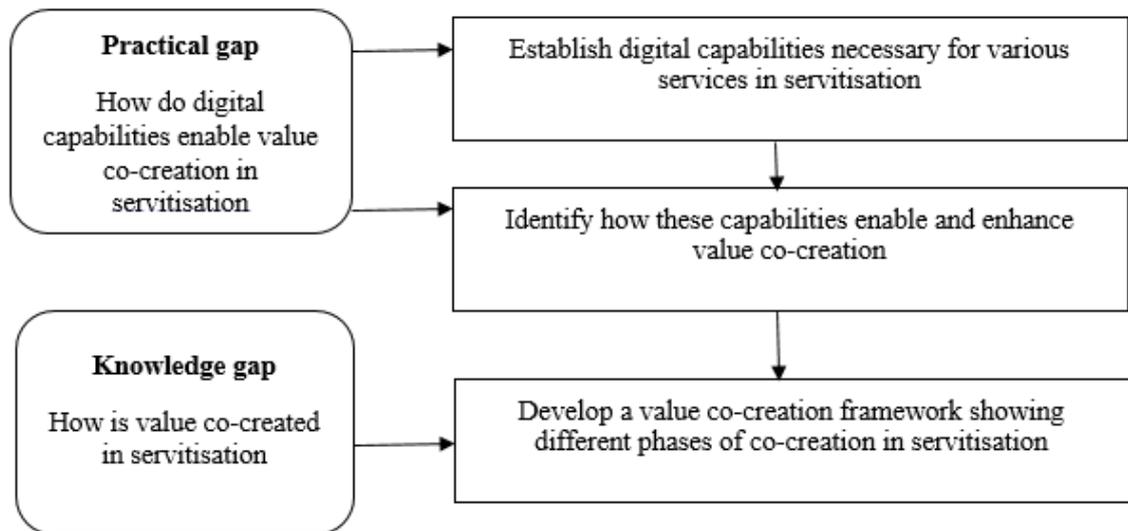
CHAPTER 2:   Theoretical Background

This chapter presents a literature review of the core concepts that provided the theoretical background for the study. It describes the servitisation of manufacturing firms and the ways in which researchers have conceptualised the role of digital technologies, digital capabilities, in the context of servitisation. It explores concepts, frameworks, and approaches to value co-creation from services field; these topics will be explored in depth later in the chapter.

The study's literature review is structured as follows:

- 2.1: Defining servitisation: This section reviews the literature on servitisation to provide the theoretical basis for this study.

- 2.2: Renewed interest in services: This section describes different service offering as value propositions.

- 2.3: Capabilities: The section explores suggested capabilities in servitisation.

- 2.4: Digitalisation: This section reviews the literature on technologies that enable manufacturer services. It outlines the essential technologies and the literature on information technologies used for services in truck manufacturing.

- 2.5: Digital capabilities: This section provides past definitions of digital capability and offers a background on the functionalities required in services.

- 2.6: Value co-creation. This section provides the background, concepts and knowledge contribution around value co-creation.

- 2.7: Conceptual framework: This section describes how theoretical insight is conceptualised into a framework which will be used for the analysis in Chapter 6 and Chapter 7.

2.1 Defining Servitisation

2.1.1 The role of servitisation concept in manufacturing organisations

The popularity of servitisation amongst manufacturers is rooted in: objectives to (a) renew business practices due to the rise of manufacturing in low-cost economies (b) sustain competitiveness (Adel and Wiesner 2015), (c) create a steady revenue stream across product lifecycle (Baines, Lightfoot et al. 2009) and (d) to move beyond manufacturing to offering solutions that deliver value to customers (Penttinen and Palmer 2006). Servitisation is focused on creating value propositions that allow customers increased efficiency in achieving desired results, and represents a move away from a product-base model to a service-based model (Vargo and Lusch 2008b, Baines, Lightfoot et al. 2009). It changes the common transactional exchange between manufacturers and customers, into a relational approach centred around product and service offerings (Smith, Maull et al. 2014, Kohtamaki and Partanen 2016). Additionally, servitisation helps develop stronger relationships with customers and enhances customer loyalty (Ostrom, Bitener et al. 2010, Lightfoot, Baines et al. 2013).

2.1.2 The foundation of servitisation

Vandermerwe and Rada (1988) introduced the term servitisation to explain the notion of manufacturing firms developing customer-focused service offerings. Nonetheless, the idea behind this concept has existed for quite a long time and can be traced back to the 19th century (Schmenner 2009). In the mid-19th century, a French economist, Frederic Bastiat, argued for a focus on utility provision as opposed to the conventional theory of value attachment to physical objects, but it was not until the 1960's that the concept was adopted (Vargo and Lusch 2004).

2.1.3 Past definitions of servitisation

Many terminologies have been used to define servitisation. Vandermerwe and Rada (1988) defined servitisation as a strategy in which companies offer their products as part of a package that includes services, support, self-service, and knowledge, in order to add value to core product offerings. Other definitions include Baines, Lightfoot et al. (2009, p. 554), "*the innovation of an organisation's capabilities and processes to shift from selling products to selling integrated products and services that deliver value-in-use*", Ren and Gregory (2007, p. 124), "*a process of change of strategy where*

manufacturing companies opt for an orientation to service and/or develop more and better services with the goal of satisfying customer needs, obtaining competitive advantages and improving the company's performance" and Robinson, Clarke-Hill et al. (2002, p. 150) , "*a concept which goes beyond the traditional approach of providing additional services but considers the total offer to the customer as an integrated bundle consisting of both the goods and the services*". Whether servitisation is defined as a process (Ren and Gregory 2007), a strategy (Vandermerwe and Rada 1988), or an innovation (Baines, Lightfoot et al. 2009), central to these definitions is the transition to and delivery of product-based services, improvement of competitive advantage, and the satisfying of customer needs.

Present study's definition of servitisation

In line with past definitions, it is necessary to adopt a suitable definition of servitisation appropriate with the scope of this study. Baines, Lightfoot et al. (2009) see servitisation as an 'innovation' while (Tuli, Kohli et al. 2007) covers the relational aspect of servitisation and (Storbacka 2011) incorporates required capabilities necessary for a service business model. This study combines these important elements and defines Servitisation as:

A long-term relational processes, during which providers and customers integrate goods, services, capabilities, and knowledge components into unique combinations that are aimed at meeting customers' evolving business needs to achieve desired outcomes for both parties.

Henceforth, the above definition is used throughout the rest of the study. Inherent in this definition is the concept of firms transitioning from selling products to selling capabilities. Accordingly, it represents the shift from value-in-exchange to value-in-use.

Furthermore, servitisation of manufacturing has been studied across various bodies of academic literature and various disciplines. This growing research in different fields has provided complementary views on the design, innovation (Gebauer, Fleisch et al. 2005), delivery, and foundation for services (Oliva and Kallenberg 2003, Lightfoot, Baines et al. 2013, Kowalkowski,

Gebauer et al. 2017). Such interest gives rise to the importance of services in manufacturing which is explained in the next section.

2.2   Renewed interest in understanding services

Manufacturers offering a different range of services require diverse service processes. They differ in terms of flexibility, responsiveness, risk, and potential to create value for and with the customers (Story, Raddats et al. 2017). Many descriptions that differentiate types of services draw on the Mathieu (2001) classification of services, i.e. services in support of the product (SSP), as well as services directed towards customers' business processes termed service in support of customer (SSC), which is services in support of the customer's action (Ulaga and Reinartz 2011, Baines and Lightfoot 2014, Story, Raddats et al. 2017). The former is standardised and tends to be transaction based services which necessitate low customer interaction and relationship, while the latter is relationship oriented, involves solid customer interaction and requires a variable amount of customisation (Lightfoot, Baines et al. 2013, Baines and Lightfoot 2014, Story, Raddats et al. 2017). Ultimately, services in support of the product includes operations such as installations, repairs, and maintenance, while services in support of the customer's action includes more operations such as fleet management, optimisation of processes, life-cycle solutions, research and development services, provision of product outcomes and support for customer processes (Eggert, Hogreve et al. 2014, Baines, Ziaee Bigdeli et al. 2017).

2.2.1   Types of services in servitisation

Building on these characterisations, Baines and Lightfoot (2013), propose a classification of three service offerings, base, intermediate and advanced service offering. Base services are SSPs, while intermediate and advanced service can be seen to be more nuanced in the way they are described, thus increasing the complexities in SSCs and their potential for value creation. This range of services is intended to increase the value delivered to customers, seen as a critical strategy to address customers' unmet needs, a sustainable route to growth and enhancing other ways to be competitive (Vandermerwe and Rada 1988, Oliva and Kallenberg 2003, Baines, Lightfoot et al. 2009). Each of these services is discussed in the next section.

2.2.1.1 Base service offerings

Base service offerings are simply described as an outcome the customer gain by acquiring a product (Baines and Lightfoot 2013). In this type of service offerings, manufacturers support the customers by also providing spare parts to maintain the products. This is grounded in the idea of production competence and warranty related services.

2.2.1.2 Intermediate service offerings

Intermediate service offerings are defined as the reassurance that a product is appropriately maintained (Baines and Lightfoot 2013). With regards to intermediate service offerings, additional services, such as repair and maintenance, are included in this service package, where the manufacturers support the customer by helping them to maintain the equipment or products. Services here are more focused on maintaining products competences based on schedules, condition monitoring of field products, etc.

2.2.1.3 Advanced services

Advanced services are defined as "*capability delivered through product performance and often featuring; relationship over extended life-cycle, extended responsibilities and regular revenue payments*" (Baines and Lightfoot 2014, p. 22). The use of advanced services as a distinctive type of service is ever more common in the servitisation literature, see (Salonen 2011, Lightfoot, Baines et al. 2013, Gebauer, Saul et al. 2017, Story, Raddats et al. 2017). Such advanced services include operational services to create additional value, for instance, availability guarantee, outcome-based contract, customised services to fulfil individual customer needs, and capability contracting (Story, Raddats et al. 2017). In line with various ways advanced services have been defined, it can be viewed as a complex combination of products, services, supporting processes, and knowledge, working together to enhance customer's value-in-use. According to (Macdonald, Wilson et al. 2011), value-in-use includes all customer perceived value of advanced service, which aids or deters the realisation of the customer's preferred outcome. Advanced services offerings provide manufacturers and their customers with long-term business relationships, increased profitability, and steady revenue stream (Baines and Lightfoot 2014). However, it increases complexity when delivering value-in-use, as each customer has a slightly different focus, and also the risk of failure in the delivery is high for the

manufacturing firms (Gebauer, Fleisch et al. 2005, Neely 2008). Following the underlying assumption of heterogeneity of services in servitisation, this study specifically focuses on base, and advanced services provision during servitisation. The complexities associated with advanced services are explored further in the next subsection.

2.2.2 Complexity, challenges and difficulties of value creation in advanced services

Advanced services characteristically take the form of products and service bundled in a customised way to fulfil individual customer needs (Tukker and Tischner 2006), and to increase the value delivered to customers and manufacturers by increasing their competitiveness. These complexities mean that service offerings developed to support a particular customer's value outcome may be inappropriate for another customer's outcome. Thus, there are challenges and risks associated with the contextual use of service offerings, requiring ways to mitigate risks. Advanced service is equally associated with certain challenges such as responsiveness, immediacy, and risks associated with guaranteed outcome, etc. which require a proactive response. Risks include non-availability and suboptimal product performance (Grubic 2014), and increased downtime (Jonsson, Westergren et al. 2008), etc. To achieve greater service adds layers of complexity and challenges to the delivery of products, as customers' service needs are different (Neely 2008, Baines, Lightfoot et al. 2009, Martinez, Bastl et al. 2010), and, therefore, require manufacturers to provide unique offerings tailored to different customers at a competitive cost. Achieving these specialised service needs often results in higher investment in service design, development, and delivery (Reim, Parida et al. 2015).

2.2.3 The dynamics of the base and advanced services in the value creation process

Manufacturing firms increasingly focus on providing advanced services, although many of these firms still struggle to provide advanced services because the challenges and capabilities of advanced service provision largely differ from those of base service provision (Baines and Lightfoot 2014, Kowalkowski, Windahl et al. 2015, Gebauer, Saul et al. 2017, Shi, Baines et al. 2017). Base service is focused on supporting the functionality and efficiency of the product, whereas advanced services concentrate on helping customers achieve their expected outcomes. Therefore, advanced services require a more close relationship with customers and a higher level of customisation, with a focus on

enhancing customers value creation processes, ultimately to co-create value (Kowalkowski 2010, Green, Davies et al. 2017, Martinez, Neely et al. 2017). Thus, understanding the implication of value co-creation in services and identifying capabilities critical in helping the manufacturer manage daily operations, could provide firms with a greater insight into the strategies needed to provide advanced services.

2.3   Capabilities for services

With regards to value co-creation, new challenges will emerge as product-based manufacturers require the deployment of new capabilities to co-create value with customers (Smith, Maull et al. 2014, Sjödin, Parida et al. 2016, Story, Raddats et al. 2017). Advanced services require specific capabilities. Capabilities are routines which enable firms to carry out their business operations (Raddats, Zolkiewski et al. 2017, Story, Raddats et al. 2017). The literature suggests that capabilities are critical in helping firms achieve their strategic goals of creating, delivering and capturing value (Helfat and Lieberman 2002, Story, Raddats et al. 2017). Servitisation studies also posit that providing advanced services requires manufacturing firms to build novel capabilities that are significantly different from existing product-oriented capabilities (Gebauer, Fleisch et al. 2005, Baines, Lightfoot et al. 2009). Manufacturing firms characteristically possess highly evolved capabilities related to products and technology. However, provision of advanced services ultimately rests on the firm's ability to integrate products and services, while using them to achieve the customer's desired results (Ulaga and Reinartz 2011, Parida, Sjodin et al. 2015).

2.3.1   Extant servitisation literature on capabilities

Various servitisation studies have focused on providing insight into the important capabilities necessary for the development and delivery of services. For instance, they identified network management capabilities (Kohtamaki, Partanen et al. 2013), service innovation capabilities (Kindström and Kowalkowski 2009), system integration capabilities (Brady, Davies et al. 2005), and operational capabilities (Windahl and Lakemond 2010). However, the provision of advanced services differs substantially from product based services; advanced services require stronger customer involvement, and co-creation of the service offering (Ulaga and Reinartz 2011). Therefore, the

capability to support service-orientation is vital to firms' effectiveness in advanced services (Oliva and Kallenberg 2003).

Other recent studies suggest that the development of digital technologies, especially ICT related capabilities, drives greater customer interactivity and acts as a catalyst in advanced service provision (Kowalkowski and Brehmer 2008, Kowalkowski, Kindstrom et al. 2013, Raddats, Zolkiewski et al. 2017). Other research proposes digital capability as a viable path towards addressing increased complexity and diverse customer interactions (Parida, Sjodin et al. 2015), by enabling connected product functionalities and integrating different operational processes to increase value co-creation opportunities (Porter and Heppelmann 2014). Sjödin, Parida et al. (2016) took it a step further by comparing influential capabilities that lead to successfully advanced service offerings. Their result found that digitalisation capability is key in facilitating advanced services. Their study highlighted and demonstrated the importance of digitalisation capability in the form of smart and connected technologies for advanced service offerings and showed that it holds the highest empirical relevance in servitisation. However, the discussion in the literature has recently shifted towards the definition of what constitutes digitalisation and how its capabilities can be built (Lenka, Parida et al. 2017).

2.4   Understanding digitalisation in advanced service provision

Gray and Rumpe (2015, p. 1319), defined digitalisation as "*the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.*" Servitisation, typically by integrating digital capabilities into physical products. According to Accenture (2018), digitalisation adds a new layer of connected intelligence that enhances the action of organisations, automates processes, transforms data, and incorporates digitally enabled systems into firms to increase their insight and control over tangible goods (Daugherty, Biltz et al. 2014). Digitalisation represents a combination of hardware (e.g., wireless technology, sensors, etc.) and software (e.g., data acquisition, transmission and processing algorithms) technologies which can be seen as resources for advanced services. Digital technology innovations, such as the Internet of Things (IoT), telematics commonly used in manufacturing, cloud computing, predictive analytics, big

data, and others, have increasingly enabled an interconnected and complex world (Demirkan, Bess et al. 2015). These technologies are briefly explained in Table 2.1

Table 2.1: Technology innovations and its purpose

Technology innovation	Description	Purpose
Internet of Things (IoT)	In a global network where billions of devices are heterogeneously interconnected to interact and exchange data in order to extend their functions beyond the physical world and achieve common goals without direct human intervention (Li, Da Xu et al. 2015, Ardolino, Rapaccini et al. 2017).	IoT supports the development of monitoring services and gathering of data from field products during operation and usage. Allows monitoring of products location, use, and conditions (Baines and Lightfoot 2014).
Cloud computing	Cloud computing enables ubiquitous access to a shared pool of computing resources such as storage, servers, operating systems, etc. that can be convenient and configured on demand with minimal management effort (Butner and Lubowe 2015, Ardolino, Rapaccini et al. 2017).	Allows access to remote infrastructure, so users are able to run operating systems and applications, provides direct access and deployment of software applications via the cloud.
Big data	A collection of large and possibly complex data sets which includes both structured and unstructured data (Demirkan, Bess et al. 2015, Opresnik and Taisch 2015).	Big data impacts manufacturing competiveness by uncovering opportunities for new service offerings (Opresnik and Taisch 2015).
Predictive analytics	The application of skills, expertise, and algorithms on collected data to estimate and stimulate the likelihood of an event (Ogunleye 2014, Ardolino, Rapaccini et al. 2017).	Uses data mining techniques to identify and uncover hidden patterns in order to extract useful information from data.

2.4.1 Telematics for advanced services

Telematics is a general term that refers to any devices which integrate telecommunications devices and informatics, such as GPS systems (Ardolino, Rapaccini et al. 2017). It allows the use of technology to track and monitor remote vehicles and helps improve productivity through data communication which provides useful insights for operational efficiency. For instance, telematics is used to identify vehicle or component problems before they cause a breakdown. Telemetry allows wireless data communication and enables a range of possibilities such as fleet tracking and management.

Telematics is the technology used within the truck manufacturing industry to monitor field products. Telematics technology facilitates the remote collection and transmission of data about product performance, upon which manufacturers deploy base and advanced service functions to their customers. It supports the tracking and monitoring of remote products, enabling real-time monitoring of operations and communicates data to service providers. Through sensing and collecting operational data, providers have access to real-time status updates, which allows them to view the challenges, prompting service solutions. For instance, vehicle or components problems can be addressed before they cause a breakdown. Telemetry allows wireless data communication enabling various possibilities, such as fleet tracking.

2.4.2 Digital technology enabled services

Digital technology is continuously changing the ways the manufacturing industry operates to become service focused (Lightfoot, Baines et al. 2013). Recently, studies have investigated the role of technologies and their relevance to the development of "digital servitisation" (Ardolino, Rapaccini et al. 2017). However, the bulk of these studies are focused mainly on benefits that implementing these technologies provide (Baines and Lightfoot 2014), such as heavy equipment manufacturers offering condition monitoring services for their installed base. Extant literature agrees that digital service innovation facilitates competitive advantage of firms' offerings by allowing new opportunities to capture value (Baines and Lightfoot 2014). Often, little attention is given to investigating how these technologies enhance, enable and contribute to value creation. The focus on value co-creation with

customers highlights new challenging situations for product-based manufacturer as value co-creation, requires the development and utilisation of new capabilities to enable them to adapt to customers' characteristics proactively, through new service designs and reactively (Baines, Lightfoot et al. 2009, Smith, Maull et al. 2014, Sjödin, Parida et al. 2016). Ultimately, digitally embedded components within a product strengthen the capabilities and value of the product, which enables value creation outside the product (Porter and Heppelmann 2014).

2.4.3   Differentiation through digital services

Authors are in agreement that these digital technologies facilitate and play an essential part in advanced services (Neu and Brown 2005, Coreynen, Matthyssens et al. 2017) through enabling new product service offerings (Lerch and Gotsch 2015), reshaping competition (Porter and Heppelmann 2014), addressing customers' various needs (Parida, Sjodin et al. 2015), and recombination of existing services (Kindström and Kowalkowski 2009). More specifically, servitising manufacturers depend on digitalisation in the provision of advanced services, seen as a path towards interacting and addressing a customer's complex and diverse needs (Parida, Sjodin et al. 2015). The trend towards digitalisation is changing the ways in which service providers interact with their customers by equipping new connected product functionalities with intelligent digital systems, thereby, allowing the product to operate independently and increase opportunities for value co-creation through advanced services (Lerch and Gotsch 2015). By the use of digital technologies, products manufacturing firms are able to design and deliver new smart connected products that change the way services are provided, and enable differentiation (Porter and Heppelmann 2014).

This study focuses on digital technologies which support the development, implementation and functional aspects of advanced services, such as the Internet of Things, remote monitoring, product cloud/cloud computing, and predictive analytics, which are all vital to servitisation strategy (Ardolino, Rapaccini et al. 2017, Lenka, Parida et al. 2017). Adopting digital technologies changes the nature of service offerings. Heiskala, Hiekkanen et al. (2011), argues that digitalisation reduces the need for human interaction in service provision, but increases service facilitation, handling expectation and service fulfilment. Providing these types of new offerings, in turn, may require reconfigurations of

value creation mechanisms in manufacturing. This means investing essential resources in developing and utilising new capabilities to support digitalisation initiatives in organisations, thus, increasing the possibility of value creation within the business relationship (Coreynen, Matthyssens et al. 2017). Advanced services often rely on digital technologies embedded in physical products, which makes it technically viable to connect products to the web and assign an IP address to them allowing interaction and communication with other components remotely (Lerch and Gotsch 2015). Additionally, it helps capture operational data, encapsulating knowledge and understanding required to provide efficient services.

2.5   Digital capabilities for services

The digital capability is defined "*as an advanced ability to utilise smart and connected physical products and data analytics to facilitate development and delivery of service offerings to create differential value*" (Sjödin, Parida et al. 2016, p. 5332). This comprehensive definition is adopted for the purpose of this study. This study complements previous studies around the role of digital technologies for service provision; it focuses on the digital capabilities provided by digital technologies such as remote monitoring technologies, telematics, Internet of Things, etc. (Sjödin, Parida et al. 2016, Coreynen, Matthyssens et al. 2017). In addition, it integrates knowledge from studies that examined the organisational capabilities needed for servitisation, particularly advanced services (Porter and Heppelmann 2014, Lerch and Gotsch 2015, Cenamor, Sjodin et al. 2016, Sjödin, Parida et al. 2016).

2.5.1   Digital functionalities in services

Allmendinger and Lombreglia (2005), explored the functional aspects of digital technologies such as connected products, and identified vital functions for the delivery of smart services, which are: (a) monitoring product conditions, (b) tracking user behaviours (mapping user and product movement and locations), (c) self-diagnostics, and (d) control and automation, to provide services like predictive maintenance. Building on these findings, Porter and Heppelmann (2014) contend that smart connected products allow four types of capabilities: (a) monitoring products' condition, (b) controlling product functions, (c) optimising product and process performance, and (d) allowing autonomous product operations. Baines and Lightfoot (2014), described the key functions in delivering advanced services and suggest that the traditional information systems of manufacturing firms should be extended with capabilities such as monitoring, transmitting, storing, analysing and interpreting data capabilities. In line with these suggestions, Grubic (2014) suggests that remote monitoring allows manufacturing firms to foresee faults and deliver proactive support services to the customer, which helps their value creation process through increased uptime. Ultimately, advanced monitoring tools, communication technologies, and analytical tools allow the development of new essential capabilities that enable processing, analysing and interpreting data from the established base (Ulaga and Reinartz 2011, Iansiti

and Lakhani 2014, Porter and Heppelmann 2014). Digital capabilities can help leverage the value that digital technologies provide in a customised servitisation context, and equally facilitate its efficiency (Bask, Lipponen et al. 2010, Silvestro and Lustrato 2015). Digital capabilities provide opportunities for greater reliability and higher efficiency by changing the way products and services are offered to customers. Digital capabilities offer new functionalities and more possibilities to increase the value manufacturing firms offer and deliver to customers (Porter and Heppelmann 2014). By utilising digital capabilities, manufacturers can enhance customer co-created servitisation, address the customer's heterogeneous needs, and create mutual value.

2.5.2   Research objective and question revisited

In summary, while the reviewed literature suggested various capabilities crucial to servitisation, the digital capability was identified as highly relevant for advanced service provision. Furthermore, multiple terminologies were used to describe digital technologies in servitisation, yet the understanding of precisely what these digital capabilities in advanced service provision are was vague and seemed to be examined superficially. Therefore, the following research question was proposed:

What are the digital capabilities necessary for supporting servitised offerings?

The following section is focused on value co-creation in a servitised network.

2.6   Value co-creation

Overview of the section

This section aims to review past literature, key concepts, and frameworks of value co-creation in service fields to provide a theoretical background relevant for this study and, therefore, synthesise and conceptualise current knowledge into a conceptual framework for the study.

The concept of value co-creation in servitisation is mainly focused on the collaborative process where manufacturers and customers, integrate knowledge in a joint process to create value for actors involved (Vargo 2008, Vargo, Maglio et al. 2008). As such, the concept of value co-creation is in line with the main characteristics of servitisation, which are found to be: the involvement of customers as co-producers of services, information and knowledge intensity, and relational exchange amongst service network (Gummesson 2008, Vargo and Lusch 2008b, Bastl, Johnson et al. 2012). As a result, it is necessary to view servitisation from a value co-creation perspective, where the design and delivery of services are achieved through a relational and collaborative process to create value from the perspectives of the actor involved.

While value co-creation is a vital element of the servitisation strategy, it does not provide a clear direction for service design, service delivery and service provision in a B2B context. As such, it requires an understanding of the dynamics of value co-creation among stakeholders in servitisation, in order to know where involvement is most likely to influence outcomes.

2.6.1   Defining value co-creation

A variety of definitions of value co-creation have emerged. Some of the definitions seem to be overlapping, and in some cases seem contradictory (Lusch and Vargo 2006, Spohrer and Maglio 2008, Smith, Maull et al. 2014). As such, Maglio and Spohrer (2008) call for a multi-disciplinary approach: service science, to understanding value co-creation in socio-technical systems.

Lusch and Vargo (2006, p. 284) posit that "the *customer is always a value co-creator*." Contrary to that, Grönroos (2011, p. 290), specifies that only "*during the direct interactions with customers, do*

firms get the opportunities to engage with their customers' value creation and become co-creators of value."

Within service innovation, value co-creation is seen as involving people and combining knowledge in order to co-innovate (Ramirez 1999, Mannervik and Ramirez 2006). In an attempt to understand value co-creation, which involves interaction between people and technology, Spohrer and Maglio (2008) propose the concept of service system, which is a configuration of resources that can be dynamically configured and connected to other service systems resources. According to (Maglio and Spohrer 2008), a service system is complex and dynamic by nature, involving technology, shared information, people and value propositions integrating internal and external service systems. It is centred on provider/customer interactions and is able to improve its state, or that of another system, through acquiring, sharing and applying resources, with the aim of creating a foundation for service production and innovation. In this case, resources can be capabilities, shared information, knowledge, technology, and people.

Although there are different approaches to and definitions of value co-creation, one criterion on which researchers seem to concur is that there need to be two or more parties involved in value co-creation activities, meaning actors in the co-creation process. In a B2B context, which the present study is based on, this would mean the manufacturer and its stakeholders (e.g., customer firms or dealers) (Prahalad and Ramaswamy 2004, Grönroos 2011).

Study's definition of value co-creation

This study defines value co-creation as a joint value creation process of developing services, which includes co-design, influencing the strategic level and operational level and facilitating innovation (Lusch and Vargo 2006, Kristensson, Matthing et al. 2008, Gronroos and Voima 2013, Roser, DeFillippi et al. 2013, Roberts, Hughes et al. 2014, Green, Davies et al. 2017).

Contemporary academic discourse on services

Recent academic discourse in services and servitisation has a seen surge in the literature on value co-creation. Three ideas have been particularly influential, which are: service marketing which proposes service-dominant logic (Vargo and Lusch 2004, Vargo, Maglio et al. 2008), managerial perspective

(Ordanini and Pasini 2008), and service science initiative (Chesbrough and Spohrer 2006). These are discussed below.

2.6.2 Service marketing discourse on value co-creation

Studies in service marketing reflect a change in mind-set, where business exchange moves from goods logic to services dominant logic through a relational approach (Ramirez 1999, Vargo and Lusch 2004). This notion is detailed below.

2.6.2.1 Service-Dominant Logic

Service-Dominant (S-D) logic proposes service as '*the application of knowledge and skills by one entity for the benefit of another*' (Vargo, Maglio et al. 2008, p. 145), in other words, service is the basis for an exchange. Service is a process of collaborative value creation, and value co-creation is based on the foundation that economic value is derived from usage of goods and services as resources, as opposed to the exchanging of goods or services as assets (Ramirez 1999, Vargo, Maglio et al. 2008). This represents an alternative view to Porter (1985), who suggested that value is added in sequence through production. In line with this understanding is the idea that value is collaboratively created among actors (Ramirez 1999). This view has been formalised as Service-Dominant logic and presented as an alternative to the goods-dominant logic (Vargo and Lusch 2004).

Foundational premises of S-D logic

S-D logic places emphasis on value co-creation achieved by the customer when using or experiencing a product (Smith, Maull et al. 2014). Primarily, there are eight foundational premises of S-D logic theory (Vargo and Lusch 2004, Brodie, Saren et al. 2011), which was later updated with two additional premises (Vargo, Maglio et al. 2008). From a value co-creation perspective, five of these are core, namely: (a) service is the fundamental basis of exchange, (b) the customer is always a co-creator of value, (c) all economic and social actors are resources integrators, (d) organisations can only offer value proposition, and (e) value is always uniquely and phenomenologically determined by the beneficiary. This means that organisations cannot create or deliver value independently of their customers. Therefore, value is created in use. The following sub-section explores servitisation through the lens of S-D logic to provide a detailed view.

S-D logic perspective on servitisation

In servitisation research, the S-D logic approach suggests a view that places more emphasis on the customer's use contexts (Smith, Maull et al. 2014, Green, Davies et al. 2017). The essence of S-D logic is to co-create value through the integration of customer's resources in the design stage of the service system to achieve individual desired outcomes (Spohrer and Maglio 2008). Customers' resources are mainly operant resources. According to Vargo, Maglio et al. (2008, pp. 148), "operant resources" act upon other resources while "operand resources" are an operation that is acted on, for example, products. As manufacturers move towards a greater number of services to provide solutions to various customers, different challenges and complexities associated with diverse contexts of use are seen. In line with this understanding, the value is derived in usage (value-in-use) and depends on the context. This highlights the increased need for customer visibility and collaboration as a viable approach to mitigating these challenges (Ng, Guo et al. 2008). Emphasis on customer use contexts became particularly apparent due to new business models, for instance, pay-per-use, where the customer pays for the period they hire/use the truck rather than repairs. Literature in this area highlights the vital need to focus on the multiple actors of a service network, especially integrating customers' resources and competences into the design of future service offerings (Guo and Ng 2011, Jaakkola and Hakanen 2013, Smith, Maull et al. 2014).

These jointly developed capabilities enable the steady co-creation of mutually valuable outcomes that go beyond just products' performance (Guo and Ng 2011). These streams of literature are compatible with Service-Dominant logic (Vargo and Lusch 2004, 2008), which provides an alternate lens through which value creation is conceptualised by placing focus on co-creation of value-in-use. Manufacturers offer various categories of service provision using goods as a distribution mechanism(Green, Davies et al. 2017). The value in Service Dominant logic is that it is jointly and reciprocally co-created through interaction and integration of resources within and among providers and customers.

2.6.2.2 *Value-in-Use and contextual variety*

Value-in-use is regularly used to reinforce customer centricity. Extant literature acknowledges value-in-use is imperative to a servitised strategy, but there appear to be differences in the way the term is

applied. Servitisation requires a close link to customers which is usually referred to as customer centricity (Galbraith 2002). What one customer considers important may not be of much importance to another customer, and this comes across in related literature. Accordingly, Raja, Bourne et al. (2013) highlighted the importance of understanding customers' views on integrated products and services, as well as value-in-use derived from integrated offerings. This emphasis on customer's context, not only incorporates various elements of extant definitions but is in line with S-D logic, which focuses on value co-creation achieved through the customer's experience or usage of physical products. This description considers the design stage of services that includes both manufacturer's and customers' resources (Spohrer and Maglio 2008), while aiming to incorporate customers' different use contexts, in order to achieve their complex needs and heterogeneous outcomes.

The customer is vital to the value creation process for both the use of products and services. If the value is only created in use, it then follows that customers are co-creators of value (Vargo and Lusch 2008a). Therefore, value is not delivered by the manufacturers, rather they offer a value proposition, which, if accepted by the customer, allows value to be created and determined (Payne, Storbacka et al. 2008). This blurs the organisational boundary into a collaborative relationship where both actors are responsible for realising desired results (Smith, Maull et al. 2014), and where digitalisation provides opportunities to address these challenges through service innovation (Maglio, Vargo et al. 2009, Lerch and Gotsch 2015, Cenamor, Sjodin et al. 2016).

2.6.2.3 Knowledge contributions to service-dominant logic

Several studies have contributed to Service-Dominant logic (Ballantyne and Varey 2008, Payne, Storbacka et al. 2008, Brodie, Saren et al. 2011, Spohrer 2011, Gronroos and Voima 2013). Two important conceptual frameworks for value co-creation seem to be most vital, value creation and value co-creation as depicted in Figure 2.1 (Gronroos and Voima 2013) and Figure 2.2 (Payne, Storbacka et al. 2008).

The review of the literature showed that, only a handful of studies examined the implications of value co-creation in servitisation. Therefore, there is a need to extend the literature search to the more general service field to better understand and position the phenomenon of value co-creation in

servitisation. The aim is to draw insights from these studies in order to inform the conceptual framework (Figure 2.6).

Gronroos and Voima (2013) consider value co-creation in the context of service-dominant logic and developed a conceptual framework showing that value co-creation can only occur when customers and providers jointly engage and interact in the value creation process, termed joint sphere (see Figure 2.1). While Payne, Storbacka et al. (2008), conceptual framework embeds three interrelated processes, customer, encounter and supplier processes demonstrating how value co-creation can be managed (see Figure 2.2). These are further explained in the subsequent subsections.

Value co-creation from service logic viewpoint

Building upon the service orientation, Gronroos and Voima (2013) differentiate between the idea of customer 'value creation' and 'value co-creation'. The former relies on the customer's activities as economic actors, and the latter is comprised of the interactions of two or more economic actors (providers and customers) (Grönroos 2011). The authors conceptualise value co-creation as a "joint collaborative process through direct interaction which adds value for one or both actors. A framework by Gronroos and Voima (2013), uses three important spheres in which value can be created and co-created, these are providers, joint, and customers spheres, as shown in Figure 2.1. It defines the roles of providers and customers, as well as the scope, locus, and nature of value creation, where value creation refers to value-in-use and value co-creation as a function of interaction.

Figure 2.1: A framework of value creation spheres (Gronroos and Voima 2013)

Producer: The provider as producer of resources to be used in the customer's value creation

Co-producer: The customer participates as co-producer in the joint production process

PROVIDER SPHERE
• production (potential value)

JOINT SPHERE
• value creation in interaction (real value)

CUSTOMER SPHERE
• independent value creation (real value)

Customer's role

Value creator/ co-creator: The customer is the value creator in direct interaction, but when inviting the provider into this process (a merged dialogical process), value is co-created with the provider

Value creator: The customer is an independent value creator outside direct interaction

Provider's role

Value facilitator: The provider is a value facilitator

Co-creator: The provider may get an opportunity to engage in the customer's value creation process as a co-creator

Value facilitator: The provider is a value facilitator

From a value creation perspective

Within this context, service embeds two logics, the provider service, and customer service, comprising joint interaction between the two (Gronroos 2008). The author sees service as a value supporting process which facilitates interactive processes that supporting customer's value creation practices (Gronroos 2008). As such, service should be seen as resources to help customers achieve value-in-use. With this view, customers are seen as value co-creators, and providers (manufacturers) as value facilitators through direct interactions with customers in the joint process (Gronroos and Voima 2013).

Relational process of value co-creation

The framework of Payne, Storbacka et al. (2008) extends S-D logic by demonstrating how customers engage in value co-creation in the B2C market (see Figure 2.2). Their process-based framework offers a structure showing three interconnected processes, customer, encounter, and supplier processes, as key processes for managing value co-creation. In Figure 2.2, the middle two-way arrows show the two-way continuous activities which connect the supplier and customer processes, creating possibilities for value co-creation. The big thick one way arrows between 'customer learning' and

'relationship experience' represent the mutual learning at both supplier and customer ends as a key-component, which nurtures and promotes potential value co-creation activities.

Figure 2.2: A conceptual framework for value co-creation (Payne et al. 2008, p.86)
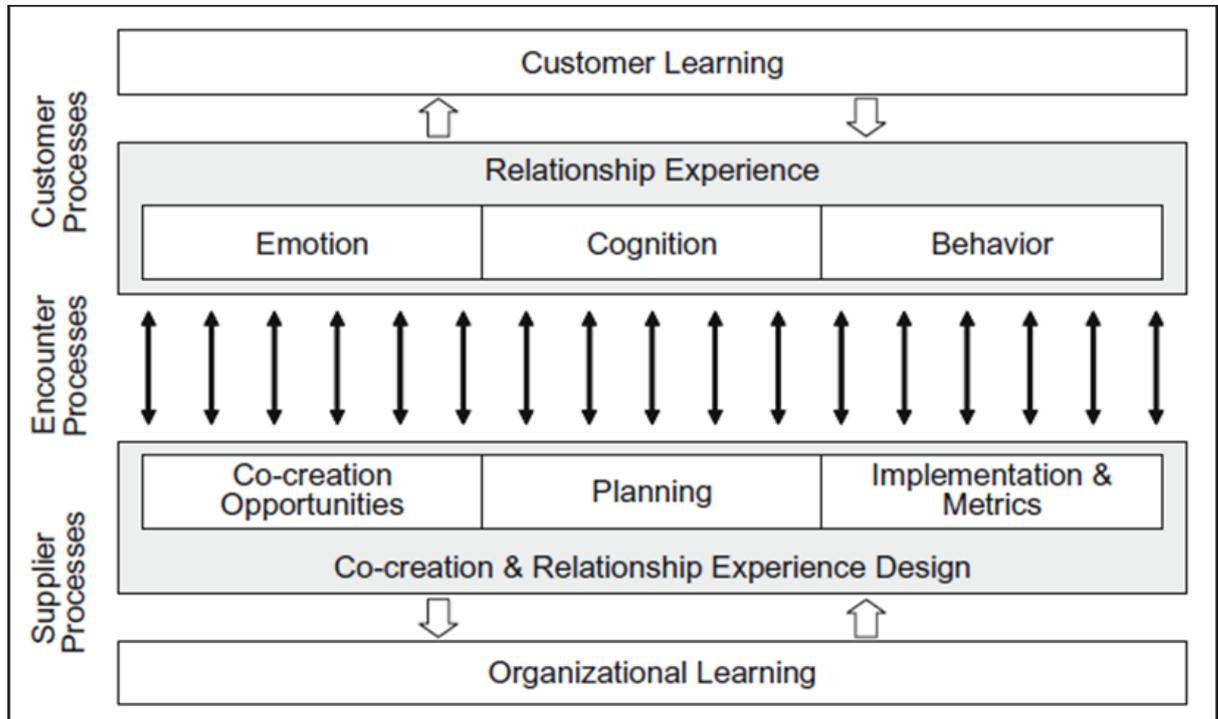
The framework suggests three broad forms of encounter that facilitate value co-creation: communication encounters, usage encounters and service encounters (Payne, Storbacka et al. 2008). The authors suggest that in order to manage value co-creation related to customer's experience, there is a need to define customer practices in relation to different encounters, which the authors categorised into three relationship experiences: emotion, cognitive and behaviour supporting encounters. This framework describes the importance of the customer, supplier, and encounter processes in an integrative way, implying that adopting a co-creation process necessitates communication, managing expectations, and promises among involved stakeholders (Payne, Storbacka et al. 2008). The framework provides a structure for customers' involvement and demonstrates that opportunities for value co-creation can be identified by the suppliers, educating the customers about certain co-creation behaviour, and seeking new ways for customer involvement (Payne, Storbacka et al. 2008).

2.6.3 Managerial discourse on value co-creation

From a managerial perspective, the phenomenon of value co-creation can be seen from the Prahalad and Ramaswamy (2004) book entitled "*the future of competition: co-creating unique value with customers.*" The book calls for a paradigm shift, drawing on the difference between conventional value creation and value co-creation, where companies are traditionally categorised as business-to-customer or business-to-business, and most actions are company-centric. They suggest a new way: customer-to-business-to-customer, which places more emphasis on customer value creation (Prahalad and Ramaswamy 2002, Prahalad and Ramaswamy 2004).

Furthermore, Prahalad and Ramaswamy (2004) introduced the DART model of value co-creation (Dialogue, Access, Risk assessment, and Transparency), which focuses on interactions between companies and customers to support value co-creation activities (see Figure 2.3).

Dialogue

Dialogue is about open interaction, profound engagement, and collaboration between providers and customers, leading to an understanding of the customer's perceptions of value. It is more than listening to customers. It requires shared knowledge and communication between two equal problem solvers or people with the same goal.

Access

Access starts with tools and information. It is about allowing customers access to the providers' processes and the opportunity to gain experience without owning a certain product. For example, the sharing of operational data between the organisation and its customers. Having access can create new opportunities in emerging markets (Prahalad and Ramaswamy 2004).

Risk Assessment

Prahalad and Ramaswamy (2004), refers to risk here as the likelihood of harm to the customer. When communicating with customers, managers are usually focused, almost completely, on articulating benefits, thus, largely ignoring risks.

Transparency

As information about products, technologies, and business systems becomes more reachable and available, creating new levels of transparency becomes increasingly necessary. Transparency refers to the notion of allowing customers to see the production and delivery process of the value propositions (Prahalad and Ramaswamy 2004). Organisations have usually benefited from information asymmetry between companies and customers; this is disappearing very quickly due to value co-creation (Prahalad and Ramaswamy 2004).

These components of the DART model complement each other, as access and transparency of the process allow valuable dialogue and a better understanding of the risk associated with the service offering.

Figure 2.3: The DART model (Prahalad and Ramaswamy 2004, p. 9)
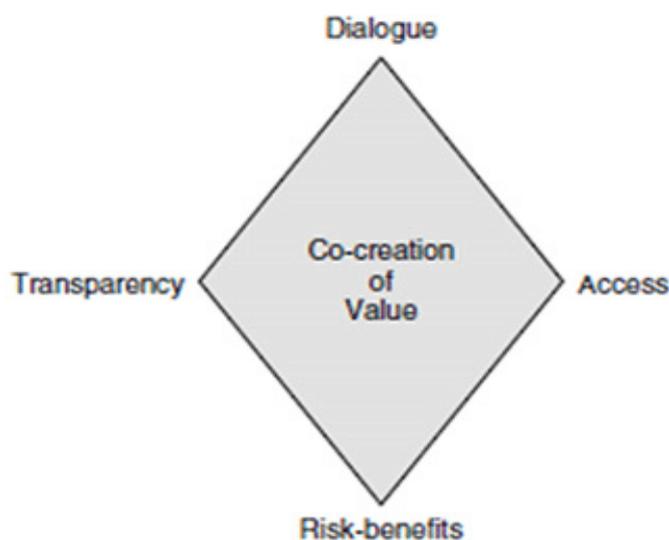
Prahalad and Ramaswamy (2004), emphasise that co-creation is a joint value creation between the company and the customer that entails the joint definition of and solution to problems. Active and continuous dialogue permits customers to construct a personal experience which suits their context. Nonetheless, it is noted that value co-creation is not about providers trying to please the customer with excessive customer service. In line with this, Prahalad and Ramaswamy (2004) demonstrate what co-creation, is and what it is not, as shown in (Figure 2.4).

Figure 2.4: The concept of value co-creation (Prahalad and Ramaswamy 2004, p. 8)

WHAT CO-CREATION IS NOT

- Customer focus
- Customer is king or customer is always right

- Delivering good customer service or pampering the customer with lavish customer service
- Mass customization of offerings that suit the industry's supply chain
- Transfer of activities from the firm to the customer as in self-service
- Customer as product manager or co-designing products and services

- Product variety

- Segment of one

- Meticulous Market research

- Staging experiences

- Demand-side innovation for new products and services

WHAT CO-CREATION IS

- Co-creation is about *joint* creation of value by the company and the customer. It is not the firm trying to please the customer

- Allowing the customer to co-construct the service experience to suit her context

- Joint problem definition and problem solving

- Creating an experience environment in which consumers can have active dialogue and co-construct personalized experiences; product may be the same (e.g., Lego Mindstorms) but customers can construct different experiences

- Experience variety

- Experience of one

- Experiencing the business as consumers do in real time
- Continuous dialogue

- Co-constructing personalized experiences

- Innovating experience environments for new co-creation experiences

2.6.4   Value co-creation from the service science community

Service science has evolved significantly from information systems (IS) and calls for an

interdisciplinary study of service systems and how resources of one or more service systems are

applied for the benefit of another (Chesbrough and Spohrer 2006, Spohrer and Maglio 2008, Heiskala,

Hiekkanen et al. 2011, Baines and Lightfoot 2013). This multi-disciplinary approach to understanding value co-creation is complex and considers the creation of value from a service system perspective where resources are integrated through interactions with other service systems for value co-creation.

These resources can be knowledge, shared information, technology, and competencies (Edvardsson, Tronvoll et al. 2010). The service science perspective applies scientific understanding to advance the ability to design, improve and scale up services, to drive service innovation, and competition through the co-creation of value (Spohrer and Maglio 2008, Ostrom, Bitener et al. 2010). It involves service innovation, which creates value for providers, customers, and network partners, through new and improved service offerings, processes and business models (Ostrom, Bitener et al. 2010). Within this community, two important ideas are prominent: service system, and service design and management. These are discussed below.

2.6.4.1 Service system thinking on value co-creation

Spohrer and Maglio (2008) propose a "service system" as a concept that will help understand the nature of service and respective resources. A service system is conceptualised as a configuration of resources contributing to reciprocal value co-creation with other service systems (Spohrer and Maglio 2008). Vargo, Maglio et al. (2008) described two types of resources and made a distinction between operant and operand resources. Operant resources can act on other resources to provide benefit; in other words, they create value. Operand resources, in turn, require action to provide benefit. In line with S-D logic foundational premises 4 (FP 4), "*operant resources are the fundamental source of competitive advantage*" (Vargo and Lusch 2008a, p. 148). The authors discuss two kinds of co-creation: direct and indirect service provision. Within direct service provision, the organisations operant resources are vital, while for indirect service provision customers commonly use their operant resources to act upon resources provided by the manufacturer. Resources integration is an important part of a service system development, where usage, process, and integration of accessible resources play a vital role, and customers are supported through resources integration processes for value co-creation (Vargo, Maglio et al. 2008, Edvardsson, Tronvoll et al. 2010, Edvardsson, Ng et al. 2011). In brief, resources integration through interaction is a dominant way to co-create value where customers

input, i.e., direct involvement of the customer in value co-creation through direct interaction is intended for specific service activity (Peters, Löbler et al. 2014) and customer information is fundamental for service delivery (Peters, Löbler et al. 2014, Ruiz-Alba, Soares et al. 2017).

2.6.4.2 Service design and service management

The idea underlying the service system approach from an operations management perspective is that customer should take part in the design of a service they will later use. This study considers value co-creation in the context of service design, considering that there is a level of joint development which Gronroos and Voima (2013) describe as joint sphere. Designing or innovating existing service (service innovation) combines innovations in technology, business model, social organisations, and demand, with the objective of improving the service system, creating new value propositions (offerings) or creating new service systems (radical innovation). Service innovation can be a result of the reconfiguration or reprogrammability of existing service elements (Yoo, Boland et al. 2012). Service design can be seen as embedding user involvement in service development (Chesbrough 2003). Thus, service design and service innovation partly overlap. A model by (Kumar 2009) provides a design perspective on innovation. It suggests that adopting and understanding the user's view in design innovation is core to the notion of value-in-use (Vargo and Lusch 2008a, Gronroos and Voima 2013). The model demonstrates the difference between business and technology driven innovation and design-driven innovation. The former starts with traditional product innovation, while the latter starts by understanding the user's needs (see Figure 2.5).

Figure 2.5: The models of innovation (Kumar 2009, p. 92)
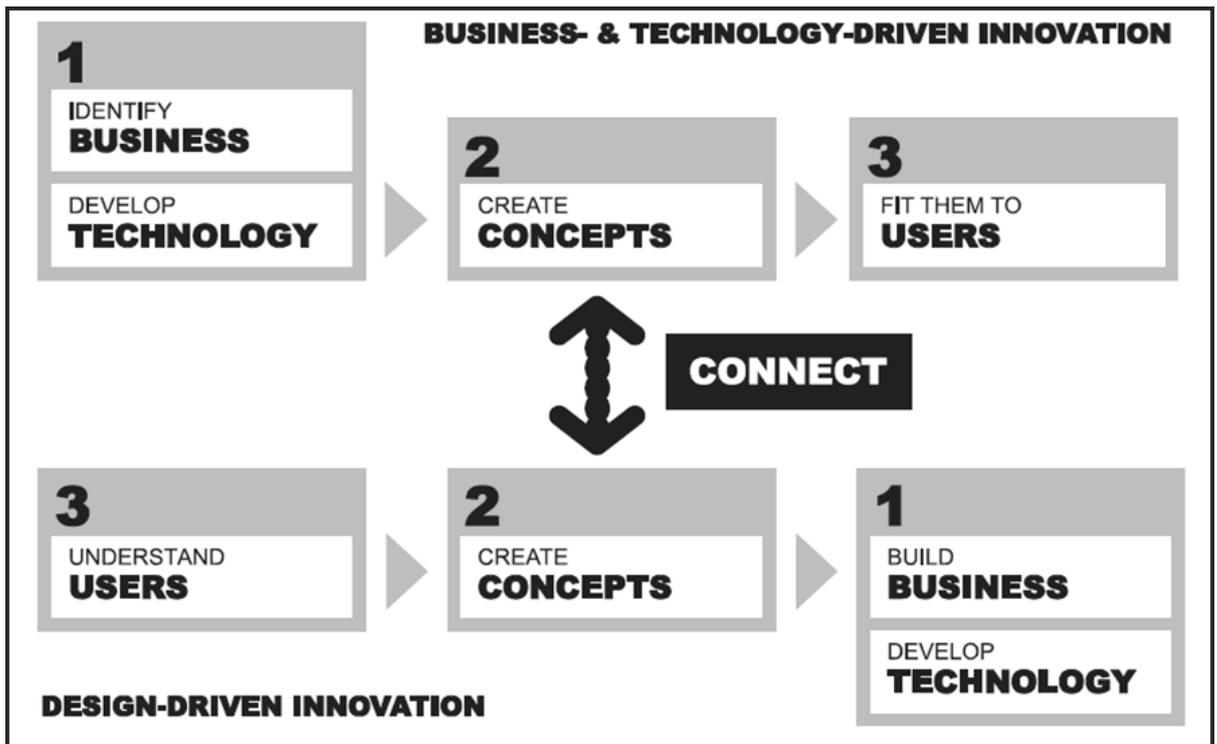
2.7 CONCEPTUALISING THEORETICAL INSIGHT INTO A FRAMEWORK

This sub-section aims to translate the theoretical understanding, key concepts, and approach to value co-creation identified in literature into a conceptual framework of value co-creation which will be used later for the data analysis. The conceptual framework is designed to: 1) understand value co-creation in services, 2) analyse the current business approach of the case organisations, and 3) present the findings of the study. The literature review showed existing frameworks, models and current perspectives on value co-creation in various fields such as service design, service marketing, and management and service innovation. While the existing frameworks and current perspective are useful, each offers slightly different perspectives and different levels of abstraction. None of the existing frameworks provided the holistic view required to execute this study. Therefore, it was essential to design a framework by expanding and adapting notions of value co-creation proposed in the literature. The resulting framework seeks to clarify value co-creation in servitisation, be usable with case companies, and, in turn, answer research question RQ2: *How is value co-creation manifested in servitisation based on existing theoretical attributes?*

2.7.1 The themes

To achieve this purpose, it is necessary to summarise the current understanding under relevant key concepts. In the literature, three vital concepts of value co-creation were identified, which relate to: a) strategic objectives in value co-creation (Mannervik and Ramirez 2006, Vargo and Lusch 2008a, Gronroos and Voima 2013), b) service design and service management (Sanders and Stappers 2008, Kumar 2009, Yoo, Boland et al. 2012), and c) a focus on interactions, involvement, and relationships (Lusch and Vargo 2006, Payne, Storbacka et al. 2008, Vargo, Maglio et al. 2008). To provide an overview, Table 2.2 summarises the key themes of value co-creation in the order in which they are presented and explored further in sub-section 2.7.2.

2.7.1.1 Overview of the main themes

Theme 1: Strategic objectives, seeks to cover the contemporary discussion in Service-Dominant logic and stems from marketing theory. Theme 2: Service design and service management, aims to cover understanding from the service science perspective which considered service system, service design,

and operations management perspectives when designing, improving, and managing value propositions. This includes co-design and co-innovation of services which plays a vital role in value co-creation (Sanders and Stappers 2008, Ruiz-Alba, Soares et al. 2017). Theme 3: Interactions, involvement, and relationships, stem mainly from collaborative and co-production service activities through the relational approach. Literature emphasis that value co-creation requires active interactions and relationships between two or more actors. For the purpose of this study, these would be manufacturer, customer and sometimes dealers (Vargo, Maglio et al. 2008, Grönroos 2011, Gronroos and Voima 2013). Realistically, these three themes overlap however to simplify the themes and demonstrate their meaning they are treated as separate sections, as shown in Table 2.2.

Table 2.2: Three key themes of value co-creation in services

Key themes of value co-creation	Description
Theme 1: Strategic objectives	This theme demonstrates how the company's strategy and goal affects its value co-creation approach (Vargo, Maglio et al. 2008, Ojasalo 2010).
Theme 2: Service design and service management	This theme focuses on service development including the process of developing and adapting value propositions (Lusch and Nambisan 2015).
Theme 3: Interactions, involvement, and relationships	This refers to the relational nature of service, where interactions and relationships between provider and customer are key areas in value co-creation, and enhance the corresponding customer needs and provider competencies (Ramirez 1999, Vargo, Maglio et al. 2008).

Furthermore, the review revealed an inconsistency in the way the literature describes how service management, service design, and service innovation are performed. For instance, some illustrate ways of performing services using user-oriented design as opposed to participatory design, goods logic vs. service logic, or technology-driven innovation vs. user-driven innovation (Lusch and Vargo 2006,

Kumar 2009, Grönroos 2011). To simplify this, Table 2.3 shows the poles ranging from a traditional servitisation approach to a customer co-created servitisation approach as Green, Davies et al. (2017) suggested. This sequence will help explore how theoretically derived attributes of value co-creation are applied in servitisation, demonstrating the difference between the traditional approaches to service and the customer co-created approach.

Table 2.3: The opposite poles of value co-creation approach

Key themes of value co-creation	Poles of value co-creation in servitisation	
Theme 1: Strategic objectives	←	→
Theme 2: Service design and service management	Traditional approach	Customer Co-created approach
Theme 3: Interactions, collaborations and relationships		

Rationale for selecting the three themes

The topic of value co-creation in servitisation is positioned at the intersection of marketing and strategic management, service research and innovation, inter organisational relationship and operations and production management (Vargo and Lusch 2004, Payne, Storbacka et al. 2008, Ramaswamy 2008, Chesbrough 2011, Raja, Bourne et al. 2013, Smith, Maull et al. 2014). This comes from the fact that value co-creation and servitisation are composed of various complex hard (service exchange, technological systems, financial outcomes) and soft (commitment, trust, relationships) factors which are closely entwined. Past literature is in agreement that value co-creation occurs in joint interaction, however, it suggested a multi-theoretical approach within which collaboration can be characterised (Vargo, Maglio et al. 2008, Grönroos 2011, Gronroos and Voima 2013, Smith, Maull et al. 2014, Lenka, Parida et al. 2017). Value co-creation is a multi-disciplinary and complex phenomenon which comprise of various characteristics such as resources integration (Lusch and Vargo 2006), ongoing relationship (Zwick, Bonsu et al. 2008, Vargo and Lusch 2008a), collaboration (Vargo, Maglio et al. 2008, Mele, Colurcio et al. 2014, Pirinen 2016), creation of value propositions (Vargo, Maglio et al.

2008), desired outcome (Rusanen, Halinen et al. 2014) and co-production activities, (Ordanini and Pasini 2008, Ordanini and Parasuraman 2011). There is a need to converge these concepts in to a meaningful categories to enable a multi-theoretical framework in servitisation to facilitate a more insightful analysis, so that existing knowledge can be understood and used in empirical research. Therefore, these concepts are grouped under three main themes of value co-creation as summarised in table 2.4.

Additionally, four sub-themes are proposed to understand the meaning and characteristics of the main themes better. These sub-themes describe in detail the kinds of attributes included in each theme, as shown in Table 2.4 below. The next section details the description of each theme.

Table 2.4: Key themes of value co-creation and sub-themes.

Key theme	Sub-themes	Description
Theme 1: Strategic objectives	1A) Business goals	Manufacturer's and customer's business objectives.
	1B) Perception of value	Benefits both parties desire to obtain from the application of knowledge and skills (Vargo, Maglio et al. 2008).
	1C) Strategic process	Aligning strategy with process.
	1D) Co-production of service activities	This is a collaborative production of outputs between provider and customer that aims for mutual exchange and may be an antecedent of value co-creation in B2B services (Vargo, Maglio et al. 2008, Edvardsson, Tronvoll et al. 2010).
Theme 2: Service design and service management	2A) Resources integration	This refers to the dynamic process of configuring and integrating interdependent actors resources for their benefit and the benefit of others (Vargo and Lusch 2008a, Vargo and Lusch 2008b, Lusch and Nambisan 2015).
	2B) Collecting information on the customer	Customer's information processed and integrated into service innovation.
	2C) Creating value propositions	The dynamic process where the provider adapts her proposition to apply competency and knowledge in ways that leads to something desirable to the customer (Vargo, Maglio et al. 2008, Edvardsson, Tronvoll et al. 2010).
	2D) Testing and launching a value proposition	Real outcome and value propositions developed.
Theme 3: Interactions, involvement, and relationships	3A) Provider and customer relationship	The relationships between manufacturers and their customers.
	3B) Nature of interaction	Direct or indirect interactions between the manufacturers, customers and other network actors.
	3C) Amount of interaction	The frequency of interaction within the service network.
	3D) Level of access to information and other resources	Equality or inequality of information access/knowledge between provider and customer that can lead one actor's benefits to dominate (Edvardsson, Tronvoll et al. 2010).

2.7.2   Value co-creation in strategic objective (Theme one)

The first theme follows the discussion in the literature related to Service-Dominant logic theory and service logic (Gronroos 2008, Vargo, Maglio et al. 2008, Grönroos 2011). The rationale for assembling this theme is to show how strategic objectives and business goals are defined in both traditional servitisation and the customer co-created servitisation approaches. To adopt value co-creation approaches in servitisation, manufacturers need a new kind of strategic goal and a commitment to change (Lusch and Vargo 2006).

2.7.2.1 Traditional servitisation approach in theme one.

In the traditional servitisation approach to business goals, a firm creates and sells goods and services, with the aim of maximising value for the firm: a mind-set associated with goods-dominant logic, where the value is achieved through the exchange (Lusch and Vargo 2006, Grönroos 2011, Gronroos and Voima 2013). Here, the emphasis is on the optimisation of the firm's processes. As Kowalkowski, Kindstrom et al. (2013) suggest, service is in support of the supplier's product and process. The strategy is developed without active customer involvement, where the strategy is developed inside-out. The firm has its value-creation processes, where goods and services are used to generate value through the fulfilment of customer needs. In this servitisation approach, the manufacturer uses its ICT, resources, and knowledge, and sees production and technical knowledge as the most important resources.

2.7.2.2 Customer co-created servitisation in theme one

In this approach, greater emphasis is placed on the customer's context; firms jointly create comprehensive customer solutions to increase the customers' value-in-use, enabling economic value for the customer firm (Grönroos 2011). In customer co-created servitisation, the approach considers a joint process, where strategy is developed closely between employees, customers, management, and other stakeholders, i.e., from outside-in, which fits in with the Kowalkowski, Kindstrom et al. (2013) depiction of service in support of the customer's processes. Here, the focus is on the customer's value creation processes, so as to facilitate customer's value-in-use (Ojasalo 2010). Both firms and customers resources are shared and jointly integrated, and their competence is actively employed for

the benefit of the actors involved (Spohrer and Maglio 2008, Storbacka, Brodie et al. 2016). Table 2.5 summarises the strategic objectives theme.

Table 2.5: Theme 1- Strategic objectives

Theme 1: Strategic objectives	**Poles of value co-creation in servitisation**	
	Traditional approach	**Customer co-created approach**
1A) Business goals	Creates and sells products and services in exchange (value-in-exchange)	Jointly creates comprehensive customer solutions (value-in-use)
1B) Perception of value	Focus on achieving the provider's perception of value	Focused on the customer's desired value from the provider's application of skills and knowledge
1C) Strategic process	Inside-out	Outside-in
1D) Co-production of service activities	Focus on value creation processes	Focus on customers involvement in value creation processes

2.7.3   Value co-creation in service design and service management (Theme two)

The second theme is focused on service design and service innovation (Sanders and Stappers 2008, Kohtamaki, Partanen et al. 2013, Peters, Löbler et al. 2014). This theme is embedded in the process of developing value propositions as shown in Table 2.6.

2.7.3.1 *Traditional approach in Theme two*

In the traditional approach in Theme 2, firms see resources integration as transforming the micro-specialised competences into complex value propositions. As such in the traditional approach, firms collect information on the users through structured means, such as surveys questionnaires, etc. to gain insight into the user needs and satisfaction (Prahalad and Ramaswamy 2004, Sanders 2008). This user information is then processed within the firm, and new value propositions are developed by having an expert mind-set. In other words, the development follows an inside-out process (Payne, Storbacka et

al. 2008). Consequently, the value proposition is tested within the firm and is launched through the traditional market approach, i.e. selling goods and services to the customers (Sanders and Stappers 2008, Kumar 2009).

2.7.3.2 Customer co-created approach in Theme 2

In the customer co-created approach, the value is understood as a process of resource integration (Vargo, Maglio et al. 2008), signifying the importance of customer competence. A firm gathers information on the customers through participatory methods, such as listening and learning together (Ballantyne and Varey 2008). This customer information is then processed in collaboration with the customer, with the aim being to enhance the relationship. The value proposition is jointly created and tested by both actors to achieve the desired outcome. In line with this early collaboration, a comprehensive customer solution is achieved, and no separate launching is required. As a result, customers are involved and proactively take part at every stage of the service design and innovation. This approach is encouraged by (Grönroos 2011), suggesting an outside-in approach, by stating that proactively involving the customer and understanding customers' value-creating processes allows firms to effectively and efficiently design more ways to provide resources that support value co-creation. Thus the customer's role in service design and innovation can be divided into two; customers as informant and customers as co-designer (Ojasalo 2010). When services are jointly designed and innovated with customers, the customers are active partners at every stage and are no longer seen only from an observational viewpoint (Jaakkola and Hakanen 2013, Smith, Maull et al. 2014). This study, in line with Mattelmäki and Visser (2011), perceives co-design as a subcategory of value co-creation. Theme 2 is summarised in Table 2.6.

Table 2.6: Theme 2- Service design and innovation

Theme 2: Service design and innovation	Poles of value co-creation in servitisation	
	Traditional approach	Customer co-created approach
2A) Resources integration	Emphasis on firm resources, processes, competences, and technologies	Emphasises on resources shared among network actors
2B) Collecting information on the customer	Information is collected through structured methods	Information is collected through participatory method, listening and learning together
2C) Creating value propositions	Inside-out, design by the firm only	Outside-in, including the customers
2D) Testing and launching the value proposition	Internally within the firm, and by selling products/services	Externally with customers, through the provision of solutions

2.7.4   Value co-creation in interaction, involvement, and relationships (Theme three)

Theme 2 is focused on provider/customer interactions, involvement, and relationships as an important activity in value co-creation. From a value co-creation perspective, interactions and collaborations are seen as conditions, where provider and customer mutually engage, understand, and influence each other's processes and benefits (Vargo and Lusch 2008a, Grönroos 2011). In the course of interaction, the firm has the opportunity to engage and provide inputs for value creating activities of the customer, and therefore; the firm becomes a co-creator of value (Gronroos and Voima 2013).

2.7.4.1 Traditional approach in Theme 3

In the traditional approach, customer relationships are oriented towards transactions and the relationships with customers are not actively sustained. In the traditional approach, most interactions occur at the point of product and service exchange. This approach follows the contemporary discussion of goods dominant logic (Prahalad and Ramaswamy 2004, Vargo and Lusch 2004, Ojasalo 2010), where the nature of interactions is passive, and the focus is on selling and some after-sales activities. Customers' access to information and other resources are limited, leading to information

asymmetry (Edvardsson, Tronvoll et al. 2010), i.e., where one actor dominates another, and customers have no opportunity to observe the manufacturer's service operations.

2.7.4.2 *Customer co-creation approach in Theme 3*

In the co-creation approach, service exchange is inherently relational between a provider and its customer (Vargo 2008). The firm's activities are geared towards developing long-term relationships with customer involvement (Ojasalo 2010, Bastl, Johnson et al. 2012). Here, interaction is two-way and proactive, with continuous dialogue focusing on shared experiences and quality of interaction, and can occur at anytime and anywhere (Prahalad and Ramaswamy 2004, Ramaswamy and Kerimcan 2013). The firm has a deep understanding of the customers' processes, and the customer has access to extensive information and other resources. Table 2.7 summarises Theme 3.

Table 2.7: Theme 3- Interactions, collaborations, and relationships.

Theme 3: Interactions, involvement, and relationships	Poles of value co-creation in servitisation	
	Traditional approach	Customer co-created approach
3A) Provider and customer relationship	Relationship is transactional	Focused on developing an ongoing relationship with customers
3B) Nature of interaction	Passive interaction, usually during sales	Continuous dialogue and proactive interaction
3C) Amount of interaction	Generally at the point of exchange	Bi-directional and active interaction (anywhere/anytime)
3D) Level of access to information and other resources	Precisely limited	Transparent collaboration and access

2.7.5   Summary and implications for the study

This study aims to understand value co-creation within B2B servitising organisations through an in-depth analysis of multiple case studies. To achieve this purpose, a conceptual framework was needed based on a contemporary understanding and incorporating value co-creation characteristics in related fields, such as service management, service design, and service innovation. Therefore, the objective of this chapter was to present current knowledge, models, and frameworks of value co-creation in current literature, and to synthesise this knowledge to introduce a conceptual framework of value co-creation in servitisation. The literature review illustrated the current discussion, models, and frameworks related to value co-creation. These frameworks are useful, but each showed slightly different perspectives at different levels, which sometime may be too abstract to be practically implemented within companies.

A conceptual framework on value co-creation was designed a) to understand value co-creation in servitisation, b) to analyse the current business approach of the servitised case companies, and c) to present findings of the study. The conceptual framework, as shown in Figure 2.6, is an initial attempt to incorporate the current understanding of value co-creation in related fields - service management, service design, and service innovation. The case study was used to empirically test the extent to which the framework actuality represents value co-creation within servitised cases, in order to help the case organisations understand value co-creation, and communicate to them how best to co-create value with customers.

Figure 2.6, illustrates the three main themes and the sub-themes, with brief descriptions, included in a conceptual value co-creation framework to help with data analysis in the empirical investigation and to present the findings of the case organisations.

The next chapter will discuss research design, where the conceptual framework will be used for data analysis, and findings of the study will be considered in further refining the study's conceptual framework.

Figure 2.6: The conceptual framework of value co-creation

Theme 1: Strategic objectives (Grönroos 2006a; von Hippel 2005b; Mannervik & Ramirez 2006; Vargo & Lusch 2006	Poles of value co-creation in servitisation	
	Traditional approach	**Customer co-created approach**
1A) Business goals (Koumpis, A. 2010)	Creates and sells products and services in exchange (value-in-exchange)	Jointly creates comprehensive customer solutions (value-in-use)
1B) Perception of value	Focus on achieving the provider's perception of value and its strategic objectives	Focused on the customer's desired value from the provider's application of skills and knowledge
1C) Strategic process	Inside-out	Outside-in
1D) Co-production of service activities	Focus on value creation processes	Focus on involvement of customers in value creation processes
Theme 2: Service design and service management (Magnusson et al. 2003; Meroni & Sangiorgi 2011; Sanders & Stappers 2008)	Poles of value co-creation in servitisation	
	Traditional approach	**Customer co-created approach**
2A) Resources integration	Emphasis on firm resources, processes, competences and technologies	Emphasises on resources shared among network actors
2B) Collecting information on the customer	Information is collected through a structured method	Information is collected through participatory method, listening and learning together
2C) Creating value propositions	Inside-out, design by the firm only	Outside-in, including the customers
2D) Testing and launching the value proposition	Internally within the firm, and by selling products/services	Externally with customers, through the provision of solutions
Theme 3: Interactions, involvement, and relationships (Grönroos 2011a; Lusch & Vargo 2006)	Poles of value co-creation in servitisation	
	Traditional approach	**Customer co-created approach**
3A) Provider and customer relationship	Relationship is transactional	Focused on developing an ongoing relationship with customers
3B) Nature of interaction	Passive interaction, usually during sales	Continuous dialogue and proactive interaction
3C) Amount of interaction	Generally at the point of exchange	Bi-directional and active interaction (anywhere/anytime)
3D) Level of access to information and other resources	Precisely limited	Transparent collaboration and access

CHAPTER 3: THE STUDY

The previous chapter reviewed the literature on value co-creation in services to develop a conceptual framework of value co-creation research, and to provide definitions of concepts around digital technologies, digital capabilities and value co-creation research. Part of the study's objectives is to characterise value creation in a servitised context, based on empirical findings, and synthesise these findings to refine the value co-creation framework in the previous chapter.

This chapter outlines, explains, and justifies the chosen methods to investigate the impact of digital capabilities on value co-creation within servitising organisations. This chapter begins by explaining the philosophical stance adopted for the study, i.e. defines the truth (Hair 2003) and knowledge (Kothari 2004), and justifies the choice of multiple case studies. Thereafter, it describes the sampling method used and case selection criteria.

The chapter is organised in six sections:

- Sections 1: The research paradigm. This section outlines the philosophical stance of the research and the limitations of this choice.

- Sections 2: Research strategy. This section describes the research method and justifies its selection.

- Sections 3: Research approach.

- Sections 4: Research design. This section explains the individual steps and processes employed in the present research.

- Sections 5: Validity and reliability of the research. This section examines the quality of the research method.

- Sections 6: Summary of the chapter.

Figure 3.1 shows a summarised structure of the research methodology chapter.

Figure 3.1: Structure of the methodology chapter.
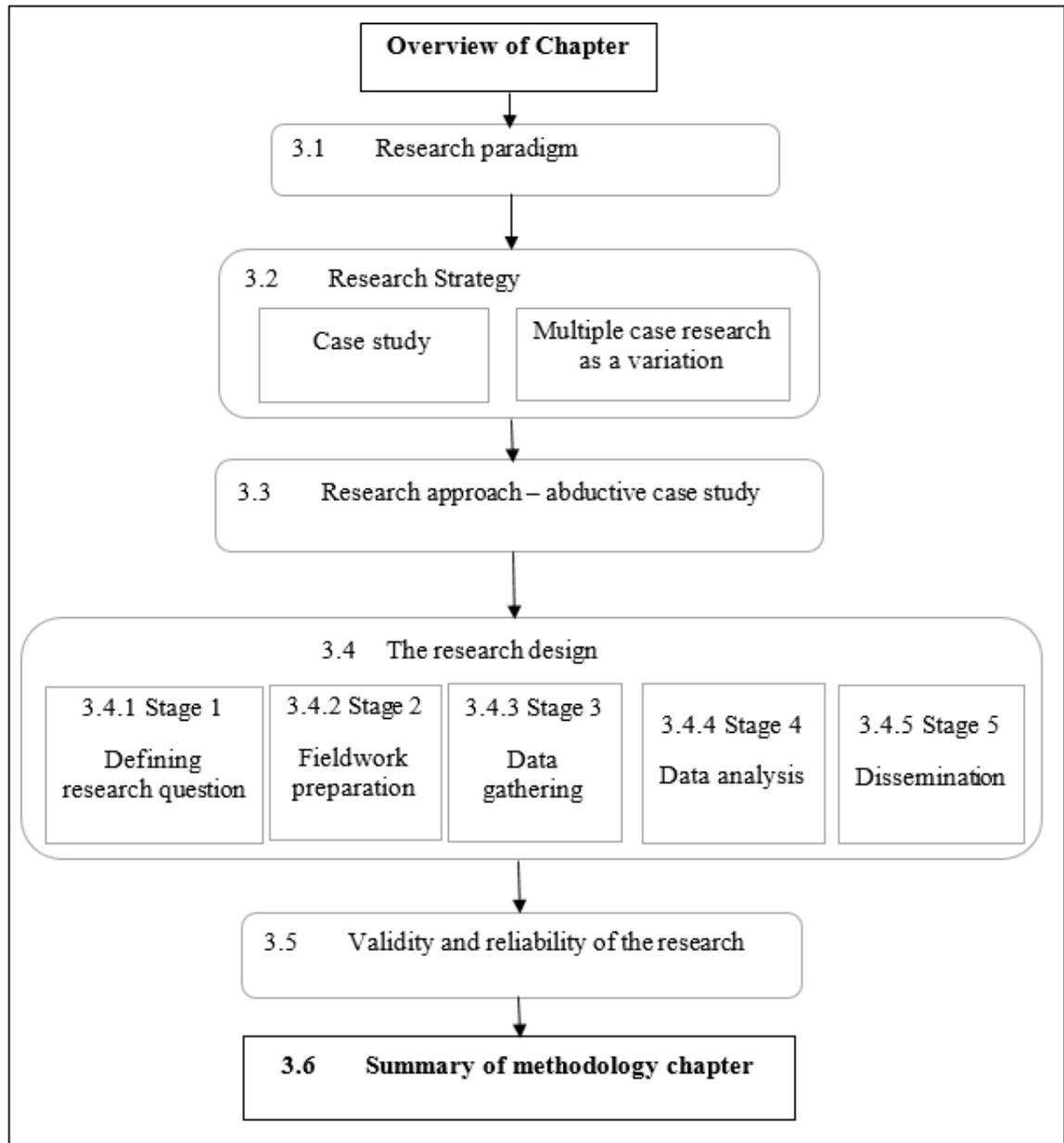
3.1 The research paradigm

"*The lens through which we view the world is our personal philosophy*"(Mills and Birks 2014, p. 18). Every piece of research comes with the researcher's philosophical assumptions and beliefs. According to (Crotty 1998, Denzin and Lincoln 2011), individual researchers generally view the world differently and those viewpoints affect their research methodologies. Organisational research sees a research paradigm as a unique set of connected philosophical assumptions about knowledge which influence the course of a study, methods for data collection, the definition of truth, and knowledge claims (Lee and Lings 2008). A research paradigm represents "*a set of common beliefs and agreements shared between scientists about how problems should be understood and addressed*" (Kuhn 1962, p.45). Researchers approach their studies with a certain paradigm (worldview), and set of beliefs that guide their inquiry (Creswell 1998). These beliefs are linked to ontology (what is the nature of reality?), epistemology (how do you know something?) and methodology (how you go about finding out?). Some of these research paradigms are discussed below.

3.1.1 Positivism research paradigm

According to Bryman (2008, p. 697), positivism " *is an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond*". Predominantly, positivist research assumes objective reasoning in the study of organisational phenomena, which can be identified and verified through objective reasoning and analysis (Easterby-Smith, Thorpe et al. 2012). Two major beliefs of positivist research are: (i) research should concentrate on directly measurable phenomena, with any reference to subjective views excluded; (ii) theory should be tested in a hypothetical-deductive manner, using facts impartially collected from the external world (Orlikowski and Baroudi 1991, Lee and Lings 2008, Symone and Cassell 2012). Positivist research assumes reality exists (ontology), independent of the witness (i.e. the researcher), and can be identified from the research (Darke, Shanks et al. 1998). It aims to produce generalizable knowledge from the testing of a priori hypotheses (Symone and Cassell 2012). As the present research is not focused on hypothesis testing, taking a positivist stance will not be suitable for this study.

3.1.2 Critical research paradigm

A critical inquiry assumes ideas are mediated by power relations in society. Its main focus is on social change, creating awareness among subjects involved so as to enact change to a reasonable extent. It follows a meta-process of investigation, which questions currently held assumptions and challenges conventional social structures (Gray 2013). One assumption is that privileged people in society exert an oppressive force on subordinate groups, therefore they determine knowledge by their area of interest, and regulate what is regarded as 'true' (Easterby-Smith, Thorpe et al. 2012). Critical theory has affected management and organisational research (Gray 2013). However, it is the least commonly used among the three major research paradigm in information systems research, which typically aims to interpret rather than to change the world. It is not used in the present research because the aim of the study is not to change the world. Instead it aims to identify digital capabilities and understand how value co-creation manifest in a servitised organisation based on existing theoretical attributes and, therefore, develop a research framework for servitisation.

3.1.3 Interpretivism research paradigm

The interpretivism research paradigm aims to understand organisational phenomena by accessing and summarising the subjective views of the people involved. Prasad (2005, p. 13) proposes that "*all interpretive tradition emerged from a scholarly position that takes human interpretation as the starting point for developing knowledge about the social world*". An interpretivist uses a humanist and subjective approach to investigate a phenomenon (Hussey and Hussey 1997). According to (Hussey and Hussey 1997, Lee and Lings 2008), an interpretivist believes in the shared view of the observer, which is expected to decrypt the dormant meanings and related values of a social phenomenon. It starts with socially derived subjective perspectives on events. Thus, reality (ontology) will be contextually determined, subjective and constructed.

This study is characteristically exploratory, meaning that data collection methods are flexible and sensitive to social context, and that the method of analysis intends to foster an understanding of the context (Myers 1997, Mason 2002, Saunders, Lewis et al. 2012). An interpretive study accounts for events and situations, seeking to increase understanding of a phenomenon within its natural setting,

from the participant's perspective. The research did not impose 'a priori' understanding of the situation (Orlikowski and Baroudi 1991). An interpretivist researcher uses an inductive process, methodologically. Interpretive research can help information system researchers explore and create understanding about human thought, action and technological phenomenon within social and organisational contexts (Orlikowski and Baroudi 1991, Myers 2009).

3.1.4 Paradigm choice

Based on above views and arguments, this study follows an interpretivist approach as it accept the assumption that the social world is shaped through our interpretations and, therefore, is both complex and emergent (Gray 2013). One of the objectives of this research study is to investigate servitisation and to explore what digital capabilities support value co-creation within a business network. Interpretivism has been proposed as a philosophical basis for information systems research because it allows the investigation of both social and technological objects (Myers 1997, van Aken 2005). As the study's aim involved analysing the meanings essential in service activities, as perceived by manufacturers and customers, interpretivism is appropriate. The rationale for this decision is explained below.

Value co-creation in servitisation is an emerging, ongoing and contemporary phenomenon that unfolds in a complex interplay between technology and social structures; therefor, this should be studied in its context. Crotty (1998) argues that the nature of a study's research problem informs its researcher's view of what constitutes acceptable knowledge on that problem, which then drives the philosophical stance. As such, to examine and understand how digitalisation enables value co-creation in a servitised network, a qualitative research method rooted in interpretivism (Myers 1997) allows better insight into the phenomenon. Social features, such as how participants interact and innovate over time, can be observed.

This paradigm is suitable for discovering the underlying meaning of events, process and activities (Myers 1997, Crotty 1998, Denzin and Lincoln 2005). Since this study aims to investigate how value is co-created within a business network, the impact of digital capabilities and how they enable value co-creation, the events, processes and activities taking place in the case companies, are primary evidence.

3.2   Research strategy

The study investigates the role and impact of digital capabilities on value co-creation of servitising organisations, and also aims to show how value is co-created within this context. Notwithstanding the eminence of servitisation in literature and practice, '*theoretically it is still largely in a nascent phase*' (Kowalkowski, Gebauer et al. 2017, p. 82, Zhang and Banerji 2017).

The literature review showed that digitalisation plays an important role in the servitisation process, but failed to show what constitutes digital capabilities, or how these capabilities enable value co-creation within a servitised network. Theory around this subject area is emergent and understudied.

Rich and detailed data is needed to understand the phenomenon (Langley 2007), and it is important to use a method which will allow deep investigation. In line with these considerations, the study adopts a qualitative case study that aims to explore value co-creation in advanced services.

3.2.1   Case study

"*Case study research consists of detailed investigation, often with data collected over a period of time, of one or more organisations, or groups within organisations, with a view to providing an analysis of the context and processes involved in the phenomenon under study*" (Cassell and Symon 1994, p. 208). A case study is useful when trying to understand a real-life phenomenon in depth, which incorporates vital contextual background information. Case study research allows the combination of various qualitative data collection approaches within an organisation, for example document review, interviews etc. This combination of methods is used partly because complex phenomenon may be best described through various methods so as to increase validity (Cassell and Symon 1994).

3.2.1.1 Rationale for case study strategy

Case research provides a representation of a phenomenon by uniting the case and available data, so as to show detail, and relationships. It equally allows the researcher to recall the full and expressive characteristics of actual events, for example, organisational processes, managerial decisions, their effects, relationships and behaviours (Yin 2009). Case research is used extensively in information system research because it is suitable for identifying and analysing evolving phenomena (Darke, Shanks

et al. 1998), and since the objectives of the research was to identify digital capabilities and analyse how value co-creation manifest within servitisation in order to advance understanding of the phenomenon, case research seems to be the most suitable approach for the study. Voss, Tsikriktsis et al. (2002) promote the use of the case study approach for exploratory research purposes, as it allows inquiry into a contemporary phenomenon. As such, the case study approach is suited for this study, where gathering rich data is expected to identify aspects of digitalisation and value co-creation phenomena (Eisenhart 1989).

Despite the benefits of case research, it has some limitations. Various authors (Eisenhart 1989, Cassell and Symon 1994) noted that case research may be considered labour-intensive, and can lead to complex theories because of its rigorous use of experimental evidence. Also, case study outcomes are frequently seen to be impossible to reproduce, with resulting theory being less generalizable (Lee 1989). These weaknesses will be mitigated, to an extent, by carrying out several case studies during this research.

3.2.1.2 Dimensions of multiple cases versus single case

In the realm of interpretivism, multi-case research is an accepted method, as it enables broad exploration of concepts and allows a degree of generalization (Yin 2009). Also, the exploratory nature of this study's research questions demand a methodology that is suitable for bringing out rich and detailed data (Yin 2009). There were further considerations concerning whether to use a single case study research design or multiple case studies. The table below describes the contrasting implications of a single case study versus a multiple case study design.

Table 3.1. Single vs multiple case studies (Yin 2009)

Single case	Multiple case studies
Empirical	Allows analytical and empirical generalization
Represents critical case in testing well-formulated theory	Considered more compelling and more robust
Represents extreme or a unique circumstance	Overall study is regarded more robust (Herriott and Firestone, 1983).
Representative or typical case	Follows theoretical replication to develop a rich theoretical framework which can be generalised
Revelatory	Allows theoretical replication
Longitudinal purpose	Cases are replicated with different theoretical conditions which provide evidence for further contributions.

Following this comparison, and to address limitations identified for the single case approach, this study uses the multiple case study approach. The sub-section below explains the multiple-case method in detail.

3.2.2   Multiple case research

The use of multiple case studies for research provides important variation that enables analytical generalisation (Yin 2009). Carrying out multiple case studies increases confidence in findings, as it allows cross investigation and analysis of a phenomenon in different situations (Cassell and Symon 1994, Darke, Shanks et al. 1998). The use of multiple case studies allows replication of findings and cross-case analysis (Yin 2014), reinforces its accuracy (Benbasat, Goldstein et al. 1987) and captures useful emergent properties in an organisation (Miles and Huberman 1994, Yin 2005). Multiple case studies may either produce similar results, or produce contradictory evidence (Remenyi, Wiliams et al.

1998). They can be used as part of a grounded theory approach (induction process), or used to validate an established theory (Remenyi, Wiliams et al. 1998).

The multiple case study design collects data by interviewing participants in different organisations (Gephart 2004). The empirical grounding for this study stems from four case studies (Myers 1997, Yin 2014). Selecting multiple organisations as cases allows the cross case analysis of all the individual cases; thereby allowing accurate explanation (Yin 2014). As data comes from respondents dealing with service development, digitalization, information technology and management roles, employing a multiple case study permits adaptations of terminology and discovery of patterns across the four organisations (Eisenhart 1989, Yin 2005). Respondents used for various cases worked across various levels of the organisations, providing a summary of the phenomenon under investigation. This process equally helps increases external validity and reduce witness bias (Voss, Tsikriktsis et al. 2002).

Yin (2003, p. 1) noted, " *in general, case studies are the preferred method when 'how' or 'what' questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context*". Therefore the decision to adopt case studies, was equally based on the nature of the research questions being addressed. This research centres on exploring the value co-creation phenomenon in servitised organisations, and RQ1: *What are the digital capabilities necessary for supporting servitised offerings?* focuses on identifying the digital capabilities necessary for supporting value co-creation and 'how' these digital capabilities enable value co-creation in a B2B context. These questions highlight the exploratory nature of the research and align with the approach suggested by (Yin 2003, Yin 2005).

The above criteria confirm that multiple case study research fits this study and it is an appropriate methodology for investigating the impact of digital capabilities on value co-creation in servitising companies.

3.3 Research approach

Introduction to different research approach

The literature describes three different research approaches for qualitative research, which are inductive, deductive and abductive research approaches. According to Hyde (2000), "*deductive reasoning commences with generalisations, and seeks to see if these generalisations apply to specific instances*; and *inductive reasoning commences with observation of specific instances, and seeks to establish generalisations*". An inductive approach starts with empirical data, i.e. theorising from data through data analysis, whilst the deductive approach is based on logical reasoning where hypotheses are constructed out of an existing theory, and data is then collected to test the theory. The third approach is termed the abductive approach, which provides a fit between the two other extremes (Creswell 1998, Dubois and Gadde 2002, Kovacs and Spens 2005, Saunders, Lewis et al. 2012). The study adopts an abductive research approach it works both ground up from case data and top down from literature.

3.3.1 The choice of Abductive Approach of Reasoning

The core idea of abductive reasoning is that it provides a systemized creativeness in research that allows 'new' knowledge to be created through the continuous iteration of theory and emerging data to deepen both empirical and theoretical knowledge (Andreewsky and Bourcier 2000, Taylor, Fisher et al. 2002, Kovacs and Spens 2005). An abductive process of investigation allows detailed and rich data to be obtained for the phenomenon under examination, in this case, value co-creation through digitalization, service provision and data exchange in business relationships.

The use of an abductive approach and multiple case design allows a foundation for the generation of new theory or the validation of existing theory, as it generates a deep description of the phenomenon (Geertz 1973, Meredith 1998). The aim is to provide a detailed description and develop a theoretical framework which can be generalised (Strauss and Corbin 1998).

Abductive reasoning attempts to understand the theory related to the study to gain pre-understanding and allows a conceptual framework to be developed (as presented in Figure 2.6), which is continuously improved, partly as a result of emerging findings (Dubois and Gadde 2002).

The abductive research process
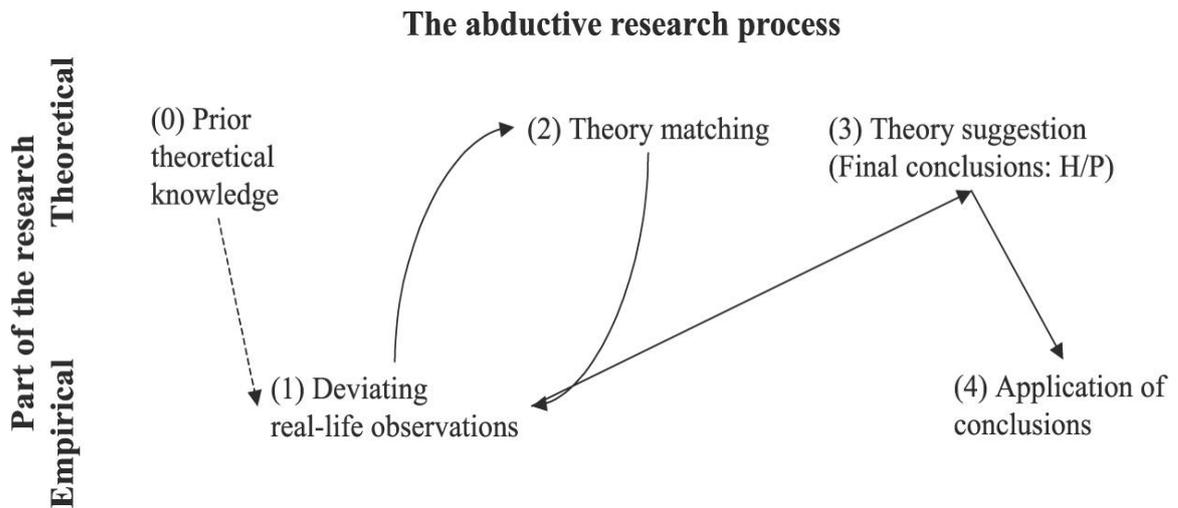
Figure 3.2: The abductive research approach adopted from (Kovacs and Spens 2005, p. 139)

Figure 3.2 shows how the process of abductive research begins at the point where deviation is observed between empirical observation and prior knowledge (Kovacs and Spens 2005). This is followed by the stage where iteration or a systematic combining of existing knowledge and emerging theory takes place (Dubois and Gadde 2002), in order to discover a new framework or extend existing theory by suggestions or propositions. This leads to stage three where research conclusions are presented. The final stage includes the application of research conclusions to an empirical setting (Kovacs and Spens 2005). It aims to understand new phenomena and to suggest new theory through propositions (Andreewsky and Bourcier 2000). As data collection and theory development can occur simultaneously in both methods, abductive reasoning plays an important role in case research (Dubois and Gadde 2002).

3.4   Research design

The research design guides the researcher's process of data collection, the techniques, and approaches to data analysis (Yin 2009). This will explain 'why' and 'how' certain cases, data collection and analysis methods are selected. The design of this research is based on an in-depth abductive multiple case study, as supported by various authors who have previously used this method (Dubois and Gadde 2002, Dubois and Gadde 2014). The research follows the five stage process by Yin (1994). The details of each stage are given below in section 3.4.1 to 3.4.1.

Figure 3.3: Five stage process for case design by (Yin 1994).

3.4.1 Stage 1: Defining the research parameters

According to Yin (1994), the first stage of case research design requires three important components, which are research questions, theoretical propositions and units of analysis. These three components are explained in details below.

3.4.1.1 Research Question

The initial stage of the research entails identifying and defining the research questions (Yin 1994, Stuart, McCutcheon et al. 2002). This is a stage where research objectives and scope are clarified, as was described in Chapters 1 and 2. The study started by reviewing literature around digital technologies in servitisation, capabilities and literature around value co-creation so as to identify the knowledge gap. It was followed by defining the research questions, which would help close the identified gap, and finally, stated the research objectives. This study aims to examine value co-creation between manufacturing firms and their customers, and how digital capabilities enable these processes.

3.4.1.2 Theoretical proposition

Theoretical aspects of case research direct attention to what should be investigated within the scope of the study (Miles and Huberman 1994, Yin 1994). After defining the research questions, another important element in the first stage of the case research process relates to the theoretical propositions of the study (Yin 1994). This is where the link between the research questions and the conceptual framework is demonstrated, and its fundamental logic, assumptions, and expectations are discussed.

This study combines three important concepts; servitisation, value co-creation and digitalisation. A conceptual framework was developed in the previous chapter, based on literature about these three concepts, and this framework will guide this study. Value co-creation within a B2B context is a complex phenomenon relating to different processes, relational elements, and diverse organisational

structures. The theoretical framework facilitates the investigation, following the assumption that value co-creation phenomenon develops in relation to organisational context.

3.4.1.3 Units of analysis

Finally, to conclude the first stage, requires the establishment of the study's unit of analysis (Yin 1994). Unit of analysis underlines the boundaries and limitations of the investigation (Yin 2005). It shows what will be studied and at what level of analysis, for example, society, individual or organisation etc. It determines how the findings from the cases can be linked to the wider body of knowledge (Dubé and Paré 2003). Within the context of this research, a case study involves: a manufacturing firm, which delivers product-service offering to customer firms, in some cases the, dealer and the customers. The unit of analysis chosen for this study is thus the service network providing and receiving value proposition, especially from the customers' perspective. This delineates the scope of the study. The use of service network rather than provider organisation reflects the significance of relationship in value co-creation (Vargo, Maglio et al. 2008, Vargo and Lusch 2008a). Within each organisation, participants chosen were the service managers which are most knowledgeable in servitisation, technological use and value propositions. This enabled focusing on specific engagements which allowed investigation of relationships and other value co-creation activities at the level experienced by participation actors. This helped provide better understanding of how their perception of value is shaped.

3.4.2 Stage 2: Fieldwork preparation

Having defined the research questions, the next stage entails planning appropriate fieldwork for the study. Devising a thorough plan minimises confusion and provides clarity during the process of data collection (Cassell and Symon 1994, Denzin and Lincoln 2005). Because of the exploratory nature of this study, additional care was taken to accommodate the flexibility necessary for developing themes from the empirical data. The three main components of the instrument development stage are case selection, instrument selection and case study protocol (Yin 2003). These components are discussed further in the following sub-sections.

Access to the right data is a crucial part of any research study. Yin (2009) advises that a researcher should have adequate access to potential data. This research adopts a multiple-case, methodological approach, and selected participants who understood the phenomenon of servitisation, hence, they could answer the research questions (Creswell 1998). The author suggests selection of cases should be done in order to show different perspectives on the problem, process or event being portrayed. Yin (2003) advises that the number of cases needs to be considered since a bigger number of cases ensures greater confidence for the findings and results of the research. Various sizes of customer organisations were selected for the study; the researcher ensured at least one key account customer and a small medium enterprise organisation were selected to provide a balanced view. The manufacturers selected offer a wide range of services and have digital capabilities supporting servitisation and business operations in general. All organisations met the minimum criteria for the study to ensure quality.

Two main sampling approaches

Selection of cases at the organisational level includes different types of firms and various firm sizes. Case selection also highlights the importance of stage two as this is where empirical settings are chosen for inquiry. There are two main sampling approach; random and purposive sampling. These are explained below.

Random approach

The first approach of sampling considers a random or probability sampling selection approach, and this is usually applied to research aiming for statistical generalisation (Bryman 2012). This approach is mostly used in quantitative studies because it requires a large population to sample. However, there are a limited number of truck manufacturers.

Purposive approach

The second is purposive sampling which is commonly used in qualitative studies, and aims "*to sample cases/participants in a strategic way, so that those sampled are relevant to the research questions that are being posed*" (Bryman 2008, p. 415). According to Silverman (2013), purposive sampling needs the researcher to understand the nuances and characteristics of the population under inquiry and select

pertinent cases. As this study is qualitative research, exploratory in nature, therefore, the purposive

sampling method is appropriate and is also feasible.

3.4.2.1.1 *Types of Purposive sampling*

There are various types of purposive sampling techniques which can be used and these are shown in

Table 3.2.

Table 3.2: The types of purposive sampling (Adopted from Bryman, 2012, pp.419).

Type of Purposive sampling	Definition
Extreme or deviant case sampling	Sampling cases that are unusual or that are unusually at the far end(s) of a particular dimension of interest.
Typical case sampling	Sampling a case because it exemplifies a dimension of interest.
Critical case sampling	Sampling a crucial case that permits a logical inference about the phenomenon of interest – for example, a case might be chosen precisely because it anticipated that it might allow a theory to be tested.
Maximum variation sampling	Sampling to ensure as wide a variation as possible in terms of the dimension of interest.
Criterion sampling	Sampling units (cases or individual) that meet a particular criterion.
Theoretical sampling	Sampling related units on the basis of relevance to the research question, theoretical position and contextual account.
Snowball sampling	Sampling a small group of people related to the research objectives. These people in turn direct the researcher towards other relevant individuals who are experienced or are aware of the researcher's interest.
Opportunistic sampling	Capitalising on opportunities to collect data from certain individual, contact with whom is largely unforeseen but who may provide data relevant to the research question.
Stratified purposive sampling	Sampling of usually typical cases or individuals within subgroups of interest.

Bryman (2012) suggests that sampling should be done at various levels, such as the organisational

level where the case organisation is selected, and the individual level where participants from the case

organisations are selected. The research objectives should inform the criteria for selection.

Additionally, Bryman (2008) argues that sampling should not be limited to only organisation and individual, instead it should also apply to documents, or even country of data collection, so as to position the research in its context or background. Following this understanding, the chosen technique is discussed in detail below.

3.4.2.1.2   Application of criterion sampling to the case study

Criterion sampling describes all units (cases or individuals) that meet a particular criterion (Bryman 2012). The selection of both organisations and individuals followed a criterion sampling procedure (Patton 1990, Yin 1994). Guided by the research questions and objectives, case organisations, individuals, and secondary data sources were strategically and systematically selected meeting three minimum criteria:

- Must be within the context of the study, i.e., a manufacturing organisation involved in product/service offerings with customers in B2B context. The products and services must be sold together as an integrated package, delivered over a period of time.

- An organisation that has been involved in servitisation for at least two years, and have been part of the service network, which includes customer organisations and dealer network to help provide a rounded perspective.

- Able to interview one or two key participants, in order to obtain sufficient data and participants needs to be people involved or aware of the service provision.

These minimum criteria were set out to ensure adequate data was collected.

3.4.2.2 Identifying the instrument/case organisations

Identification of cases began in February 2016. The study focused on truck manufacturing industry because (i) the truck manufacturing industry is involved in servitisation, and (ii) have customer organisation to support the B2B focus of the study. Some contact details were also obtained from the Advanced Services Group (ASG) Aston University. One of the manufacturers which met all the criteria above was contacted independently, and an interview was scheduled. At the same time, an email invitation was sent out to other potential participant organisations, and followed up with calls to these companies, asking for their permission to interview staff in the related departments. However, few

positive responses were received. Most declined because of lack of time to commit to the research. While in other cases, the reasons had to do with internal policies which prevented them from taking part.

Due to these difficulties identified above, a tactical decision was made to always ask participants for referrals to additional contacts or further organisations of interest. This identified new contacts at each interview. Nonetheless, care was taken to make sure all referred participants or organisations met the three minimum criteria.

The first interview was carried out in April 2016 after approval from the Aston Business School ethics committee (see Appendix 1). During the first interview the participant asked if the researcher would be interested in attending one of biggest conferences for high value truck manufacturers and their networks hosted every year by the technology company that provides the technology for these services. This invitation was accepted and opened up a new opportunity to meet other manufacturers and their various customers. Many contacts were made on the day of this conference and were followed up with an email for more data collection. These contacts were established after the conference in May 2016. The majority of the contacts were interested in participating in the research. These were mostly truck manufacturers, dealers (suppliers) and customer firms.

Most of the interviews were carried out with top management personnel in charge of the technology, the services and the after sales processes in the organisations (see Table 4.1 for the list of the case companies, the participants and their roles). They either introduced the researcher to their colleagues for further interviews or facilitated introduction to new contacts in customer organisations. In the manufacturing organisations, access was sought from at least two key areas: the Service Manager/personnel and the Technology Manager. In the customer or dealer organisations, interviewing the managing director was very important as they run and monitor the day-today-day operations for the company and have a broad perspective. The research spreadsheet was constantly updated according to developed contacts, participant availability and scheduled dates for data collection.

3.4.2.3 *Case study protocol*

Bryman (2008) suggests that having a case study protocol guides the researcher and improves the reliability of the study. Interview questions are the main part of case study protocol. The protocol should include the objectives of the research, guidelines for reporting and field procedures (Yin 2009). The research objectives were explained earlier in stage 1; guidelines for reporting will be explained later in stage 5. Field procedures are hands-on instructions for the researcher, before, during, and after the interviews. The field procedures for this study were categorised into three set of instructions: (a) the list of tasks before interviews, such as the list of documents to print and present at the interview, (b) the list of instructions during the interview, for example, signing the consent form by potential interviewees to allow the recording and taking of notes as the interview goes. A copy of the consent form is presented in Appendix 2 on for potential interviewees and (c) an email to thank the participant and reminding them to send any relevant documents cited during the interview. The next stage discusses in details the process of data collection for this study.

3.4.3 Stage 3: Data Gathering

According to Yin (1994), there are various ways in which data can be collected in a case study; this includes interviews, documents, archival records, observations, and attendance at meetings. Dubé and Paré (2003) suggest that, in information systems (IS) research, interviews are the most commonly used source of data with document review second. Therefore, interview were used as the primary form of data collection for this study. The interviews were discussion led rather than structured (Yin 2009). This allows the researcher to focus on the case topic and still gives the chance to elicit relationships perceived by the participants. Nevertheless, interviews can be limited by the poor structure of questions, poor recollection of events, and the possibility of the researcher influencing how the participant answers the questions (Yin 2003). To address these issues, Yin (1994), recommends the use of an interview protocol.

3.4.3.1 *Interview protocol and design of interview questions*

The interview protocol comprised of three main sections which were (a) pre-interview preparations; a checklist of items required (b) the study's objectives (c) research questions: around digitalisation, the

offerings, service innovation processes and customer involvement in value co-creation, and (d) ending the interview. Table 3.3 shows the interview protocol.

Table 3.3: The interview protocol document

The Interview Protocol	
Section 1 – Interview Checklist	
Detail	**Description**
Digital recorder, business cards, diary for note taking, pens, extra batteries	All items are required for the interview.
Section 2 - Introduction	
Detail	**Description**
ABS participant briefing, ABS research consent form	The interviewer introduces the study objectives, explains how long the interview might last and asks the interviewee to sign the consent form showing he/she agrees to be recorded.
Section 3 –Interview Questions	
Detail	**Description**
1 – Context • Personal • Industrial • Organisational background 2 - Strategy and objectives • Value proposition and value delivered 3 – Service development, service delivery and service innovation processes. • Digitalisation or digital resources • Change in business model • Data and value 4 – Motivation for customer involvement • Interaction with customers • Relationships etc.	Section 1 related to the context of the research. Questions here were asked in relation to background to obtain information about real life context. Section 2, questions in relation to offerings, digital resources as regards to value (research question 1 and 2) Section 3, questions on motivation for customer involvement.
Section 4 – Ending the interview	
Detail	**Description**
Thank the participant and ask he/she would like to receive a summary of the research.	This section finalises the interview. Ask for further contact and also ask for details of key personnel are mentioned during the interview.

A preliminary set of interview questions were prepared and discussed with the supervision team of this study. After the meetings, these semi-structure interview questions were re-evaluated and further developed as shown in Appendix 4. Due to the nature of the semi-structured question, these questions provided a guide to cover all aspect of the research themes.

3.4.3.2 *Primary Data: The interviews*

Interviews are chosen as the primary instrument for data collection since they can provide the required data to achieve the exploratory purpose of this study. This allowed exploration of the service innovation concept at organisational and strategic levels, and provided a foundation to investigate the conditions within which value co-creation occurred. The processes and characteristics are described below.

Interview process

A total of 23 interviews were carried out with these organisations; these were tape recorded and transcribed verbatim. The interview process started with case 1, a high value truck manufacturing company with a successful track record of product related services. In order to anonymise data, have greater freedom in discussing the findings, and also for confidentiality reasons, the company involved will be referred to as TruckPro1. Interviews with other truck manufacturing organisations followed; they are named TruckPro2, TruckPro3 and TruckPro4. The whole interview and data collection process was carried out between April 2016 and April 2017. Prior to the interview date, a copy of the research ethical approval was always sent to the participant (see Appendix 1). As explained earlier, the interviewees were provided with the research participant briefing (see Appendix 3), objectives of the research were explained to the participant, and a copy of the Aston Business School (ABS) research consent form (see Appendix 2) was presented for their signature before the interview could start.

Access to manufacturer

The initial interview with the manufacturer allowed the researcher a better understanding of the operations, the amount of interaction, and data exchange that goes on at the beginning, during and after sales. It also provided a good understanding of the services they offer, the network structure and service activities involved.

Access to Customer Organisation

Following this understanding, access to the external organisations was discussed, for example, the dealer (suppliers), technology company and the customer organisations. TruckPro's were asked to introduce the researcher to some customers of strategic importance to TruckPro1's product and service provision.

In that way, it can be ensured that the customers selected are of paramount importance to products and services. Access to the customer organisations was granted for further investigation. For the purpose of confidentiality, the customer organisations will be identified as TruckCus (see Chapter 4 for details).

Access to Suppliers (Dealers or technology provider)

After this second phase of interviews, the next phase included interviews with a technology partner used by two of the manufacturers (TruckPro1 and TruckPro3) who is referred to as: TechTech. In some cases representations from the dealer network (TruckSup) were interviewed, who are important to service provision or maintenance.

Sample size

In the light of the criteria discussed in Section 3.4.2.1.2, it is worth mentioning that data was collected and analysed from 80% of the UK truck manufacturing industry for this thesis, since the goal for the research process was to interview as many cases as possible to enable deep examination of this phenomenon.

The Interview data

Notes were taken during each interview to capture interpretations. Overall, interviews were conducted in 15 organisations, which consisted of TruckPro1 and its four customer organisations, TruckPro2 and its three customer organisation, TruckPro3, its two supplier organisations and one customer organisation, and TruckPro4, its one supplier organisation and one customer organisation, and finally, the technology partner organisation TechTech.

All of the case organisations were visited in person, except two interviews which were conducted via Skype. The case organisations were located all over the United Kingdom. In total, 23 interviews were conducted in 15 organisations, totalling 65 hours of interview. Typically, interviews were conducted in company conference rooms, which allowed clear recordings. Details and summary of interviews from various cases can be seen in Table 3.5.

Table 3.4: List of interviews for this study

Network Role	Organisation	No of Interviews
Manufacturer	TruckPro1	4
	TruckPro2	2
	TruckPro3	2
	TruckPro4	1
Customers	TruckCus1	1
	TruckCus2	2
	TruckCus3	2
	TruckCus4	2
	TruckCus5	1
	TruckCus6	1
	TruckCust7	1
Suppliers	TruckSup1	1
	TurckSup2	1
	TruckSup3	1
Technology Partner	TechTech	1
Total	**15**	**23**

All the interviews were transcribed afterwards and checked to ensure accuracy of the transcript. This also allowed familiarisation with the data.

3.4.3.3 Secondary Data: Presentations.

In addition to the interview data, secondary documents were presented during some of the interviews. These included some company service design diagrams, and case company PowerPoint presentations. According to (Eisenhart 1989, Voss, Tsikriktsis et al. 2002), triangulation of various data collection methods increases the validity and reliability of the findings and also adds to the thoroughness of outcomes.

3.4.4 Stage 4: Analyse Data

Data analysis consists of two stages. Stage one, applied a thematic analysis in order to identify the constituents of digital capabilities necessary for servitisation. Stage two utilised the conceptual

framework of value co-creation (see Figure 2.6) to examine the cases to understand their value co-creation approaches. These two stages are explained below.

3.4.4.1 Initial data analysis

Data analysis consists of the process of probing, organising, classifying and recombining patterns in data, and developing relationships, in order to draw a conclusion (Yin 2009). The data analysis stage allowed data to be organised in themes, then examined to see how they fit. In exploring the data, various steps were followed to ensure rigor, and the principles of thematic analysis were followed (Braun and Clark 2006). Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data (Braun and Clark 2006, p. 79).

The first analysis followed a thematic analysis approach which allows the inductive or theoretical analysis of data. Thematic analysis provides a detailed description of certain aspects of the data allowing research questions to be answered (Braun and Clark 2006). Core to this technique is structuring findings around main themes during the coding process, which was then applied, reviewed and refined. (King 2012) argues that structuring findings around a study's theme provides a concise presentation of the results and allows strong thematic discussion, therefore enabling meaningful categorisation and representation of qualitative results.

To answer the first research question regarding *what are the digital capabilities necessary for supporting servitised offerings? and how are these digital capabilities combined for various service offerings?* an initial analysis was carried out.

Reading the interview transcript

The first step to this data analysis concentrated on an in-depth analysis of raw data that is the interview transcripts, by reading each interview over and over again, and each time, highlighting illustrative phrases and quotes that were interesting in relation to the research questions. First, the analysis focuses on the manufacturing firm who offer these advanced services through digital systems. At the early stage, the coding template included only the four main categorise related to the research question to keep focus; the contextual background, service networks, the service offering and the digital aspect of

service provision. To help identify conceptions of digital capabilities used within service networks, and their implications for customer engagement within the network, see chapter 5.

Applying codes to the excerpts

For the second step, common and interesting phrases, words, or terms mentioned by the participants were coded according to the research questions, making it possible to identify the first-order categories of codes, searching for themes and reviewing those themes. These codes expressed the participant's views and opinions. By doing this, the data was organised into meaningful groups (Miles, Huberman et al. 2014), see Figure 5.3 for the data structure. Some authors warned against the problem of losing focus during interview coding (Miles and Huberman 1994). Therefore, the research questions and objectives were kept in view in order to stay focused.

Reduced to smaller categories

In the third step of the analysis, the initial codes were analysed further to ascertain relationships, patterns and links within the codes and thus to identify smaller categories, otherwise known as second-order themes, which allow various contextual factors and emerging relationships to develop, all through the process. Furthermore, these themes were reviewed and refined to generate a new table of the analysis which provided a summary of the data based on the relationships.

Aggregate dimension

In the last step of the thematic analysis, the precise focus of each theme was refined and related to the overall story of the analysis, as well as to literature. Compelling extracts from data were selected which related to the research questions and literature, and are presented in the thesis. In view of this, the data structure presented the first-other categories, the second-order themes and aggregate dimensions. The data structure is presented in Figure 5.3.

3.4.4.2 Data analysis stage two

The research began with initial theoretical understanding of the area of investigation as summarised in the conceptual framework (see Figure 2.6). To answer the second research question (RQ2): *How is value co-creation manifested in servitisation based on existing theoretical attributes?* the conceptual value co-creation framework developed in chapter 2 was used (see Figure 2.6). The aim of the framework was

to 1) understand value co-creation in service business (B2B), 2) analyse the business approach of the case organisations as relates to value co-creation, and 3) present findings about the case organisation. In exploring the data, various steps and instruments were used to ensure rigor. This study systemically coded the data, employing the conceptual framework together with the abductive process of iteration discussed in section 3.3.1 (Miles and Huberman 1994, Dubois and Gadde 2002). The conceptual framework allowed data to be categorised within the three themes and 12 sub-themes of the framework. Additionally, the framework contained two extreme poles: a) the traditional approach, and b) the value co-created approach. As the data categorisation progressed, it became apparent that the two extreme ends of the poles would not illustrate the current state of the case organisation business approach in relation to value co-creation. Therefore a third category named 'transitional approach' was created in between the two extremes in order to capture the exact state of the case companies and the analysis proceeded through the integration and interpretation of quotes and their meaning (see Chapter 6).

3.4.4.3 Cross-case analysis

A cross-case analysis was used in chapter 7, to answer the second research question. The results of each case were presented separately, narrating the story theme by theme. Within the narrative, additional quotes were presented to increase the validity. The cases are numbered as TruckPro1, TruckPro2, TruckPro3 and TruckPro4, the cases and the informants are equally labelled (details provided in Chapter 4). Participants' views for each theme was detailed, and network characteristic and the results of each case summarised in a figure, (see Figure 7.1-7.4)

Cross-case analysis is important as it improves case study research generalisability (Miles and Huberman 1994, Dubé and Paré 2003). The process entails a systematic comparison between cases. According to Miles and Huberman (1994), multiple case studies help the researcher form general categories of specific conditions where findings occur, and also show the relationships between the conditions.

The main features and characteristics of each individual case were summarised, to compare and contrast between cases on key variables (Miles, Huberman et al. 2014). Tables were used to summarise all categories so that emergent themes in the case organisations were identified. Finally, a tables was used

to show the differences in the case organisations and to show various case data along three themes to analyse connections or differences (see Table 7.6).

3.4.5   Stage 5: Reporting

The final stage of a case study design involves planning how to share the outcome of the research. Arguably, one cannot predict a research outcome hence making it hard to define the structure for the research output. Nonetheless, part of this study's outcome has resulted in one academic conference paper (Ajaegbu, Uren et al. (2017)) and further plans are underway to extend the dissemination of additional result through other avenues, including a white paper and journal articles.

3.5   Validity and reliability of the research

In qualitative research, literature proposed various criteria in which the validity and quality of a research can be measured. When evaluating a qualitative study, the four main measures for ensuring the quality of a research are: a) credibility, b) dependability, c) transferability, and d) confirmability (Hirschman 1986, Patton 2002, Yin 2009). These four criteria were applied in this study to ensure standards and enhance the quality of this research.

3.5.1   Credibility

Credibility refers to the extent in which the study result provides an acceptable representation of the data (Hirschman 1986). The findings of the study extensively provided direct excerpts from participant which were used both in texts and tables in order to reflect reality through the respondents' actual words. In addition to this, an abductive multiple case study approach enable continuous iteration between theory and emerging data, therefore resulted in various emerging themes that were reflected in the refined conceptual framework (see Chapter 7 and Chapter 8).

3.5.2   Dependability

Dependability in a qualitative study, examines the degree to which an investigation measures what it claims to measure and provides consistency in the replication of results of the study (Guba and Lincoln 1994, Yin 2014). Which means that the results should be approximately the same if another study adopted the same procedure with the case data. In other words, reliability (Yin 2009). To

improve reliability, this study documented every single procedure and provided a step-by-step explanation of how the study was carried out. Furthermore, a case study database was created to safely store all the data, for instance, the name and contact details of the participants, interview guide, documents, notes, interview recordings and transcripts of the study. This can be used to retrieve data when similar research is being conducted in the future (Saunders, Lewis et al. 2009, Yin 2009, Miles, Huberman et al. 2014). For this study, four cases were used to build a chain of evidence. Triangulation was achieved through the combination of multiple sources of data (interview data and filed notes) and theory to explain the phenomenon of study (Eisenhart 1989). The abductive process of the data analysis seeks to find the links between emerging findings. These findings are supported by the informants' direct quotes, which demonstrate the connection between data and theory (Yin 2009, Saunders, Lewis et al. 2012, Miles, Huberman et al. 2014).

3.5.3   Transferability

Transferability refers to the extent in which the study's findings can be applied to other contexts. In other words, the generalisability of findings. One of the most common criticisms of single case study research concerns whether findings are generalizable particularly in supply chains since they are context specific (Christopher, 2011; Goffin et al 2012). Case research relies on analytical generalisation which occurs when findings are replicated (Silverman 2014, Yin 2014). The use of multiple case studies and literature during analysis makes findings transferable to similar cases (Eisenhart 1989). Additionally, the study paid attention to context of the research which is evident in the conceptual framework related to B2B services. This was also extended in the findings from different contexts were integrated in order to refine the framework. Furthermore, the whole service network was investigated until theoretical saturations was attained (Miles, Huberman et al. 2014). This guaranteed that the emerging findings were not exclusive to a particular company, thus allowing transferability.

3.5.4   Confirmability

This refers to the degree at which the result where interpretation of the result are that of the participants and the phenomena being investigated rather than the researchers own. To avoid bias and

establish the link between the data and the findings, a summary of the findings were presented to the supervisors for validation. This frequent reflection with the supervision team ensured co-creation of knowledge by integrating their feedback.

In conclusion, applying these quality criteria on this study significantly enabled rigour and trustworthiness of the study.

3.6   Summary

The research methodology chapter presented all the important methodological choices and their justification for this study. Table 3.6 outlines the summary of the key methodological choices.

Table 3.5: The key elements of the methodology chapter.

Choices	Key elements
Philosophical stance	Interpretivism (Myers, 1997; Denzin and Lincoln, 2005).
Research method	Multiple case research (Yin, 2009; Voss et al 2002).
Research approach	Abductive multiple case study approach (Dubois and Gadde, 2002).
Case selection	Criteria and snowballing sampling (Bryman, 2012; Miles and Huberman, 1994) Truck manufacturing firms and their networks.
Data collection	Semi-structured interviews, field notes. 23 interviews conducted in 15 organisations in the service network
Data analysis	Thematic analysis (Braun and Clarke, 2006).
Quality of research	Data triangulation (theory, data); validity and reliability (case study database, direct quotes to support findings, multiple cases).

A detailed account of the case companies is presented in the next chapter.

CHAPTER 4: The Case studies

This chapter describes how the case organisations were grouped. In total, fifteen organisations were selected for the study, as seen in table 4.1. Their selection was based on criteria sampling, as described in chapter three. The organisations were grouped into cases comprising of: truck manufacturer, its customers and suppliers (technology company, if outsourced or a dealer organisation).

Table 4.1: Summary of case organisations

Name of Organisations	Network Role	Cases
TruckPro1	**Manufacturer**	**Case 1**
TruckCus1	Customer org (Key account customer)	
TruckCus2	Customer org (SME)	
TruckCus3	Customer org (Key account customer)	
TruckCus4	Customer org (Key account customer)	
TruckTech	Technology company	
TruckPro2	**Manufacturer**	**Case 2**
TruckCus4	Customer org	
TruckCus5	Customer org (SME)	
TrcukPro3	**Manufacturer**	**Case 3**
TruckSup1	Dealer/Supplier network	
TruckSup2	Dealer/Supplier network	
TruckCus4	Customer org	
TruckTech	Technology company	
TruckPro4	**Manufacturer**	**Case 4**
TruckSup3	Dealer/Supplier	
TruckCus6	Customer (SME)	
TruckCus7	Customer org (Key account customer)	
TruckCus4	Customer org	
Total	**15**	**Four case studies**

The following sections describe the fifteen organisations, their use of digital technologies for advanced service development, service involvement and service delivery for customers.

4.1   CASE 1: TruckPro1's service network

Overview of TruckPro1

TruckPro1 is a European truck manufacturer. It is one of the leading international suppliers of commercial vehicles and transport solutions in Europe, with a successful track record of product and service provision. The company operates globally and generates over 60% of its revenue from the provision of services that are closely coupled to its products. TruckPro1 sells on average, about 4500 vehicles per year, with more than 10% market share within the UK. Their products range from trucks, buses, vans, engines to spare parts. TruckPro1 has over 800 people employed around the country. The company has dealership support centres all over the country. The company moved into the service business in the early 2000's and was one of the early adopters of servitisation in the UK truck industry. Prior to that, the company was selling around 1000 vehicles a year with no service contracts, which was less than 5% of the market share.

Products and Services offerings

TruckPro1 aim is to optimise customers' operating profits by selling intelligently coordinated service packages and innovative solutions for modern logistics, guaranteeing the maximisation of vehicle performance, availability, and to reduced overall cost. The main component of TruckPro1's after-sales service is to service and maintain trucks for the customers. Their service packages are grouped into two main types: the silver level service, which is a base offering, and the gold service contract, which is an advanced offering. These are sold as three to five year contracts. There are other services that customers can add to an existing contract. These service bonds are seen as a vital tool for developing strong relationships with customers. Hence, TruckPro1 strives to improve these service agreements.

Technology for services

TruckPro1's objective is service development and design through installed digital technologies (installing telematics, and remote monitoring technologies for services) for trucks that would enhance after-sales services for its customers. For instance, solutions to reduce downtime and improve uptime of the customers' trucks.

Four participants were interviewed from this company, one workshop was attended, and some archival documents were obtained as an empirical base for this study.

During the interviews, TruckPro1's service offerings and technological solutions were discussed and evaluated. Most of the participants interviewed were from the after-sales service and technology department of the company, except the CEO, who initiated the idea of service provision in the first place.

4.1.1 TruckCus1

TruckCus1 is a truck rental company based in southern England. Their business involves leasing, hiring and renting truck, trailers and buses to various companies all around the UK and some into Europe. The company runs a fleet of between 400 to 500 vehicles. TruckCus1 is one of TruckPro1's biggest customers, with 99% of products in their fleet from TruckPro1.

Operations

TruckCus1 would buy vehicles from truck manufacturers such as TruckPro1, and then hire those vehicles on to customers, such as supermarkets, which are key account customers. While the vehicles are with their customers, TruckCu1 manages any breakdown, maintenance, or any compliance issues. So TruckCus1, in addition to renting trucks, does the fleet management for their customers.

Technology

The company uses various technological systems to manage their operations and services to customers. In their operations department, they have a fleet management system which allows them to manage and monitor the frequency of breakdowns, the cost to TruckCus1 and what component of that vehicle fail regularly, allowing them to report back to the manufacturer of the vehicle. The company has a telematics system, which allows it to track assets, monitor fuel consumption, and see who is driving the vehicle and how they are performing. The performance side of the information is passed to the customer for their business management, for example, training drivers. TruckCus1 is more concerned with the vehicle maintenance, as this is the area they manage: therefore, cost of maintenance is most important to them. The telematics system is integrated into the fleet management

system, allowing them to link electronically to the breakdown companies or their vendors to know what is going on with the vehicles.

4.1.2   TruckCus2

Overview of TruckCus2

TruckCus2 is a family owned haulage and distribution business based in North West of England. The company has been in operation since the mid 1950's. It is a small medium enterprise operating about 50- 60 vehicles within its two branches, employing over 60 staff members. The majority of their fleets are used for double or triple shift working patterns to deliver materials for a wide range of industries. TruckCus2 fleets range from 3.5 to 44 tonnes. With technology investment, the company's annual turnover has continually grown over the years.

Technology for service

In 2011, the company completed the installation of vehicle telematics across their fleet to enhance driver training, safety and efficiency. Their vehicles are equipped with real time GPS Satellite Tracking and messaging, which enables up to the minute positioning of their vehicles and their customers' consignments. They have a traffic office, which uses TruckPro1's tracking system, allowing the efficient scheduling and management of their fleet, and total traceability of their customers' orders. They have a web interface portal which enables their customers to enter their jobs directly onto the traffic system and to be able to know when the delivery is complete.

TruckCus2 offers overnight, same day or next day delivery to their customers making vehicle efficiency and the uptime of the utmost importance to them. Some of the products they deliver are time sensitive, especially within the food industry.

4.1.3   TruckCus3

TruckCus3 is a transport distribution and warehousing company that has been in operation for the past 45 years, based in the Midlands. About 40% of their fleet come from TruckPro1, 55% from TruckPro2 and the remaining 5% from various other truck manufacturers. Although, TruckPro1 referred the researcher to this customer, the participant responded to questions based on their experience from the

two major manufacturers that they use, which were TruckPro1 and TruckPro2. A lot of their business operations are carried out within and outside the UK. Therefore, each driver's performance is very important to them, as this affects their fuel costs.

Services

In the transport part of the business, they offer same day, next day and overnight deliveries within the UK and across Europe. They also deliver hazardous products for sea cargo. For the warehousing operations, they offer storage, and maintain the products' integrity during storage. Their services require moving sensitive products for their customer, such as food distribution to retailers, pharmaceuticals, machinery, equipment etc.

Technology

The company has been using telematics for about five years. TruckCus3 has its own telematics system, but uses the manufacturer's telematics systems as a benchmark. Driver behaviour is vital to the delivery business, thus they have their own driver training department. They focus on monitoring each driver's performance using telematics data. Based on that, they give training to the drivers to improve how they drive the vehicle, as the way the driver performs is where their cost savings come from. Furthermore, with telematics, fully integrated IT systems and geo-fencing, TruckCus3 are able to provide real-time and accurate expected time of arrival (ETA) information to their customers. Through an online portal, TruckCus3 can share tracking and delivery information with their customers, allowing them to manage their operations.

4.1.4   TruckCus4

Overview of TrckCus4

TruckCus4 is a key account customer whose fleet is made up of all the major truck manufacturing brands in the UK, but is predominantly TruckPro1 and TruckPro2. The company is a food supply specialist, supplying to major retailers and food manufacturers in the UK. Established in the early 90's. TruckCus4 have grown consistently through efficient delivery at an exceptional standard rate. For their operations, TruckCus4 uses trucks, temperature controlled trailers working closely and collaboratively with the manufacturers to ensure efficiency. With innovative technologies and over

1500 workers across its business, TruckCus4 aims to make their supply chain operations as efficient as possible. TruckCus4 has nine distribution depots strategically setting them apart from competitors. The company operates a fleet of over 450 vehicles.

Services

Their clients includes dairy companies, fresh bakery companies, retailers, etc., which use the temperature controlled technology on their trucks. The company handles over 150,000 pallets and 1.5m cases every week and has partnered with the biggest names in retail and food industry, working quickly to implement solutions for their partners.

Technology and innovation

TruckCus4 was one of the early adopters of telematics systems and has 100% telemetry across its fleet. The company uses various other systems, specifically warehouse management systems, transport planning systems, fleet management systems and telematics vehicle tracking systems. Their initial telematics systems were taken directly from the manufacturers, but as the fleet grew, and because their fleet is made up using different manufacturers, it was becoming difficult to keep up with information coming in from various manufacturers. The company ended up losing clarity on their driver performance, which was important to their business. Therefore, a decision was made to go directly with the technology provider, TruckTech, to standardise the solution across their fleet.

TruckCus4 has a specialised in-house IT team. The company handles all kinds of data coming in and translates it into a format that their customers can understand, providing transparency and giving them greater control. The focus on building a strong and responsive customer-centric IT platform is that it enables them to deliver speed and simplicity that sets them apart from their competitors. Therefore, it is at the centre of everything they do as a business. They focus on any aspect of value-adding technology that supports their ultimate delivery of a robust business solution.

4.1.5 TruckTech

Overview of TruckTech

TruckTech is an international technology company which has been in existence since the early 1980's. During the late 1900's, the company was bought out by a new management team. Over the last 20 years, TruckTech has invested significantly in research and development to ensure its solutions are underpinned by market-leading technology. With more than 500 staff members working for the company, they aim to understand each customer's business requirements and then design a suitable solution for them.

Technology and services

TruckTech uses various technological systems, such as telematics, tracking systems, integrated cameras and digital platforms, to help companies develop and deliver information, services and product modules via digital platforms. Their clients include manufacturers, the military and heavy equipment manufacturers.

4.2 CASE 2: TruckPro2's service network

Overview of TruckPro2

TruckPro2 is a high valued truck manufacturer that operates in the commercial vehicle industry. The company is generally known for excellence in the quality of their products and has a reputation for being technologically innovative in providing advanced services. TruckPro2 predominantly operates in the UK but its parent organisation functions globally with a head office based in Europe. In the UK, TruckPro2 is one of the leading vehicle manufacturers with a turnover in excess of £ 800million, and it employs approximately 1,200 staff across its five regions. With more than 20% of the market share in the UK, TruckPro2 sold on average, about 7000 trucks a year, outperforming their corporate objectives of 20% by some margin. They also saw their net sales rise by 10% with an increase in service revenue of 7%. TruckPro2 consists of 14 retail dealerships, and two dedicated vehicle maintenance units. 50% of their dealer network is privately owned by independent dealers.

Products and services

Their product ranges from medium vehicles (7.5 tons) to heavy trucks (45 tons), buses and coaches, specialist trucks, engines and used vehicles. Their products are sold through various methods, including acquisition from contract hire and leasing purchase. Attached to these products are three to five year service packages. TruckPro2 vehicles are sold through sales representatives who are based in these dealership networks. They also sell parts, support and services contracts. Due to the high regulatory requirements of the UK trucking industry, vehicle maintenance is of vital importance to vehicle operators (the customers) as they are required by legislation to carry out a formal inspection every six weeks. This makes TruckPro2's services mainly centre on the repair and maintenance of vehicles and other service related activities, done through their dealer network.

Their customer base is segmented into two groups: the key account customers that are mainly large national or international fleet customers, which represents over 35% of the business, or retail customers, generally small to medium sized enterprises that represent over 65% of the business. TruckPro2 service offerings include: preventative maintenance, driver training, finance, fleet management, inspections and warranty. These services are ultimately segmented into three main bundles. The standard offering is basically a simple overview of how the vehicle is performing, called the monitoring report, sent to the customers at the beginning of every week. The comprehensive package takes care of all the maintenance, as well as the legal and time based safety inspections that customers are obliged to comply with. The control package is a portal based service that includes everything in standard offering, the comprehensive offering and additional fleet management services. What started as a base service offering to aid drivers has progressed and has now developed into a more advanced service offering helping customers manage their businesses. As a result, the capabilities to provide services to various customers across the UK were seen as vital.

Technology to support services

TruckPro2 uses telematics to support the collection, distribution and advanced analysis of customer usage data. They provide their solutions in-house and to customers. In the early stage of their servitisation strategy, telemetry data was sent, using text messages, to offer customers' drivers' aid,

but the degree of interaction was low. Over the years they have upgraded the solution which is now based on integral hardware in the vehicle, i.e., they build the telemetry unit as part of the overall vehicle.

4.2.1   TruckCus4

See section (4.1.4) above.

4.2.2   TruckCus5

TruckCus5 is a privately owned general haulier, which has been in existence since the late 90's, and 99% of their operations are within the UK. The company has over 60 vehicles and about one third of those vehicles are TruckPro2. The company buys some of its trucks, while others are purchased through lease for 3 to 5 years on maintenance contracts. This means that as long as the vehicle is not damaged on purpose or carelessly, anything that goes wrong with it is covered under the maintenance agreement, including all routine maintenance and legal inspections.

TruckCus5 gets each vehicle's tracking report, driver behaviour report, and also gets the service inspection sheet, which is a legal requirement. It tells them, for example, what the condition of the tyres are and many more things about the condition of the vehicle. This allows them to manage the drivers and get the best out of them for the vehicle. Another report is the maintenance report. This is a document they have to keep to prove the road worthiness of their vehicle.

4.3   CASE 3: TruckPro3's service network

Overview of TruckPro3

Truck Pro3 is a European truck manufacturer which acquired a UK truck manufacturer in the late 80's to become one company. This merger gave them an advantage over some other truck manufacturers operating in the UK, by giving them the biggest market share in the industry. Their headquarters is based in Europe and they are still the market leader in the UK with approximately 30% market share. Their operations are backed by their dealer network, with more than 130 dealers across the UK, only about 30 of which are franchised to sell vehicles. Accordingly, there are two types of dealers within the company, out of 133 dealer, 32 are franchised to maintain and also sell vehicles while the other

101 dealers only provide maintenance support to TurckPro3. 99% of their dealers are independently owned and TruckPro3 do their best to support them in all areas of service.

Products and services

TruckPro3 manufacture light, medium and heavy duty commercial vehicles, ranging from 7.5 to 44 tonnes vehicles, and are known for their low operating costs and advanced design. Selling of the products, maintenance and repair contracts, parts and accessories are all handled by the dealer networks. They offer five different services packages available for a period of 3-8 years to suit their customers, as seen in table 5 below.

Technology for services

The company offers a comprehensive range of standard and optional servicing packages using telematics units pre-installed in all their new vehicles. Using this technology, TruckPro3 uses a modular approach to deliver services and allow customers to monitor a driver's report, fuel report, emission report etc. through an online portal. The system is integrated with Google Maps, allowing the customers to view their assets in real-time, get detailed information and playback certain functionalities to view other aspects of field operations. Telematics offers TruckPro3 an ideal platform for various services using a third-party technology company. These include direct communication to drivers in the field and enabling logistics planning tools to improve customer efficiency.

4.3.1   TruckCus4

Refer to section (4.1.4) above.

4.3.2   TruckSup1

Overview of TruckSup1

TruckSup1 is an independently owned dealership company, which is one of the largest of TruckPro3's dealership groups in the UK. They operate 10 dealerships, strategically located across the UK. The company is one of the 32 dealerships of TruckPro3 franchised to sell vehicles. The company was founded in the 1920's and has a distinguished history as a franchised commercial vehicles dealer. As a privately owned company, security of employment is very important and highly valued within the

company. They aim to exceed their customer's expectation by offering high quality transport services in an ethical manner and at competitive prices.

Products and services

TruckSup1 sells new and used trucks, provides repair and maintenance, sells truck and trailer parts, and offers cost-effective transport and finance solutions. Each member of their dealership group has a comprehensive range of TruckPro3 parts stocked to support various customers across the country. With stockholding equivalent of £4.5 million, TruckSup1 provides a daily delivery service from all locations. TruckSup1 workshops operate 24 hours a day to permit maintenance work at off-peak hours, and employ over 150 factory trained technicians with in-depth TruckPro3 product knowledge.

Technology for services

TruckPro3 is the only truck manufacturer relationship they have. Therefore, their interest are wholly aligned with their trucks, unlike other dealers with various manufacturers relationships. They achieve a high quality transport service by working closely with TruckPro3, utilising modern technology to provide innovative solutions to customers. With TruckPro3's telematics solutions, in-depth knowledge of their products and appropriately trained technicians, TruckSup1 are able to plan, support and manage various repair and maintenance needs, thus assuring maximum availability of customers' vehicles.

4.3.3   TruckSup2

Overview of TruckSup2

TruckSup2 is an experienced franchise dealer of TruckPro3, based around the West Midlands. Founded in the early 1920's, the company has over 480 staff members and works with all major truck manufacturers across Europe, providing repair and maintenance support, vehicles leasing and part sales, including aftersales services to customers.

Products and services

They offer 24 hours parts sales, vehicle recovery and repair and maintenance services, giving customers complete flexibility for any repairs and parts needed. They offer leasing and contract hiring of vehicles from the market-leading range of trucks, using an expert and experienced sales team.

Technology for services

Using TruckPro3's telematics solutions, the company offers 24 hours breakdown services with average response time of 44 minutes and 80% of all vehicles are repaired at the roadside. Their factory-trained technicians work in fully equipped workshops containing the latest diagnostic equipment provided by TruckPro3 and from their associate truck manufacturers. Therefore, they use various technological systems depending on the product. They also perform tachograph download for various customers, calibrations, all legal inspection and maintenance work undertaken, for example, six weekly checks, annual MOT test for all trucks and trailers etc. Their technicians receive regular training from the manufacturers on how to use their telematics system, to plan, schedule and aid maintenance work.

4.3.4   TruckTech

Refer to section (4.1.5) above

4.4   CASE 4: TruckPro4's service network

Overview of TruckPro4

TruckPro4 is a European truck manufacturer. They are one of the late adopters of servitisation in the road transport industry. TruckPro4 operates in the commercial vehicle industry. It mainly operates over continental Europe and has a smaller market share in the UK. The company has about 70% market share in Italy, 85% market share in Spain and just 7% share in the UK. TruckPro4 vehicles are sold across UK through their supplier network using the suppliers' own sales teams. On average, the company makes about 3% turnover on vehicle sales. Their products range from 7.5tonnes vehicles up to 45 tonnes.

The company's service offering is centred on vehicle repair and maintenance, which is carried out by the dealer network. They have various service offerings which include: six weekly inspection, fleet management, driver training, warranty, preventive maintenance and a finance option. TruckPro4 customers are grouped into two main categories, the key account customers and retail customers. The key account customers are any customer invoiced from the manufacturer, and retail customers are organisations that buy through dealers. Retail customers are generally small to medium sized companies, which represent about 80% of the business, and key account customers are the top 20% of the business, which are large fleets.

Products and service offerings

Due to competition and the goal to gain more market share, TruckPro4 decided to expand by adopting a more customer-centric approach, increasing its service offerings to target different areas of customer problems. Consequently, the capabilities to provide various services to customers across the country became vital. TruckPro4 designed and proposed various value-added services, which allowed the customers to choose from various options. The proposed options are:-

a) Product offering: which allows the customer to purchase the product with a base warranty and maintain it themselves.

b) Product and service package: Where the product is maintained through the dealer.

c) Advanced services offering: where all maintenance and services are managed by the provider and the dealers.

The first offering represents traditional product sales, the second and third offerings involve servitisation.

Technology for services

The company uses telematics systems to provide two main set of functions to improve the customers' experience. Their exclusive system, which is developed in-house by their head office information technology team, aims to integrate the control of information, navigation, aid the drivers and help operators manage their fleets. On the truck, the system is connected to the satellite navigation system enabling the service helpdesk to monitors drivers location and evaluates their driving style. The

vehicles have dashboards, where a driver can see upcoming event and adjust their driving style for example, using the cruise control etc. The telematics fleet systems allow TruckPro4 to offer fleet management services to various customers through a digital platform which the customers can assess at a single click. Data on every connected vehicle is automatically routed to their customer centre based in Europe (Headquarters), including its GPS position and the error codes of the vehicle's electronic control unit, making it possible to effectively provide quick assistance at all times. It also monitors and communicates vehicle location using advanced functions.

4.4.1   TruckCus6

Overview of TruckCus6

A Midland based transport and logistics company, TruckCus6 is a family owned business which is part of a major freight distribution and transport group. Established in the early 80's, their palletised distribution service covers the UK and the European mainland. TruckCus6 is a medium sized organisation with a fleet of more than 44 trucks, delivering loads from hazardous goods to construction equipment, and meeting fleet operator's recognition standards. Their trucks are sometimes used for double or triple shifted patterns to help meet business demands. The TruckCus6 fleet is made up of various brands of truck, allowing them to manage high volume production and delivery standards 24 hours of the day.

Technology for services

Using telematics and a transport management system, TruckCus6 manages complex supply chains that plan delivery routes and manage specific staffing operations to meet various business requirements. The telematics system provided through the manufacturers allow them to track deliveries until they get to the customers.

4.4.2   TruckCus7

Overview of TruckCus7

TruckCus7 is a reputable key account customer that has been in operation over 30 years. The company provides the largest agricultural service business across UK and partly within Europe, supplying

chemicals to and collecting agricultural output from over 20,000 farmers, representing 40% of the UK agricultural industry. With 30 distribution sites within the UK, the company employs over 800 staff. As the leading provider of agricultural services, TruckCus7's focus is to ensure customers can meet daily farming challenges.

Products and services

The driving force of their business and services is to deliver heavy agricultural products to various customers, which requires TruckCus7 to find vehicles with higher payload capacity than the model it is replacing. Furthermore, due to the long distance journeys their drivers cover on a daily basis, TruckCus7 considers driver's comfort highly important and specify that all vehicles to meet these requirements; for instance, automatic gear box, higher engine horsepower for ease of operation, comfortable seats, electronic mirrors etc. TruckCus7 pays little attention to fuel efficiency as their business operations are carried out seasonally (at a certain period of the year) and it does very low mileage at the end of the five year service contract.

Technology for services

Vehicle uptime is absolutely critical for TruckCus7, especially in the busy period of the year, which makes the service package they procure vital, and how the vehicles are managed or maintained even more crucial. The vehicles come with telematics and TruckCus7 pays monthly for service maintenance, eight weekly checks and the annual MOTs, which allows them to predict costs of maintenance. The service provider manages that through telematics.

4.4.3   TruckSup3

Overview of TruckSup3

TruckSup3 is a main dealer for TruckPro4, based all across the UK. The company is a wholly owned dealership with authorised sales of vehicles, parts and service repairs for TruckPro4.

Products and services

They have a highly trained technical team with manufacturers training and technology to maximise their customers' fleet uptime and to reduce running costs without compromising on quality. They

provide aftercare services to TruckPro4's customers, which is coordinated by the manufacturer's customer centre. The technicians are trained on the manufacturers' telematics, in an effort to support customer needs.

4.4.4 TruckCus4

See section 4.1.4 above.

Conclusion

In summary, Chapter 4 presents background information of all the case studies, describes their products and services, and shows what technology is used for their services.

The following chapter details the study's analysis.

CHAPTER 5: Digital capabilities and servitisation

5.1 Overview of chapter

This chapter offers an in-depth account of the empirical data from the case organisations described in chapter 4. It analyses how manufacturers utilise digital technologies and the capabilities that these technologies provide to compete and to co-create value through servitisation.

This chapter analyses the key constituents of digital capabilities (termed: *data capturing capability*, *connectivity capability,* and *analytical capability*), and shows how each capability is used for various service offerings. This chapter is focused on answering the first research question (RQ1): "*What are the digital capabilities necessary for supporting servitised offerings?"* And (RQ1a): "*How are these capabilities combined for various service offerings?*"

Figure 5.1: an overview of the first empirical chapter.

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┌─────────────────────────────────┐
│       5.1 Overview of chapter   │
└─────────────────────────────────┘

5.2 Emerging framework: the core digital capabilities in servitisation
(RQ1)

┌──────────────┐  ┌──────────────┐  ┌──────────────┐
│ 5.2.1 Data   │  │ 5.2.2        │  │ 5.2.3        │
│ capturing    │  │ Connectivity │  │ Analytical   │
│ capability   │  │ capability   │  │ capability   │
└──────────────┘  └──────────────┘  └──────────────┘

5.3 Implications of digital capabilities for service offerings (RQ1a)

┌──────────────────────────┐   ┌──────────────────────────┐
│ 5.3.1 Base service       │   │ 5.3.2 Advanced service   │
│ offering and the         │   │ offering and the         │
│ resultant attributes     │   │ resultant attributes     │
│ of digital capability    │   │ of digital capability    │
└──────────────────────────┘   └──────────────────────────┘

┌─────────────────────────────────┐
│    5.4 Summary of findings      │
└─────────────────────────────────┘
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5.2 An overview of the emergent model: demonstrating the core digital capabilities (RQ1)

Based on the empirical data, two main findings were generated to establish the digital capabilities necessary for supporting base and advanced services in servitised networks (see figure 5.2).

First, the study identified that digital capabilities provided the functionalities used in servitisation and are made up of three vital elements, *data capturing capability, connectivity capability,* and *analytical capability*. **Data capturing** capability enables the visibility of operations and provides valuable data. **Connectivity capability** aids information to be transmitted among interacting partners in the service network, enabling information flow. **Analytical capability** facilitates data and information processing, generating insight for servitising firms. The findings demonstrate that these capabilities trigger, enable and facilitate interactions between manufacturers and customers, enabling customised service delivery, and hence value co-creation.

Second, findings showed a hierarchy in the manner that digital capabilities are used for different service offerings, enabling value co-creation. It was observed that in providing base service offerings, only the first two capabilities, namely data capturing and connectivity capability, were used, while advanced service offerings required all three identified capabilities to provide the outcome and to support customers' needs. The analytical capability was mostly used in advanced service offering for value creation/co-creation, and this allows the sustainability of value created, and enhances competitive advantage. The functions of these capabilities are detailed below, supported by the participants' quotes.

Figure 5.2: An overview of the emergent hierarchical model of digital capabilities in servitisation
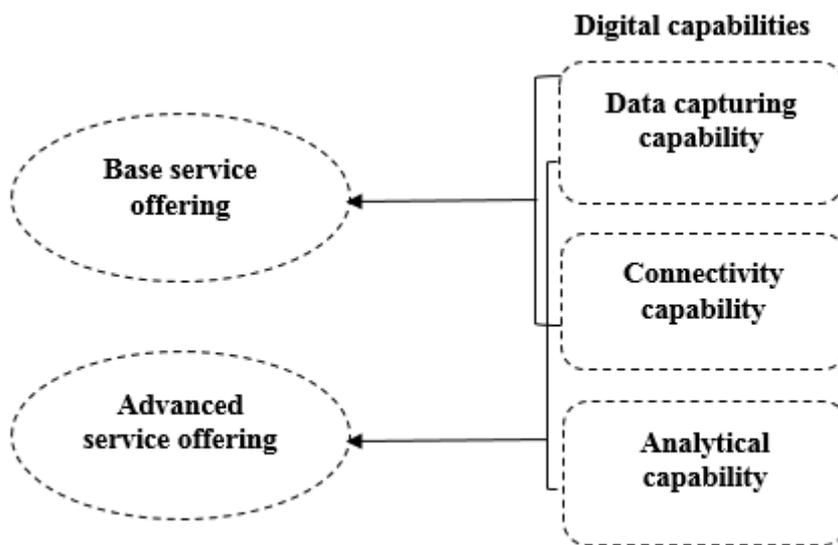
Data structure

The data structure displays the first-order categories, second –order themes and aggregate dimensions that emerged as a result of the coding and analysis. The presentation of the analysis will first focus on data capturing capability (and its underlying first-order categories and second-order themes), before focusing on the connectivity and analytical capabilities (and their underlying categories and themes). Figure 5.3 presents the data structure. The analysis which led to the model will be presented in sections 5.2.1, 5.2.2 and 5.2.3.

Figure 5.3: Data Structure.
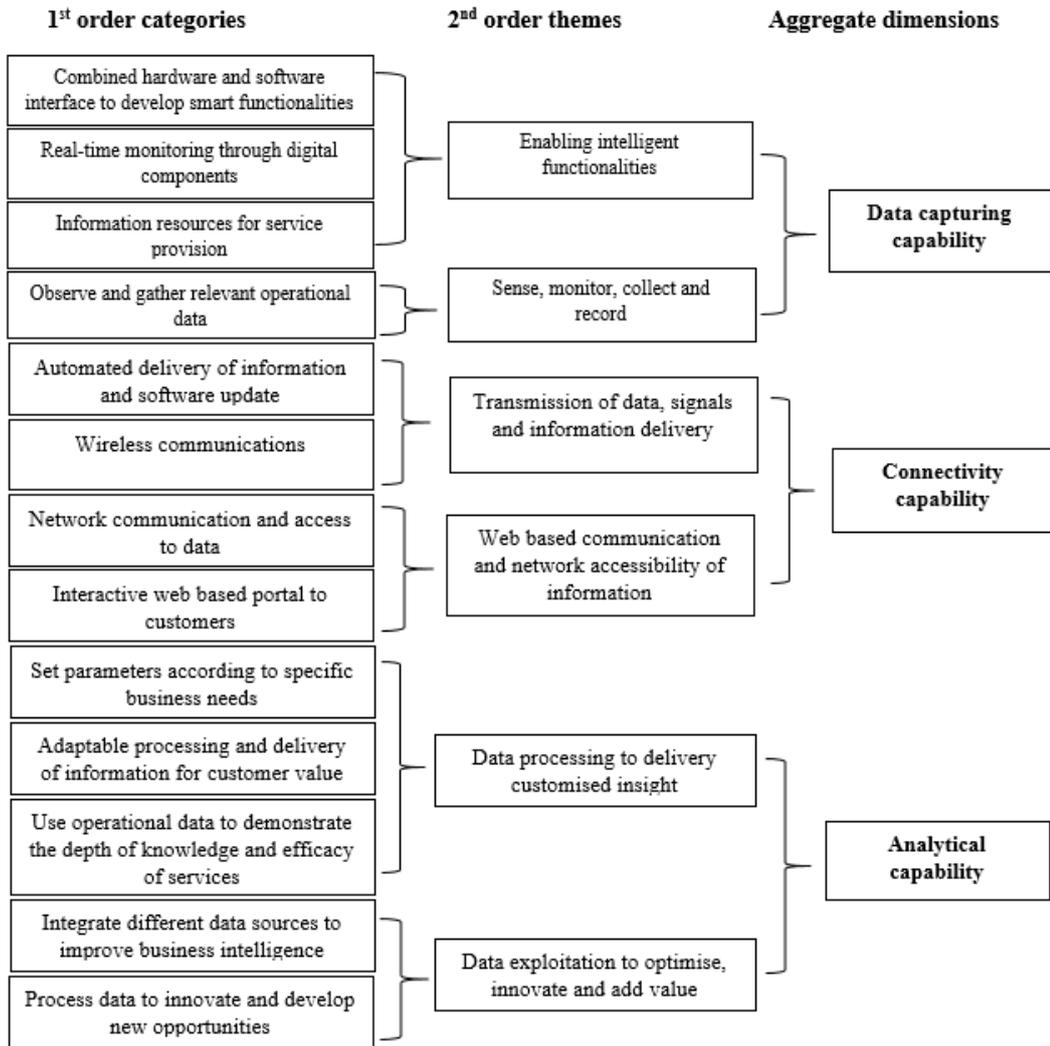
5.2.1   Data capturing capability
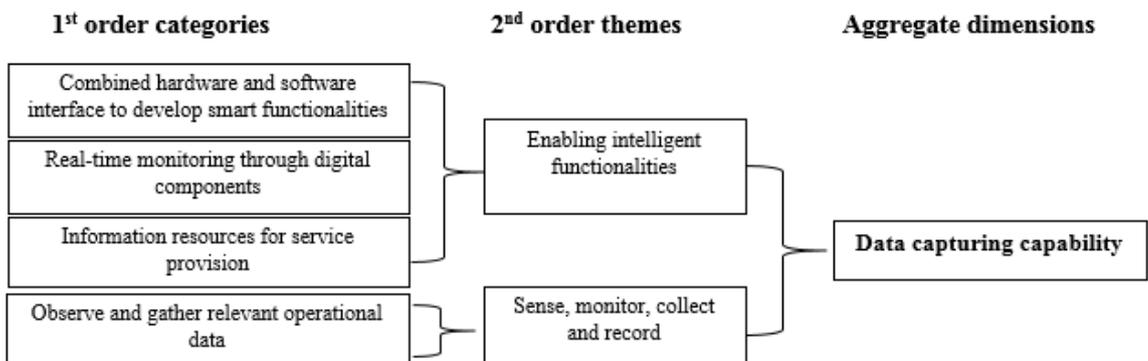
Data capturing capability in servitisation emerged as an aggregate dimension in the analysis, capturing the comprehensive alignment of hardware and software components to sense, monitor and collect information from product operations with low human involvement.

The emergence of data capturing capability as an aggregate dimension emerged from identifying the first order categories from data (*combined hardware and software interface to develop smart functionalities, real-time monitoring through digital components, information resources for service provision, and observe and gather relevant operational data*), and their subsequent integration into second order themes *(enabling intelligent functionalities; sense, monitor, collect and record)*. The presentation of the findings is structured around the second order themes.

5.2.1.1 Enabling intelligent functionalities:

Enabling intelligent functionalities captures the real-time visibility of product operations and initial data processing. The analysis identified that at the start of the business relationship with its clients the manufacturers employ digital technology (telematics) for data to be captured, then the online platform increases the user's abilities and provides an environment for generating solutions.

Hence, the analysis of the data indicates that the case companies begin with data capturing capability, and showed that there were instances in which all cases use two or more of the 1st order categories to facilitate information gathering on product usage, fulfilment of customer's needs, and information sharing with customers. These first order categories are discussed below.

Combined hardware and software interface to develop smart functions

In the context of servitisation, the manufacturer initially upgrades the hardware components of the product with sophisticated IT systems and sensors that allow devices and embedded operating systems to sense and capture critical information. These enhance intelligent functionalities and, therefore, offer opportunities for increased operational efficiency to the end users. The respondents explained how they upgraded the integral hardware aspect of the product with telemetry units to gather operational data that supports various service offerings. The respondents from TruckPro1 and TruckPro2 explains:

> ***STM, TruckPro1#5:*** *"So what we do, the reason we fit this box [telemetry] is, what this box can do is: it can connect to a thing called the CANBUS on the vehicle which is a bit like the brain of the truck"*

> ***STM, TruckPro2, #3:*** *"Over the years, we've actually upgraded the product which is now based on integral hardware of the vehicle. So we actually build in the telemetry unit as part of the overall vehicle, so it is not just an add-on feature, the actual hardware is completely embedded within the vehicle product. And we then offer various telemetry services to the end user customer to help him manage his business effectively."*

Real-time monitoring through digital components

Smart technological functions facilitate interactions and support the processing of real-time information the about products condition. Gaining and advancing insight into the user's operations enables identification and understanding of customer needs. The Regional Director of TruckPro2 explains:

> ***RED, TruckPro2, #34:*** *"The factory are monitoring the vehicle performance in real-time across the globe, and they are able to come up, just like we get an update on our mobile phone, to improve things. So it's the case with vehicles now."*

Information resources for service provision

The ability to capture data through embedded smart components is prevalent in the implementation of servitisation, as this enables intelligent functionalities and, equally, emphasises the foundational role of data and information services. The embedded tracking devices provide opportunities to observe products remotely and to acquire customer usage and operational data, necessary for service provision or product upgrades. In other words, data is one of the main resources used for service provision, and it enables deep insight into different customers' usage.

Also, TruckPro2's Service and Technology Manager explained that access to a products condition helps them carry out maintenance proactively to prevent customers' downtime, and also helps them avoid uncertainties, rather than maintaining vehicles on a time-based schedule. He explained that:

> ***TruckPro2 STM, #12:*** *"Service is by time of mileage based interface because of the UK legislation, often it's down to an inspection which is a time based interval. It's got to come off the road for an inspection, as we move further and further, it actually become a modularised service regime, you actually repair stuff proactively as it is required. So you don't take off the road all day, you take it off for 45 mins. Or your truck is due in for a scheduled service. However, we see it needs a large service, therefore, we need it for 7 hours. We would schedule a technician for 7 hours."*

Sense, monitor collect, and record was identified as a second order theme that captures the transmission of operational data to the product cloud. This theme was based on, another 1ˢᵗ order category (*observe and gather relevant operational data*).

Observe and gather relevant operational data

Participants were asked about the way that they capture and share information with members of the service network. The respondents explained that data is at the core of their value propositions, in essence, sensing, monitoring and collecting usage data enables them to communicate vital information to support customer operations. Some of the respondents explain:

> ***STM TruckPro1, #6****: "It [Telematics] monitors and knows the fuel consumption of the vehicle, the mileage driven, idling, which is wasting fuel. It also monitors things like if [the driver] is driving harshly, harsh braking or harsh steering and all those kind of things. So really it can detect if the vehicle is being driven properly or not."*

> ***RED TruckPro2 #18****: "Every vehicle has a communicator on board- blackbox. In [TruckPro2]'s world it's called a [….], and this […] is the mind of information on the vehicle, so every customer gets free of charge what we call entry level information package with telematics."*

The case companies further explained that monitoring their products closely helps them to minimise risks on service contracts. For example, it facilitates the reduction of risks transferred to the manufacturer by being proactive in response to customers and supporting preventive maintenance. The collected and recorded data helps the case companies provide an information service to customer organisations. Acquired product usage information is sent to the customers weekly or monthly and includes information about product utilisation, which motivates customers to perform better. This implies a focus on value-in-exchange. The illustrative examples in Table 5.1 demonstrate how the case companies deploy the first order category of capabilities for service provision and management. These instances from the case companies emphasise that operational data collected from the field products is the main resource for delivering and managing their service offerings. Such monitoring of real-time vehicle performance information enables rapid diagnostics of product failure, allows quick response and facilitates an immediate resolution to problems. Data capturing capability is the foundation on which servitising organisations implement and navigate towards digitization of products and services.

Table 5.1: Data capturing capability – illustrative data for theme 1 and 2.

Theme one: Enabling intelligent functionalities	
1a: Combined hardware and software interface to develop smart functionalities	• Now every manufacturer signed up to a European protocol which allows each of us to share and exchange information, so we have something called fleet management interface on the vehicle, where [TruckTech] could bolt unto [TruckPro2] performance data for [TruckTech] customers, seemingly we can put our […] into a [TruckPro4] and draw the data. • We have our own in-house telematics solution which is called [….].Whenever you buy a product from [TruckPro4], it's got telematics built into it*"***(DAM, TruckPro4 #64)**
1b: Real-time monitoring through digital components	• The factory are monitoring the vehicle performance in real-time across the globe and they are able to come up just like we get an update on our mobile phone to improve things. So it's the case with vehicles now (#34)
1c: Information resources for service provision	• We are actually calling it the […] vehicle concept here in [TruckPro2], where the unit is embedded within the truck and we are also taking what we call service management data (STM, TruckPro2, #5)
Theme two: Sense, monitor, collect and record	
2a: Observe and gather relevant operational data	• It will also inform us of any active or inactive fault codes on the vehicle. So the vehicle constantly senses and stores any data about faults. So for **example,** turbo charger is developing a fault, it will record the code, which we will take off the download, to inform us of what is going on (RED, TruckPro2, #25) • From our point of view, also we can contact the vehicle remotely and pull to take a download of operational data the tachograph information (RED, TruckPro2 #22)

5.2.1.3 Summary and Implications of data capturing capability

Data capturing capability was identified as the first capability associated with digitalisation of products and services, which refers to the ability to align hardware and software components with sensing, monitor and collect information from product operations with low human interference. Visibility of

operation emerged as the main characteristics of data capturing capability. The study proposes visibility of operation as the manifestation of monitoring products and operations, which enables unique identification of customer operational data relevant for service delivery, service improvement, and service management.

It emerged that insight into customer operations is focused on helping manufacturing firms understand how their products fit within different contexts. The focus is on providing manufacturers with the data ability to respond to the customers' environment in real-time. Particularly, it emerged that visibility of customer operation allows stronger relationships within the service network, especially when manufacturers aspire to promote servitised offerings. Extant literature on servitisation highlights the role of data as a vital antecedent for the effective provision of servitisation (Bastl, Johnson et al. 2012, Lightfoot, Baines et al. 2013, Opresnik and Taisch 2015). The study's findings extend prior understanding by showing that visibility of customers' operations allows manufacturers to observe and identify areas of improvement, which facilitates long term relationships with the customers. The nature of these relationships provides the basis for, and is seen as a prerequisite for, future collaboration and value co-creation processes.

Ultimately, all these second order themes enable data capturing capability for customers' improved understanding and in doing so, provide insight into what is most important to customer's business operations.

5.2.2   Connectivity capability
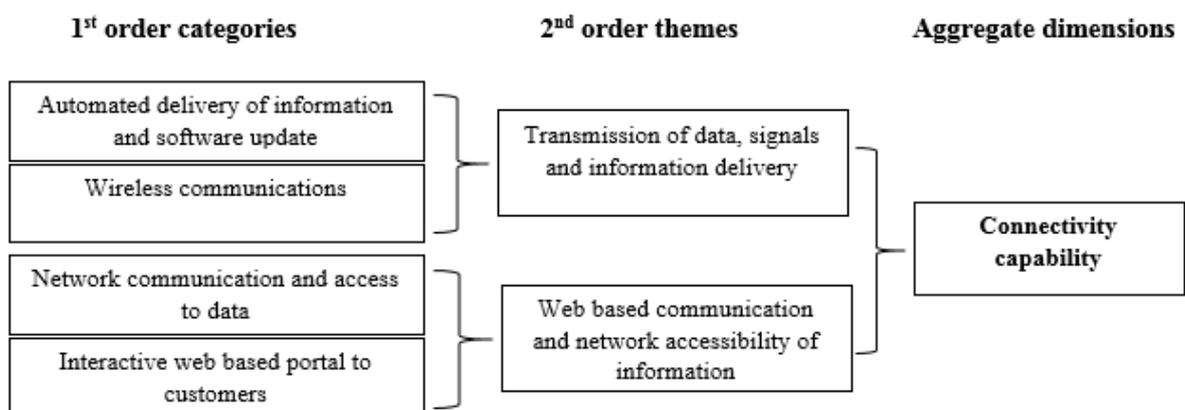
Connectivity capability in servitisation emerged as the next aggregate dimension in the analysis, capturing the ability to communicate and transmit signals from digitalised products through a wireless communication network. For instance, ports, internet protocols, antennas, and software, etc. The emergent connectivity capability, as an aggregate dimension, followed as a result of first order categories from the data (*automated delivery of information and software update, wireless communications, network communication and access to data,* and *interactive web based portal to customers*) and their subsequent conceptualisation into second order themes (*transmission of data, signals and information delivery,* and *web based communication and network accessibility of information).*

5.2.2.1 Transmission of data, signals and information delivery

The study's empirical data indicates that, through connectivity, data is transmitted from digitalised products to data processing centers available to actors in the service network, for example, in the cloud environment. The first order categories underlying this theme are further explained in detail.

Automated delivery of information and software update

The case companies provide repair and maintenance for their customers and supply spare parts as part of their advanced service package. Before telematics, in the event of a breakdown, the dealer would have to travel to the location and plug in their diagnostic tool to figure out the problem. Under this category, information is transmitted from the telematics system to the control centre (storage and processing centre) which the manufacturer can view in the cloud. As the Service and Technology Manager of TruckPro1 explains:

> **TruckPro1 STM, #11**: "*What you have is a little black box that's in the vehicle, connected to the vehicle. It's really like a mobile phone, has a sim card and the sim card basically collects data from the vehicle, and it transmits it just like a text message.*"

> **TruckPro1 STM, #12:** "*Every two minutes its sending us information, and it's sending information on the speed of the vehicle, the location of the vehicle, how it's been driven, the health of the vehicle all those things were being parcelled up and transmitted and [TruckTech] use a data management centre which is based in [….], same as the ones that the banks use, [..], all the big banks use the same data management centre. It has guaranteed 99.9% availability of time, all backed up and secured.*"

Wireless communication

This describes the nature of connectivity capability and its functionalities. With digitalisation, connectivity capability is enabled in the digitalised product through a wireless connection. This

transmits information and can be virtualised in the cloud using an access code or password. The STM of TruckPro1 details:

> **TruckPro1 STM, #13:** "*All the data it goes to […] and then basically it's all held in different environments by a customer. So it's not all in one big database, but you can request it. In order to get the data you have to go through the application, and for the application, you have to have a log-in. The log-in is associated with the customer, so if you work for Cynthia transport limited, you would only get your data, you won't get anybody else's data, and the other customers won't get your data, they only get their data.*"

The 2nd order theme of *transmission of data, signals and information delivery,* focuses on activities around data and signal transmission from digitalised products to the cloud and from the cloud to various actors in the service network. For advanced services, this capability improves the efficiency of operations, such as repair and maintenance activities. With regards to advanced services, service levels of all network members are very important. That is, the truck manufacturers (TruckPro1, TruckPro2, TruckPro3 & TruckPro4) connect their telematics system to other systems within the network to enable connectivity, measurements and a consistent approach across the network. This information flow to other network partners, such as, dealers enables them to prepare for repair and maintenance of vehicles before their arrival in the workshop and thereby saves resources and reduces the cost of maintenance. The District Account Manager at TruckPro4 noted that wireless communications allows them the possibility of monitoring in an interactive and real-time manner. He explains:

> **DAM TruckPro4 #81:** "*The new technology on the new trucks, if that button is pressed, the [.....], can then remotely access the vehicle. ....You can check limit of things over the airwaves, can do a preliminary check.*"

Hence, this reduces or eliminates the need to be physically present to diagnose a problem or of getting a vehicle to the workshop and plugging in the diagnostic machine to discover faults. One of the dealer companies who perform repair and maintenance for TruckPro4 also explained that wireless communications enable them to proactively plan for maintenance. The respondent describes how the information offers insight on where the problem lies and thereby helps the technicians carry out repair and maintenance work appropriately. The CEO of TruckSup3 states:

> **TruckSup3 MD, #30:** "*The on-board diagnostics tool. The diagnostics are advising the technicians what the problem is. Instead of stripping an engine, or trying to find an electrical problem this computer downloads all the information and it tells you exactly where the problem lies.*"

TruckPro3 STM, #6: "We can proactively plan and schedule servicing, rather than taking the vehicle into the workshop and doing an inspection first, you can actually determine what the problems are before it arrives, so you are actually saving downtime, cost and improving uptime."

Creating and integrating connected infrastructure allows the status of products to be monitored, predicts when components are likely to fail, and feeds this information to the service network, so that maintenance can be planned proactively. The autonomous nature of connected systems allows the manufacturing firms to save time spent on error diagnostics and improves resources for maintenance. Connectivity capability focuses on service related support and improving business support overall. The Regional Executive Director of TruckPro2 affirms that this capability enables real-time communication with other network members for maintenance. He explains:

T*ruckPro2 RED, #61: "Minimise any unscheduled maintenance because the vehicle is monitoring its reliability in real-time, it will inform the dealer if a problem is about to happen."*

Connectivity allows some functionalities in the digitalised products to not only be modified on their own, but equally enables customers to tailor and optimise connected system functions to their particular situation, increasing customer involvement in advanced service delivery. The Service and Technology Manager in TruckPro2 explains:

TruckPro2 STM #9: "The other side of things with our communicators in the telemetry box is to actually improve the vehicle experience for the user. So for instance, we have the control unit, we call it the communicator, it actually includes the topographic map of the UK, so it can actually modify the performance of the vehicle depending on the terrain, if it's very hilly it will change the gear box of the solutions. If it's a nice downhill road, it will back off and coast to save fuel. It will actually modify the vehicle parameters, to make it more effective and economical. It is what we call intelligent driving."

TruckPro2 STM, #23: "I say to a customer some of the functionalities in our portal, you can update, you can run reports, it might differ from one customer to customer, different operations but very quickly when you start, you are actually identifying what the needs are for your operations."

5.2.2.2 Web based communication and network accessibility to information

The online portal provided to the customers and other members of the service network allows them access to view and track their vehicles in real-time. Several statements from the participants reflected that technological innovation in the truck industry transforms the nature of connection and the way service activities are exchanged in the service network. This 2nd order theme (*web based communication*

and network accessibility of information), provides opportunities to connect and exchange information between digitalised products, the operating environment and other systems on a network level.

Network communication and access to data

Network communication and access of data places emphasis on the potential of connection between the smart products that could be singular (one-to-one) or concurrent (one-to-many or many-to-many), where the data is pushed sporadically to multiple interconnected products and systems on a network level, for instance, a dealer's system. As explained by one of the participants:

> **TruckPro2 STM, #41**: *"So telemetry now gives us a vision [of] most of the important things that have to be ascertained before you can start servicing it, they [dealer] have access so is available to the dealer before the truck even arrives."*

Such communications at a network level optimises product function and provide a competitive advantage by delivering increased value to the customer operations.

Interactive web based portal to customers

Interactive web based portal allows users to achieve a higher level of product functionality tailored to their individual experience. The fleet management system can connect to various other systems to achieve the customer's ultimate operational need and goal, such as focusing on a particular driver and his driving pattern. This implies that the web portal enables dynamic functionalities, real-time information exchange and the continuous management of customer operations, which would not have been possible even with a high level of smart sensors embedded in a truck. TruckPro2 articulates that in the absence of connective functions, smart products will provide few benefits towards value creation for their customers. As TruckPro2 STM noted:

> **TruckPro2 STM, #28**: *"The efficiency is contacting the drivers, maintaining data, message into the vehicles, interactive fleet management, use the service data. Sometimes you get a situation where an operator irrespective of the price can't do the job unless they have got it."*
>
> *"When truck breaks down the truck driver presses the button, signal goes off and then all of a sudden his truck's phone starts ringing. He answers it and talks to the breakdown centre who can then keep the recovery or the technician on route up to date with what the progress is."*
>
> *"The customers can login and they've got their own login portal, so they can see where their trucks are, how they are doing on fuel, everything like that. When it comes to aftersales side of it for the R&M again they've got their own internet based portal where they can monitor progress, it's all connected."*

More illustrative quotes have been presented in table 5.2 to illustrate how service providers use the two identified elements of connectivity capability to validate the importance of this capability in service offerings.

Table 5.2: Connectivity capability – illustrative data for themes 1 and 2.

Theme one: Transmission of data, signals and information delivery	
2A: Automated delivery of information and software update	• For instance, you get a warning light on the dashboard, warning light can be orange or red. Red: means you have got to stop, orange is usually a warning (TruckPro2 STM, #29) • Basic simple overview of how the vehicle is performing and that sends us an email every week and every customer buying a new truck will get that automatically. • We can actually download that data automatically while the vehicle is driving (TruckPro2 STM, #13)
2B: Wireless communications	• If a truck breaks down, there's a little call button and all you do is press it and the sit and wait. That then sends a signal to the call centre in [TruckPro4's head office], […] sends an instruction to the nearest [TruckPro4] dealer, who distributes the nearest van to attend the truck. And because he's pressed the button on his [TruckPro4] Nav system, it also sends the GPS location (TruckPro4 DAM, #72) • Historically that has been a manual based process where you have to get the hands on with the vehicle, then perform a download. Under the [TruckPro2] monitor system, it can be done remotely without ever seeing the vehicle, just pull the vehicle and take the data remotely (TruckPro2 RED, #46)
Theme two: Web based communication and network accessibility of information	
2C: Network communication and access to data	• If we know the vehicle is due in here in […] in 3 weeks' time, our service planning team will contact the vehicle remotely, take a download to inform them of what that vehicle is likely to require. So it will tell us the millage, so we know which type of service we need to do because we have three sets of services we do depending on millage (TruckPro2 RED, #23) • The health data, I think that's absolutely fantastic because things like before the vehicle goes into the workshop, the guy in the workshop [technicians] will know exactly what maintenance or repair is required and be prepared for it. And the parts, the labour required for it and we can speak to the operator and say, we will need it for an extra one or two hours and its managing the vehicle's health through data (TruckPro1, ASTM #19)
2D: Interactive web based portal to customers	• All our data is delivered through web interfaces (STM TruckPro2, #98) • They [customers] have a username, a password, a contract with us to provide the data. So he looks at his portal he sees that his driver is doing x or y or his truck is somewhere on the south coast, he physically uses the data (STM TruckPro2, #14) • What we have is a **portal, which is […].co.uk**. that gives us access to the system, and in that system, basically we can produce reports, now this is a detailed report, lot of details about the date range, how many vehicles were reported in, what's the utilisation etc. (TruckPro**1 STM, #39)** • All our delivery at the moment is currently delivered through a standard web interface as long as you have got a web access and a browser you don't need any special software(#100)

5.2.2.3 Summary and Implications of connectivity capability

The findings demonstrated the second constituent of digital capability, termed connectivity capability, which highlights the flow of information from product cloud to the service network. As discussed in the previous section (5.2.1), data capturing capability supports the identification and understanding of customer needs, and development of services suitable for the customer context. This second digital capability (connectivity) creates value through *information flow and exchange,* and *interactions and collaboration*. Connectivity capability enables information flow between actors in the service network, which facilitates insight for product maintenance, availability, and reliability of the product. These attributes of connectivity are further explained in the next sub section.

Information flow and exchange

In servitisation, digitalisation of products and services sheds new light on value co-creation aimed at improving customer value through flow and exchange of information, interaction and collaboration. As suggested by Lee and Lee (2015), digitalisation offers the basis for multi-level collaboration, such as between systems, things (products), and collaborating actors within the service network, etc. Based on the analysis of the case studies, *information flow and exchange* emerged as the first resultant attribute of connectivity capability.

Information flow and exchange are defined here as the protocols that enable different types of information transmission within the service network. The findings demonstrate that, in servitisation, connectivity capability enables value creation through the flow of real-time information between things (products), systems and collaborating actors (people: manufacturer, dealers, customer, etc.) within the service network. This information flow improves customer value by enabling insight into their current situation improving their processes through the immediacy of response, reliability, and availability of products by reducing unplanned breakdowns.

Interaction and collaboration

Interaction and *collaboration* refer to inter-organisational partnerships which connects stakeholders in the service network, allowing support and engagement through the online platform. With this, servitisation is enabled through interactive information exchange in the service network; for example, a

dealer can access and exchange repair and maintenance information through an online portal. This facilitates information exchange and encourages collaboration amongst the service network partners, in line with the view of Lusch and Nambisan (2015), which posits that service platforms can improve the efficiency and effectiveness of service exchange by increasing information resource density. Furthermore, Bastl, Johnson et al. (2012) demonstrate that a servitised network requires regular open and multi-directional information exchange. In other words, the findings of this study confirm these assertions. Nonetheless, these past studies treat servitisation as a whole and failed to demonstrate the difference amongst servitised offerings in relation to information exchange and collaborations.

5.3.3   Analytical capability
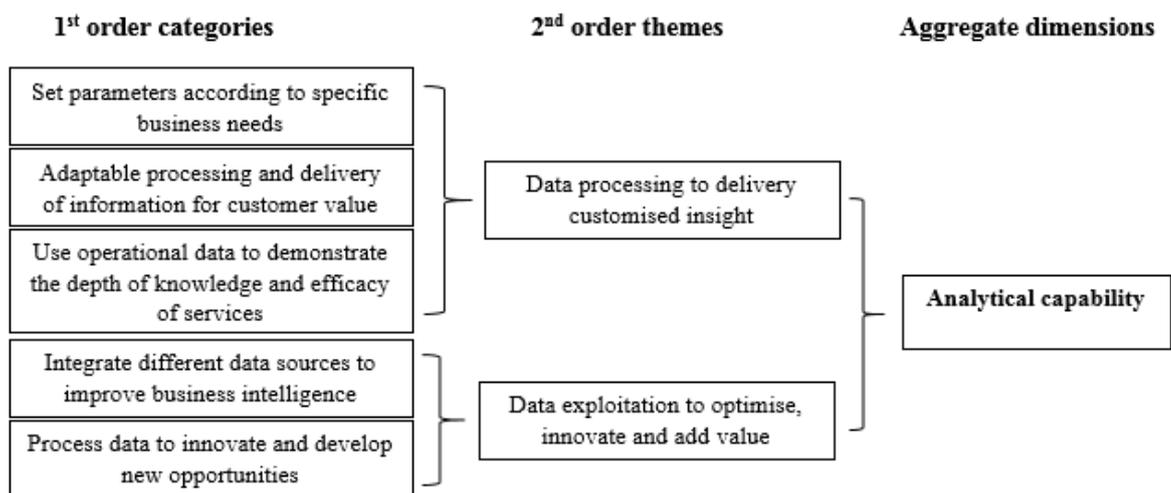
Analytical capability refers to data processing ability in which available data are effectively transformed to unlock valuable and actionable insights for various stakeholders in the service network. By emphasising and validating ways in which parameters and reporting are managed, the second 1st order category (*adaptable processing and delivery of information for customer value)* was identified. This allows the case organisations and stakeholders in the service network to assimilate and exploit information to optimise business processes. In subsections 5.2.1 and 5.2.2, an illustration of how the case companies utilise *data capturing* and *connectivity capability* to enable comprehensive monitoring and transmission of operational data for a better understanding of product usage was presented. The study's analysis identified analytical capability as the third aggregate dimension and a key component of digitalised products and services strategy. In essence, this aggregate dimension includes two 2nd order

themes: *data processing to delivery customised insight,* and *data exploitation to optimise, innovate and add value*.

The analysis identified the importance of making sense of historical data collected from digitalised products. The findings demonstrate that data processing explicitly requires setting parameters and developing rules or algorithms that process and transform data into insights for increased efficiency. Through data processing, the manufacturers acquire the understanding that provides the basis for critical decision making and market intelligence; basically, it enables operational value for them and their customers. This theme consists of three 1st order categories: *Set parameters according to specific business needs, adaptable processing and delivery of information for customer value,* and *use operational data to demonstrate the depth of knowledge and efficacy of services*.

Set parameters according to specific business needs

When participants from the case companies explained their practices and the notion of analytical capabilities, they focused on the transformation process of converting raw data into meaningful insight. This starts by setting parameters for various things, behaviours or aspects to be measured within the system. The Service and Technology Manager of TruckPro1 explains:

> **TruckPro1 STM, #40**: "*What we have to do is to take that raw data, and we have to take it through a transformation process, to make it into meaningful information. And the way we do that is- we have a set of parameters. So we have a set of parameters, so what [these set parameters] does is look for things like harsh braking. Well, good look for harsh braking means you are getting less than 0.05 incidents per hour which to you and I means better than 1 in 20 hours. To be a [grade] B driver, you have got to be better than 1 in 10 hours and so on.*"

Adaptable processing and delivery of information for customer value

A massive amount of data is generated in servitisation due to digitalisation. In order to make sense of the data, manufacturers employ analytical capability.

An example is the customisation of driver training programmes. For the customer companies, driver and fuel cost are seen as the key determinants of profitability. Therefore, driver training is of vital significance to their businesses. These customised services help by reducing accident levels, fuel costs, etc. through driver training. A Respondent from TruckPro1 and TruckPro2 explain:

> **TruckPro1 ASTM, #16**: "*We can change things around, change the parameters on the system, we do it because every operator [the customer] is different and we understand that. In our respect, we do that, and we will be going to an operator whether on our own or with a salesman, to promote it and to understand what the operator wants from the system.*"

> **TruckPro2 STM, #15**: "*It [the telemetry control unit] will actually modify the vehicle parameters, to make it more effective and economical. It is what we call intelligent driving.*"

Secondly, customisation or rules are set to suit particular business needs, which in turn enable value-in-use; this emphasises user centricity and user's context. For example, a set of parameters suitable for a particular customer may not be appropriate for another. Hence, the way in which data is processed and delivered to various customers is different.

Additionally, this capability enables reprogrammability by allowing customers to alter and set rules suitable for their business operation. The Regional Executive Director of TruckPro2 explains:

> **TruckPro2 RED, #49**: "*They [customers] can also change the parameters, in what they are measuring for their management reporting. For example, a harsh braking is measured at so many decelerations of so many kilometre per hour per second, so if they master that, and they want to put a tougher target in for the drivers they are able to change their parameters.*"

Use operational data to demonstrate the depth of knowledge and efficacy of services

It was observed that, through logical data processing, manufacturers were able to *demonstrate in-depth knowledge of service efficiency* to their customers. They also have insight that provides a foundation for performance improvement which may not have been previously possible. The study's findings show that data processing enables an understanding of how to avoid a high risk situation, especially for advanced services. The analytical capability enables manufacturers to sell availability guarantees to customers, therefore creating a competitive advantage. The Regional Executive Director of TruckPro2 provides an example:

> **TruckPro2 RED, #18**: "*For example, turbo charger is developing a fault, it will record the code, which we will take off the download, to inform us of what is going on. So when the vehicle arrives, we are best prepared to give the optimum service and minimise the downtime for the customer.*"

The ability to predict insight in a competitive and complex market allows manufacturers to proactively respond, engage with customers, and equally take advantage of developing opportunities. As the CEO of TruckSup3 explains how data helps them manage fault problem, he states:

> **TruckSup3, CEO #15**: "*We also share the data [....] with regards to parts activities and the selling of parts and also service activities where we would have, sometime we might have*

problematic vehicles that have a manufacturing issue and problem, and therefore they need to know these are the certain chassis number these affects."

Overall, the insights from data were seen as a means of adding more value for the customers, settling warranty issues and delivering advanced service within the service network. Developing a better understanding of customer's business enables manufacturing firms to maintain good relationships.

5.2.3.2 Data exploitation to optimise, innovate and add value

Similar to the interpretive practices that underpin data processing for customised insight, the 1st order category that facilitates data exploitation for optimisation and added value focuses on how the case organisations demonstrably feed into innovation. There are a number of instances in the analysed data that illustrate how the case organisations a) *integrate different data sources to improve business intelligence* and b) *process data to innovate and develop new opportunities;* this is further explained below.

Integrate different data sources to improve business intelligence

In their service network, actors depend on the internal and external environment to access resources needed to improve processes and create additional value. For example, a manufacturer may depend on a dealer's knowledge of maintenance to change certain components of their product (truck). Through assimilation and integration of different data sources, manufacturing firms and their collaborating network partners can interact, with the option to access, exchange and combine resources (internal and external) for the optimisation of business processes. One of the participants from TruckPro1 (STM) explains:

> **TruckPro1 STM, #42**: "*We get more value out of data by combining it with other types of data. We always have one little area, the telematics data which is you know, the driver behaviour, the health of the vehicle if you can combine it with the repair and maintenance data, with the factory data you know it all becomes more, you get a synergy effect effectively. We bring it all together and analyse it, so we have a business intelligence team here in IT, that can take data from different sources, they can take some of our data, some of the factory data, some repair data and effectively build reports and databases that can help the business in other ways.*"

By integrating data from various sources, the case organisations leverage information to improve service outcome and optimise performance that best supports the customer's needs. The ability to assimilate and collaborate with other firms in the service network offers greater opportunity for value creation through knowledge acquisition from data. The District and Aftersales Manager of TruckPro4 explains:

> ***TruckPro4, DAM #160****: "We help the dealer analyse and make sure they understand what their areas of responsibility are. You need to have ten clutches on your shelf because on average you sell ten a month. Typically when you are heading to March, you sell more. So rather than having ten on the shelf, you need to have 20 on the shelf."*

The manufacturer can help dealers be more efficient which feeds into the value stream of the service network.

Process data to innovate and develop new opportunities

The analysis also shows that there were numerous instances in which the case organisations would use data for innovation purposes. The second element of the 1st order category relates to *processing data to innovate and develop new opportunities*. This is focused not only on existing products and services, but also on how the manufacturing organisation processes data to improve existing offerings and to develop new services. Here, the case organisations emphasise the proficiency of the company feeding accumulated vital information into their innovation processes making the next set of products and services better for added value. This is all based on a constant inflow of data coming from digitalised products that monitor and transmit customer use data. The Service and Technology Manager at TruckPro2 narrates how the innovative performance of the organisation is actioned, based on valuable insight from data, as a result of the proactive data exploitation, he explains:

> ***TruckPro2 STM, #22****: "The sales engineering department, who specify the vehicle, normally build the truck to meet the legislative requirements. Well the speed limit in the UK is 56mph, so you gear the vehicle that runs 56mph because that's theoretically right. The only problem is, if you look at the average maximum speed in the UK of truck today, it's about 43. So we are building truck that is actually over geared for the UK market. So now we are looking at customers operations, and we can say, we know you want one of those [56mph], but actually, you are running one of those [43mph]. So we actually get the customer a better solution to his operation."*

By exploiting the collected data, manufacturers are able to develop new products to improve and optimise customers' operations. Taking advantage of customers' operational data supports the manufacturer's research teams in the development of innovative products and services, as noted above.

Additionally, in advanced service offerings, manufacturers offer various services as part of the package, such as long term cost guarantees, increased availability, legislative inspection, spare parts supply etc. With digitally connected products and analytical capability, providers are able to identify availability rates for various components of the vehicle and, based on these data, can determine the lifecycle of their

product and sell outcome-based contracts accurately. The Service/Technology Manager TruckPro2 explained:

> **TruckPro2 STM, #20**: "*Optimised service which is really a combined servitisation, we are actually using the benefits of data, the benefits of training, and combining them again to make something that is greater.*"
>
> **TruckPro1 ASTM, #19: "***The health data, I think that's absolutely fantastic because things like before the vehicle goes into the workshop, the guy in the workshop [technicians] will know exactly what maintenance or repair is required and be prepared for it. And the complied parts, the labour required for it and we can speak to the operator [customer firm] and say, we will need it for an extra one or two hours, and it's managing the vehicle's health through data.*"

Data from the customers' operations is seen as an important resource used to manage maintenance within the service network and improves customer's operation by helping them plan ahead avoiding unnecessary costs and saving them time.

Conclusion

In summary, manufacturers offer various types of services: base and advanced service offerings. Advanced services provide availability guarantees to customers using digital technologies embedded into products (trucks). The data delivered through these digitalised products offer information about various components in the truck, patterns of failure and their causes, which allows value to be created by reducing downtime for the customers and providing operational efficiency and effectiveness. This data is further processed and exploited in other ways to provide information and knowledge upon which product and service lifecycle cost and availability are assured. Data capturing, connectivity and analytical capability support these guarantees by allowing providers to monitor and control the products, and proactively identify, repair and maintain when needed, therefore, reducing risk related to advanced services.

Two points are worth noting. The concept of analytical capability is used in two ways: the first deals with information on how the manufacturing firm reacts to the external environment (customers), and the second with information for internal purposes such as product/service innovation, which also offers better solutions to customer operations. By underlining the intrinsic value of data, the case organisations essentially articulate it as an advantage in their competitive space.

Importantly, information is proactively shared within the service network to improve repair and maintenance services, which are carried out through the dealers. Respondents from the case organisations see this as an important step towards creating added value for them, their customers and the dealers, as through connectivity capability, vital information can be transmitted and integrated into an online platform, enabling virtual functionalities. In essence, customers can customise solutions suitable for their context by setting the right parameters for their operations.

Table 5.3 provides additional representative quotes supporting the 1st order category that led to the development of the 2nd order themes under the *analytical capability* aggregate dimension.

Table 5.3: Analytical capability – illustrative data for themes 1 and 2.

Theme one: Data processing to delivery customised insight	
3a: Set parameters according to specific business needs	• So if I want to see how a certain driver did in fuel efficiency last week. I can just select the date parameters in, select the driver and press enter. And it tells you how he drove, how much fuel he burned, did he brake harshly, did he have any serious braking event, is he using the exhausts break, is he driving the truck effectively basically and efficiently (TruckPro4 DAM, #92)
3b: Manage processing and delivery of information for customer value	• It fed a lot of data back about how drivers drove the truck, did drivers actually use the exhaust break? Which is an efficient way to brake the vehicle, or did they use the pedal? It fed that data back so you can develop a driver training, based on that. but more importantly how did the driver do (TruckPro4 DAM, #104)
3c: Use operational data to demonstrate depth of knowledge and efficacy of services	• It [data] proves that we have an in-depth knowledge of what we do for them. It allows us to demonstrate that we understand their business, their priority not just ours and we have focused on those (TruckPro2 RED, #89) • We offer service that basically combines telematics with driver training. We go in and train him, we look up the problem areas are beforehand, so here we will be looking at telemetry data, and we go in with probably an agenda of what we aim to work on, we train on that but then rather than just say goodbye and finished, on a regular turns perhaps monthly or every 6 weeks we would look at the telemetry data and actually do a coaching report with him (TruckPro2 STM, #30)
Theme two: Data exploitation to optimise, innovate and add value	
3d: Integrate different data sources to improve business intelligence	• We have been able to benchmark that upon real data, probably going back over two or three years because we have been gathering data now for four years, the monitor report so we know how they operate. (TruckPro2 STM #67)
2e: Process data to innovate and develop new opportunities for customers	• So now, you are finding food companies especially the main food, the supermarket and the food producers are very strong, in their environment credentials and recording off, it no longer possible now to say well ok I can do your job for 20p cheaper than everyone else in the market, they will turn around and say well actually I want the environment record for every mile you do. And so telemetry assist in that, you can run that report easily just with a button. There are areas that are savings and there are areas that without it you can't do your job (TruckPro2 STM #59)

5.2.2   Summary and Implications of analytical capability on servitisation

Analytical capability is defined as the ability to seamlessly process available data helping to unlock valuable insights for involved stakeholders. Core attributes identified in this capability are focused on

effective management of knowledge and *integration of knowledge* needed to create and improve existing service offerings, and to explore service network relationships in order to offer customers a process-oriented solution. Contrary to base service offerings, advanced services are mainly about creating innovative know-how to support the customers' businesses and add more value. The intensity of these business relationships and level of customisation required in advanced services necessitates knowledge acquisition more than data, which calls for strong analytical competence, integration and effective management of knowledge. For example, the cases above demonstrate that manufacturers provide specific training to customers depending on their needs (driver performance, product choice, business intelligence, etc.). This implication is further detailed below.

Effective management of knowledge

Effective management of knowledge not only calls for knowledge about the product and services, but also knowledge about customer types, product usage, delivery processes and market conditions (Dongmin, Dachao et al. 2012, Parida, Sjodin et al. 2015). Knowledge in this context is defined as data, information, and know-how transferred during interaction in the business relationship. Hence, analytical capability in services implies utilising and managing knowledge from both manufacturers and customers for new service design and innovating existing service for value co-creation. A previous study by Davenport, Barth et al. (2012) examined the role of data for business decision making; a process where software enables managers to convert data into knowledge, and knowledge into results. The cases demonstrated a recurring process, where the results produced further information which was converted into knowledge and again into further results, in other words, a continuous cycle (knowledge cycle). The empirical findings showed that manufacturers increase expertise by leveraging and managing knowledge discovered from accumulated data for valuable insight.

Integration of Knowledge

In advanced service offerings, first, maintenance related data was collected by the truck manufacturing companies (TruckPro1, TruckPro2, TruckPro3 & TruckPro4) and was then used to evaluate dealers' performance in order to incentivise them. For this purpose, available service performance data were utilised and turned into knowledge. It was also noticed that in advanced services, an additional

knowledge cycle was developed through telematics technology, where customers become part of the knowledge creation process for value creation. As a result, utilisation of data coming through telematics resulted in fewer accidents, lower carbon emissions, improved delivery and instant location on the map. Manufacturers integrate this knowledge for innovating existing services or developing new service offerings, and this emphasises the importance of linking internal and external sources of information and knowledge within the stakeholders in the service network. In turn, this resulted in high service performance levels within the service network. Ultimately, data was seen as a resource for base service offerings, whereas for advanced service offerings, knowledge integration and management was created with the network partners including dealers, manufactures and customers for added value.

The next sub-section will endeavour to conceptualise how these digital capabilities are combined for various service offerings.

5.3   Understanding the implications of digital capabilities for service offerings

Overview of chapter

In the previous section, in-depth analysis and conceptualisation of digital capabilities in servitisation was identified to answer the first research question: *What are the digital capabilities necessary for supporting servitised offerings?* This section is mainly focused on answering sub-question 1a: *How are these digital capabilities combined for various service offerings?* This section provides an understanding of how the *data capturing, connectivity and analytical capabilities* are deployed for the various service offerings investigated (base and advanced services).

Literature in servitisation highlights the importance of digital capabilities as a core element of servitisation strategy, the emergent model (see Figure 5.2) shows the identified digital capabilities. However, there is a need to uncover how the identified digital capabilities are combined for the two services offerings.

The analysis identified a hierarchy in the way these digital capabilities are configured for different service offerings. Specifically, the findings demonstrate that for base service offerings, data capturing capability and connectivity capability were relied upon and illustrated limited opportunities for value

co-creation due to lack of adaptability and flexibility in the way information flows. However, advanced services are more focused on customisation and adaptability of service offering in order to suit customers' context. The underlying analysis is subsequently presented.

5.3.1 Identifying the service offerings and capabilities required for each offering.

Across the four cases, the value proposition offered to customers can be categorised into two major types: (a) base offering, and (b) advanced service offerings. While the first depicts a traditional product offering, it has a weekly report to customers, as most vehicles generally include telematics box from their production line which produces these reports, but that is as far it goes. The second offering is considered advanced servitised offering. The two service offerings, the capabilities required and their resultant implication on value creation of servitised network are explained below. Table 5.4 provides a summary of different elements associated with different case organisations.

Table 5.4: Illustrative elements of services in the case organisations

	TruckPro1	TruckPro2	TruckPro3	TruckPro4
Product element	Sells trucks, parts and also offers customised products	Sells products, parts and customised products if requested.	Sells products and parts through dealers	Sells products and vehicle parts through dealers.
Services element	Uptime services, customer support in the form of R&M, fleet management services	Driver training services, efficiency improvement, consulting services to customers.	Sells maintenance services	Sells repair and maintenance services, finance and driver training reports.
Information element	Outcome based services, tachograph services, and legal required information. Telematics enables collection, distribution and advanced analysis of customer operational data.	Web-based access for supporting the sale of services. Collection and analysing of customer needs. Tachograph download services.	Sells telematics services, such as transmitting real-time truck data, camera tracking data.	Intelligent telecommunication systems which transmit real-time usage data to head office for maintenance.

5.3.1 Understanding base service offerings and the resultant attributes of digital capabilities

The first constituent of digital capability identified in section 5.2.1 was data capturing capability.

Within this capability, one resultant attribute was the visibility of operations. This was found to be

applicable to both base service offerings and advanced service offerings. However, it varied in the way

it was deployed.

Base service offering entails the sale and delivery of the trucks including one year warranty and a monitor package, which is free of charge to the customers, to give them a taste of what is available. This type of offerings is mainly used by small business customers, otherwise known as retail customers. These type of customers tends to purchase extended warranties as well as additional repair and maintenance (R&M), as explained by the Regional Executive Director of TruckPro2:

> **RED TruckPro2 #9**: *"All the vehicles go with a warranty as you would expect, for the manufacturer's warranty always 1 year warranty period. And then there are a range of extensions that one can purchase, 2nd year, 3rd year, 4th year as well, which they [small customers] can buy."*

Therefore, manufacturers deploy data capturing capability, which is focused on monitoring and proving visibility of customer operation, and to address warranty issues.

In addition, through connectivity capability, manufacturers are able to provide basic weekly reports. Through data capturing capability, manufacturers capture customers' needs, have tangible information, which allows them additional opportunity to approach a customer, increase collaboration, and support the customers in a meaningful way. Further analysis of data capturing capability and connectivity capability offer insights into the visibility of customers operations, and information exchange between manufacturers and customer, providing a further opportunity to develop a closer relationship with customers. The Product and Service Manager of TruckPro3 explains:

> **TruckPro3, PMD, #53:** *"So if [TruckPro3] has got the data to know about [customers], even if he doesn't know him personally, but there is some data exchange, maybe via the dealer salesman or again through the service side, there is a relationship. So that data allows you to develop and have is the personal relationships."*

The findings demonstrate a number of differences in the ways information is used in relation to various service offerings. For base service offerings, gathering operational data was frequently mentioned and emphasised by the participants, although it was only used as an overview of performance, mainly passed from manufacturer to the customers as summaries of operations. It also gives them an understanding of the customers business, and therefore, draws the customer into a merged process, and allow the manufactures to engage customers in a meaningful way. The Service and Technology Manager of TruckPro1 explains:

> **TruckPro1 STM #13** "*We would sell you an initial package [base service offering] of maybe with one year telematics included. So we get you interested, we get you using the service, are you happy, can you see how you are benefiting? So hopefully after the one year, you say yeah, that's fantastic, I want to keep going, I want to keep the service for more years because one year is free.*"

Within base service offerings, there is visibility of customer operations enabled by data capturing capability; connectivity capability allows information flow and exchange from the manufacturer's end to the customers. However, the business relationship for this type of service offering was found to be more product-oriented and transactional in nature. This implies that data capturing and connectivity capability do not create added value for base customers; rather they support the manufacturer's process through gathering real-time information on product condition. Therefore, with enhanced visibility of customers operations, manufacturers are able to understand the customer needs, develop suitable services and are able to draw the customer into a merged process. Overall, the base service offering is mostly focused on product operations and enabling monitoring services. This lacks customisation and mutual interactions among active resources that make up the service system.

5.3.2 Understanding advanced service offerings and the resultant attributes of digital capability

In advanced services, information flow and exchange are utilised to support customers' business processes and to determine how the desired performance can be achieved, which may lead to better reliability of products and operations. The analysis showed that in advanced service offerings, all three digital capabilities are utilised, and demonstrated how the case organisations implement a service platform to offer various advanced services, such as customised training, journey management and the ability to focus on what is important to different customer context, etc. The Service and Technology Manager of TruckPro1 explains:

> **TruckPro1, STM #83**: "*We have […], this is not standard in the R&M package, but this is an extra that [the customers] can pay for, so they can upgrade to this level. We have it modularise, if you look at the kind of things we can do, if you have got safety in mind, you can go into the safety module, and get a list of all the safety element like the harsh breaks, the camera triggers, and all the stuff, it could be an impact, so you can for example, click on an incident and you get like a playback, this is called incident data recorder, and it's not standard. The customer can check this directly himself without contacting us. So that's another level of the module we offer [in comprehensive service].*"

Emphasis is placed on upgrading the basic R&M package to include an advanced module which enables customisation and adaptability of the system to suit a particular customer need. Using the three digital

capabilities identified, the customers are integrated into a joint process, where customisation of solutions can be implemented as described above.

First, through data capturing capability, the customers of this offering were able to access new information previously unavailable to them, as the digital technology enabled *visibility of their operation*. Using this offering, the manufacturers collaborate with TruckTech to enable inclusion and interpretation of operational data for the customer. Many respondents from the case organisations demonstrated differences in customer needs and, emphasised that telematics technology enables them to monitor, identify, and capture particular customer needs through *visibility of customer operations*.

Secondly, connectivity capability allows *information flow and exchange* between systems; this facilitates *interaction and collaborations* amongst network partners. Advanced service offerings are portal based and allow interaction, collaboration and access to various aspects of vehicle information. For the case organisations, using a service platform seemed a natural way of implementing their servitisation strategy, as it provided them with flexible ways for configuring advanced service offerings, facilitated by merging their product, service and information elements, as seen in Table 5.5 below. The analysis showed that manufacturing firms use connectivity capability to enable *information flow, interaction and collaboration* amongst network members enabling opportunities to effectively use and maintain the products. The Service and Technology Manager of TruckPro1 explains:

> **TruckPro1, STM #95** *"We have got health data, this is a login we call [....], which is another solutions all part of the [comprehensive service], but it has but this is more dealer facing. This is so the dealer can look after the customer's vehicles, so what they can actually do is get details of the health data of a vehicle, basically what you have got here, there's a registration number of that truck, [...] euro6 model. This is waiting for service, you have got all sorts of information, when it went in for service, what millage its done, how many driving hours, how many idling hours all the health alerts, this one has got a problem with the cooling temperature, motor pressure of the engine, so the ides of this is that we can now make this in real-time, you don't need the vehicles in the workshop to get these information."*

Activities such as automated basic analysis of operational information, the transmission of warning signals to the service network to note where repair and maintenance work may be needed, and the ability to responsively manage customer business operations were equally observed. Information is exchanged amongst stakeholders including customers, manufacturers, and the dealers that carry out repair and maintenance. Sharing such information across the network can help the dealers prepare for maintenance

work and ensure they have the required spare parts available. This resulted in daily interaction and collaboration in the service network. Connectivity allows interaction and collaboration among the service network and promotes good relationships among the partners.

The analysis showed that analytical capability, in combination with connectivity and data capturing capability, provides a higher degree of customisation, as these deliver the information to improve manufacturer and customer knowledge. Therefore, knowledge is co-created amongst the network partners. The flexibility and integration of customers in manufacturing processes brings the focus onto value co-creation with customers along with a strong relationship alignment (this will be discussed in depth in chapter 6). The analytical capability enables the leverage of data to discover knowledge and puts more emphasis on *knowledge integration* and *effective management of knowledge* in advanced services. This provides opportunities for added value, such as providing targeted driver training for individual drivers. The Service and Technology Manager of TruckPro2 stated:

> **STM, TruckPro2 #24**: *"So those are the customer centric services, if you turn to the customer and say, what's telemetry to you, he will say well I know where my vehicle is, and I know what my driver is doing, but actually the unseen benefit to him is that we are building him a more relevant and appropriate vehicle."*

The advanced service offering is unique compared to other types of offerings in the way it utilises the three digital capabilities to deliver effective services in different contexts. The unique feature of advanced service offerings is the degree of customisation. Evidence showed that such solutions were significantly tailored to fit a particular customer's need and, therefore, were very different from each other. Connectivity facilitates the flow of information, which enables customers to take actions in order to increase value creation. For example, customers can adjust and set parameters according to the priority suitable for their particular business operation, and allow dealers to add maintenance data, and manufacturers to integrate telematics data for service innovation. This information exchange is driven by the need to innovate services. These examples evidence a hierarchy in the way digital capabilities are deployed for different service offerings. The highly customised nature of advanced service offerings requires the use of all three identified digital capabilities for its configuration and implementation.

Table 5.5 provides a summarised view of the two service offerings, its content and digital capabilities deployed.

Table 5.5: Summary of the service offerings, content, and capabilities

Offerings	Content	Required capabilities
a)-Base offering	Includes: Truck Warranty Basic weekly report Telematics technology	Data capturing capability Connectivity capability
b)- Advanced service offering	Includes: Truck Warranty Vehicle maintenance Legal requirements Tachograph download Fixed price maintenance Web based portal Telematics technology	Data capturing capability Connectivity capability Analytical capability

5.4   Summary of the chapter

This chapter presented the results of the case study addressing the first research question. In conclusion, two notable findings of the study were a) conceptualisation of the three capabilities related to digital technology in servitisation (*data capturing, connectivity* and *analytical capability*), and b) demonstrating a hierarchy in the way these digital capabilities are configured for service offerings.

The way data capturing capability is regarded in base service offerings was mainly for the manufacturers' benefit, centred on the product and used as a strategy to market the service offering. For advanced service offerings, the resultant attributes of all three identified capabilities were evident.

At the initial stage, the case companies embed smart technologies physically to gather operational usage data employing data capturing capability, which allows automated analysis of operational data. Using connectivity capability, data is transmitted to the cloud and signals are communicated to other members of the service network – manufacturers, customers, and dealers. At this stage, base services can be offered, which include basic weekly reports to customer, and in some case legal repair and maintenance needs. Evidence from the data shows that with analytical capability, advanced services are enabled which provide a greater advantage. In advanced services, manufacturing companies and customers engage in joint value creation, which involves mutual collaboration with customers to visualise and create a customised solution, suitable for their specific operational needs. The analytical capability enables these organisations to leverage the information element for advanced service.

Digital capabilities provide new avenues for interactions, knowledge sharing and boundary spanning roles between manufacturer and customers and, therefore, facilitates the integration of processes and resources to co-create value. It was found that digital capabilities are used more interactively in advanced services due to the flexibility and configurability of the offerings, unlike the base service offerings which lack flexibility and adaptation to customer's needs. These capabilities enable multiple communications (many-to-many) and access to network systems through connectivity capability. Similarly, providers are able to monitor and assess risks remotely, that helps in deploying required functions to reduce marginal costs, which was seen as an influential driver for shaping customers' demand. For example, the scalability of advanced service offerings enables the case companies to incentivise the customers who meet their set target, facilitating a flexible revenue model through profit sharing. Ultimately, evidence from data pointed out that digital capabilities provide manufacturers with the insight enabling the development of strategies used to proactively interact with and respond to customers' various business needs.

In conclusion, three digital capabilities were identified in this chapter which answered the first research question (*RQ1: What are the digital capabilities necessary for supporting servitised offerings? and RQ1a: How are these digital capabilities combined for various service offerings?*) and an illustration of their role in servitised offerings was highlighted. Finally, a description of how these capabilities are

deployed in various service offerings was depicted in section 5.3. Of particular importance was the flexibility and adaptability of information elements of the service to meet dynamic customer contexts for value co-creation. These contextual factors impacted on value co-creation throughout the case organisations and their service network.

The next chapter will explain how value is co-created in servitisation using the conceptual framework of value co-creation identified in chapter 2. This theme of value co-creation is analysed in depth in the next chapter.

Chapter 6: Value co-creation in digitally enabled servitisation

Overview of chapter

This chapter provides a detailed description of the analysis using the conceptual value co-creation framework developed in chapter 2 (see Figure 2.6). The framework was developed to understand value co-creation within business-to-business service, based on current literature. The chapter is organised as follows:

Section 1: An illustration is presented of the case companies' value co-creation processes, from manufacturers, customers and other network actor's perspectives. Each case is examined in turn

Section 2: Summary of the chapter (see section 6.5). A summary of the main findings is presented. Figure 6.1 provides an overview of the second empirical chapter.

Figure 6.1: The overview of the chapter
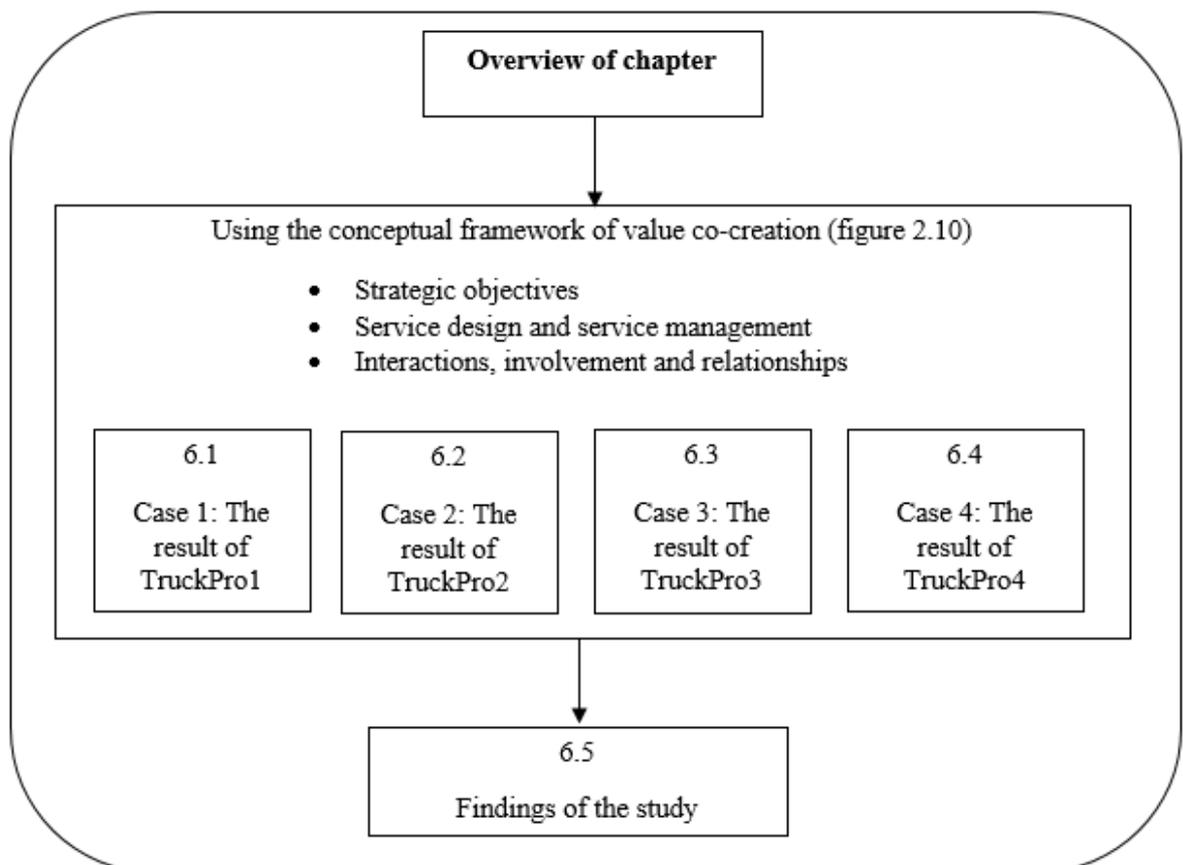
6.1 Case 1 –TruckPro1

6.1.1 Theme 1 – Strategic Objectives

The analysis identified strategic objectives as an important theme when examining value co-creation. It demonstrated how an organisation's strategy and goals affect its value co-creation approach (Vargo, Maglio et al. 2008, Ojasalo 2010). The specific aspects which emerged in relation to strategic objectives are grouped into four sub-themes, namely: 1A) business goals, 1B) perception of value, 1C) strategic processes, and 1D) co-production of service activities.

6.1.1.1 Business goals (1A)

Business goals in this context are defined as what manufacturer and customer organisations expect to achieve over a specific time period. The interview data has shown that, within the truck manufacturing industry, the percentage of their profit margin and constant change in the legislation were identified as major issues of concern for the manufacturers and customers; as such these emerged as the motivation for telematics technology. TruckPro1 was asked about their main motivation and goal for providing advanced services' with a prompt question on how this is managed. In regards to this sub-theme, *innovative strategy* and *value-in-use* of products and services were the two emergent motivations and were seen as important for both manufacturer and customers. This was to see if customers were part of the overall goal or is customers propelled this demand. These are further explained below.

Innovative strategy

It was observed that changes in legislation were an important motivation for manufacturer and customers to innovate existing strategy. These external factors drives change in strategy where a new service business model may be adopted and in order to add more value through technology. The CEO of TruckPro1 explained:

> **TruckPro1, CEO #11**: "*With all the changes with the legislation for the environment with emissions, the product became more electronic, digital, and that enabled us to create a completely new relationship with the customers because, an electronic digital vehicle when you add telematics to the vehicle, it's like a formula 1 car. You know everything about your product, and then you can actually start helping the customers become more efficient and effective using the product. That was the big change where we then saw the business develop from a product-centric vehicle supplier to a service-centric solutions provider, where you are paying for the outcome of the use of the product as supposed to the product.*"

With a service business model, TruckPro1 aims to collaboratively provide added value services to customers. It is fair to say that TruckPro1's business goals were targeted towards helping the customer become more efficient and effective, using the product to improve the end-performance of the customer.

Value-in-use

Value-in-use within this context refers to having a good understanding of customer needs and providing them with responsive, reliable and customised service offerings which target their demands. The empirical data demonstrates that the business goal of TruckPro1 strongly aims to provide value-in-use to customers, hence, adheres to a value co-creation approach. TruckPro1 was one of the first adopters of digital technology in the truck manufacturing industry hence they regard themselves as more advanced than other TruckPro's, with the aim of providing a complete service to various customers, irrespective of the customer's size, with the belief that customers determine value. The respondent also believes that when customers are happy, they are bound to patronise your business repeatedly. Therefore, for them, it is customer first before monetary value.

On the other hand, the customers aim is to reduce the cost of their operations and they acknowledge that TruckPro1 provides that added value. The CEO of TruckCus1 states:

> **TruckCus1, CEO #22**: "*With the manufacturers, we get a lot of value added services, sometimes it's a reduced cost.*"

6.1.1.2 Perception of value (1B)

Both parties desire to obtain value from the application of knowledge and skills (Vargo, Maglio et al. 2008). Following TRUCKPRO1's business goals of creating value for their end customers, in essence, TruckPro1 sees value as being able to develop a solution that supports the customer's value creation processes, and in turn, this motivates them to buy TRUCKPRO1's products. For instance, providing customers with solutions to lower their costs and offering higher quality service, TruckPro1 perceives that value relates to reliability and delivering on time services. This is noted by the Service Manager of TruckPro1:

> **TruckPro1, STM #32:** "*as a manufacturer, one of the big values for us is, as far as the tools that help the end customer, the value for us is able to provide a service that makes them want to buy [TruckPro1] trucks rather than somebody else's trucks.*"

The customers appear to value other things. Perceived value from one customer's perspective is mostly measured by the quality of service received from the dealer network. In other words, the dealers' service is a key success factor for measuring value. CEO TruckCus4 states:

> **TruckCus4, CEO #57: "***We always struggled with the quality of service with their local agent [i.e., a local workshop]. And because they kind of abdicate that responsibility to the local agent, our leverage over that local agent isn't the same as it is with [TruckPro1's dealers]. It's absolutely key for us that uptime is the key and that's actually that the service agent. So that's a key factor, success criteria.*"

It is worth noting that TruckPro1 owns more than fifty percent of the dealer network as explained in chapter 4, and as such, the dealers mostly concentrate on repair and maintenance services without the pressure of selling the products.

6.1.1.3 Strategic process (1C)

In this context, strategic processes capture the alignment of strategy with operational processes. With regards to TruckPro1's strategic processes, the whole idea and strategy were conceived and developed by the CEO of TruckPro1. Nevertheless, they believe that their strategic processes aim to solve customers' needs and improve their value creation process. This informs the way their strategy was developed. The leadership of the CEO was found to be fundamental to the invention and success of the servitised value offerings. Intrinsically, TruckPro1 focuses on quality of service, quality of the service network and good relationships with customers as their main competitive advantage.

> **TruckPro1, STM #33:** *"If we can have the best telematics system that's a good reason to buy an [TruckPro1] and not a [TruckPro2] OR [TruckPro3] or [TruckPro4]. So one of the reasons we do it is if we can give the customer what they need hopefully they'll stick with us and buy our trucks and not somebody else's trucks."*

This strategic process and strong collaboration with the customer is shared and acknowledged by a key account customer. As the CEO of TruckCus4 explains:

> **TruckCus4, CEO #7:** *"Our fleet at the moment, it's predominantly [TruckPro1] and [TruckPro2]. And we always try to work quite closely in a collaborative way. We tend to try to avoid being transactional so we try and work and collaborate with people."*

While this view is shared with high end customers, the small and medium size customers (SMEs) provided entirely different views as regards to this sub-theme (strategic processes), and indicates the need to align strategic objectives with customers' value creation processes, i.e., include customers in

their strategy. Respondents from TruckCus2 emphasized that, although TruckPro1 aims to add more value to their customers, their strategy barely reflects that, as solutions are designed to meet their (TruckPro1's) business objectives and their benefit. This, in essence, leads to limitations in the way systems are integrated, the level of access to data and other attributes related to the services. It appears there is a need for a better strategy which aligns with customers' operations and strategic needs. The Managing Director of TruckCus2 explains:

> **TruckCus2, MD #49:** "*One of the big stumbling blocks is streaming with the manufacturers, is the integration of the systems and data sharing. They [TruckPro1] say we can't integrate that. All I want is make me a button on the screen to send it [data] to an FTP site because you already do it on your own internal system, but in terms of sending your own FTP for the advance services, no [TruckPro1] can't do that.*"

6.1.1.4 Co-production of service activities (1D)

This is a collaborative production of outputs between provider and customer that aims for mutual exchange and may be an antecedent of value co-creation in a B2B service (Vargo, Maglio et al. 2008, Edvardsson, Tronvoll et al. 2010). In this regard, customers may be involved, in order to specify what a valuable service to them is, as a means of value creation. TruckPro1 seem to adopt an active collaborative approach in their service creation activities. They acknowledge the service network they operate in and encourage value co-creation within the network they operate in. The Service and Technology Manager explains that:

> **TruckPro1, STM #98:** "*We are always developing and working with [TruckTech] to come up with something new based on customers' demand, data, new ideas and how we might use some data to improve.*"

It was noted that TruckPro1 service co-production activities follow a collaborative process with customers, which involves developing desired solutions to target customer's needs (value-in-use), by integrating resources of other network partners. As such, the technology company regularly organise development meetings with stakeholders where they jointly suggest new ideas, attempt to solve challenges and improve existing services. In other words, the stakeholders in the service network have a rounded understanding of each other's business in regards to services, and the manufacturer then focuses on creating value for the customer. This "understanding" means that service is understood from a customer's viewpoint (value-in-use) through active information exchange and multi-actor

communication. For example, the uniqueness of advanced service offering is customisation to fit a particular customer need. These instances provided evidence of co-producing service activities to meet customers demand.

Summary of Theme 1 (Strategic objectives)

To summarise, the business approach of TruckPro1, regarding theme 1 appears to be customer co-created, with evidence present for the co-creation approach in three sub-themes. In TruckPro1, services activities and all value propositions are developed, based on an understanding of customer demand and requirements, through a collaborative process. TruckPro1 concentrates on building an efficient and effective service network, as this enables the quality of their solution.

6.1.2 Theme 2 - Service design and service management

The second theme of the value co-creation framework is focused on service design and innovation which is embedded in the process of developing value propositions (Sanders and Stappers 2008, Kohtamaki, Partanen et al. 2013). It includes four sub-themes termed as: resources integration, collecting information on the customer, creating value propositions, and testing and launching the value proposition. The results of TruckPro1 regarding theme 2 are detailed below.

6.1.2.1 Resources integration (2A)

TRUCKPRO1 views technology, data, and employees as their most important resources. They have a strong network of people within the organisation (e.g., aftersales team) and their dealer network who are trained on their technological system and are very knowledgeable about their products. They focus on building, integrating, and utilising resources of the value network such as dealer expertise, TruckTech technological proficiency and customer knowledge for service design/innovation, to improve quality and achieve the best outcome possible. In other words, data from the customers' operations is seen as an important resource to innovate the manufacturer's system, improve customers' operations and also as a means of managing and settling disputes. The know-how from the operators and TruckPro1's technology partner, TruckTech, are integrated to enable and enhance their service solution. Although TruckPro1 emphasise people as an important resource for their services, the respondent equally

highlights that they are always looking to improve and develop new service ideas, but lack the resources to do that. The Service and Technology Manager of TruckPro1 explains:

> **TruckPro1, STM #98:** *"We are only limited by the availability of the resources programmer, analysts, development managers, and testing results."*

> **TruckPro1, ASTM #62:** *"We have some resources issue as well, and we are looking to have more customers involved."*

Respondents from the key account organisation also indicate that they have a dedicated team which focuses on planning and chasing up service and maintenance progress with various manufacturers because they have the resources and can afford it. This allows them to exploit maximum value from these services. The CEO of TruckCus4 states that:

> **TruckCus4, CEO #34:** *"we have planners and what we call progress chasers."*

When resources are integrated under interacting conditions intended for a specific service activity value is co-created, and new opportunities may emerge to co-create additional value (Gronroos and Voima 2013). In other words, resources are integrated as an 'interaction' (Peters et al. 2014).

6.1.2.2 Collecting information on the customer (2B)

TRUCKPRO1 seem to listen and learn from customers' data and feedback coming through the salesforce. Furthermore, the company tries to take the customer's perspective into account, by holding events with some customers (key account customers) to discuss and get their opinion on new service offerings. They share new service ideas with customers in order to get their opinion or input. Here, their co-creation activities are strongly aligned and related to the customers' need for the development of value propositions. These consultations allow participants from both sides to jointly plan for future activities, giving them a rounded understanding of each other's business and service needs, in order to create value and learn together. This understanding highlights a perspective towards value-in-use and shows a multi-actor communication between TRUCKPRO1, TruckTech and customer organisations.

Within this network, it was observed that support systems, data gathering through telematics and communication underpinned the key value co-creation activities for service operations, this therefore increase the breadth and depth of interaction in the network. When compared to a secondary data from

the company's sales presentation slides, it was also confirmed that technology allows them to collect raw data from the customer's operations and this enable the manufacturer to communicate service needs to the customers:

> TruckCus1 website: *"Enables the truck's raw data to be collected from the truck in real time and then translates this into simple and meaningful reports for customers"*

Overall, value co-creation activities relevant to servitisation are driven by data and information from customers' operations, knowledge, communication and innovation. In addition, the customer information is exchanged among the service network to enhance maintenance services and create added value.

6.1.2.3 Creating value propositions (2C)

Customer information is then processed and combined with other stakeholders' expertise to jointly develop suitable systems for the customers. Therefore in regards to creating value propositions, it appears TRUCKPRO1 actively includes processes and incorporates customer's opinions. The participants stated that digital capability enables the tracking of customer use, and services are then tailored around what the customers want. Other respondents acknowledge that things are easier to work on during face-to-face interaction between manufacturers and customers. As communication becomes easier, deeper discussion and decisions are achieved. The knowledge obtained through data allowed the manufacturer to develop new value propositions, for instance tailored driver training services. TruckPro1 explained on their website the features and benefits of one of their service range.

> TruckPro1 website: "Driving Style: "Increase MPG, reduce costs and reduce emissions by identifying areas of improvement in driving style such as idling, harsh acceleration and over-revving".

6.1.2.4 Testing and launching the value proposition (1D)

Although customer information is processed and used for service innovation, there was a lack of data in support of testing and launching the value proposition. Instead, the case company attends a yearly commercial vehicle exhibition to showcase and promote the new product and service design.

In conclusion, apart from testing value proposition where there was no evidence of that in data, it is reasonable to say that in relation to the second theme of the value co-creation framework, TruckPro1 appears to have adopted a customer co-created approach with respect to three sub-themes and one in the transitional category. The empirical data analysis demonstrates that TruckPro1 strongly values customer opinion, and as such, they promoted their participation and involvement with other actors in the service network.

6.1.3   Theme 3 – Interactions, involvement, and Relationships

The third theme of the value co-creation framework centres on interactions, involvement, and relationships between providers and customers. This refers to the relational nature of service, where interactions and relationships between provider and customer are key areas in value co-creation, and enhance the corresponding customer needs and providers' competencies (Ramirez 1999, Vargo, Maglio et al. 2008). This theme equally includes four sub-themes and areas of inquiry which are provider and customer relationship, nature of interactions, amount of interaction and the level of access to information and other resources. Subsequently, the results of TruckPro1 regarding theme 3 are presented using the sub-themes.

6.1.3.1 Provider and customer relationship (3A)

The empirical data showed that TruckPro1 actively nurtures and maintains ongoing customer relationships within the partnership. In essence, trust and the personal relationship seem to be highly valued. The CEO explains:

> **TruckPro1, CEO #24:** "*The customer relationship was transactional now it's transformational. You are more of the partner with the customer creating value whereas in the past you were just a transaction selling benefits. So in the past, you were selling benefits; now you are selling outcomes.*"
>
> **TruckPro1, STM #68**: "*So we have this relationship where we work together really and collaborate very well with customers.*"
>
> **TruckPro1, ASTM #62:** "*I think all customers are different, treat them as individuals first and foremost.*"

It was equally observed that having good personal relationships with customers provides a platform for collaboration, which allows them to contribute to joint value creation. The CEO of TruckCus4 also

acknowledged the extent of their partnership with TruckPro1 and attributed that to having mutual trust and close relationship. He states:

> **TruckCus4, CEO #7: "***We always try to work quite closely in a collaborative way; we try to get as much out of the asset and the relationship as we can.***"**
>
> **TruckPro1, ASTM #100:** "*To be honest, we don't find trust to be an issue, which is good because you just get on with your job.*"

The manufacturer and customers have mutual trust and are in long-term relationships, which enable honest dialogue, transparent information and good insight into customer needs. Additionally, the close relationship between manufacturers and customers is seen as the basis or foundation for collaboration in the business relationship.

6.1.3.2 Nature of interactions (3B)

With regards to the nature of interactions with their customers, data showed that TruckPro1's interaction with customers follows two methods. One is reactive based on customer service needs. They have different types of interactions with different customers and at a different stage. The first stage of interaction mostly takes place at the early stage of the relationships, during sales when meetings or phone calls are frequent to understand customer requirements. Other interactions occur at aftersales through weekly emails or when there is an issue or complaint from the customers. The Service Manager states:

> **TruckPro1, STM #30:** "*Whatever they [customers] want, and normally most customers say well ok, I want to come in on a Monday morning and I want to see how well we did last week. Ok, I have got a 100 drivers, I want to see- I want a league table of who's the best driver, who's the worst, who's the ones in the middle so that I can reward the good ones with a bonus. So, they come in, and we set it, and they say right. I want this report, I want it to run for the last kind of week, and I want it to run a Monday morning.*"

There is online access to information related to services, which reduces the need to make personal contacts. Nonetheless, customers are able to have regular face-to-face meetings with TruckPro1 when needed.

6.1.3.3 Amount of interactions (3C)

TruckPro1 acknowledged that there is limited interaction due to lack of sufficient resources. Nonetheless, the participants hope for improvement. Although there is a customer service system

available, which operates round the clock to attend to customer's problems, both customers and TruckPro1 acknowledged that there is a need for active interaction. In regards to initiating interaction with customers, priorities are given to key account customers, and the interaction seems to be more reactive with smaller customers and proactive with high value customers. Respondents from the case company explain:

> **TruckPro1, ASTM #77:** "*We don't interact as much as we would like to, however, where there are issues or problems or some concerns, customers normally [communicate] and they will contact us. In those cases, we would serve the customer, or rectify the problem.*"

> **TruckPro1, STM #112:** *"We do have some big customers that we try to keep closer to, because you know out of self-interest, they're a big customer, therefore, they have a lot of vehicles, therefore, they're going to buy more vehicles. Therefore we try to make sure, we're proactively keeping them happy."*

Moreover, when a customer has a need to complain or has an issue, the respondents emphasised that issues are quickly resolved.

6.1.3.4 Level of access to information and other resources

TruckPro1 uses a virtual service platform for customers to access information and other resources to see the current state of their field products, driver reports, and maintenance details. Therefore, both manufacturers and customers have unrestricted access to the collaborative on-line platform.

Summary of Theme 3

In summary, TruckPro1 clearly adopts a customer co-created approach with regards to business activities in theme 3, scoring three in a co-creation approach and one in a transitional approach in sub-theme amount of interaction. While mutual trust and long-term relationships matter, personal relationship with individuals equally counts and are highly valued within the service network. TruckPro1 appears to have an active collaborative relationship with key account customers, but, the company also attempts to resolve issues for smaller customers as soon as they occur. In addition, the online service platform supports and enables transparency.

6.1.4   Conclusion

The compounded result for TruckPro1 is presented in one table (see Table 6.1 below), which includes the three themes, 1, 2 and 3. The result demonstrates that ultimately, TruckPro1 has adopted a value co-

creation approach with evidence for nine sub-themes in the customer co-created approach and three in the transitional approach. It can be said that the case company adopts a value co-creation mind-set and respondent's evidence from the analysis suggests that it is a valuable mode of business operation to the case company.

For strategic objectives, it was equally notable that customers' perception of value differs from the manufacturers. TruckPro1 aims to create value-in-use through visibility of customers' operations, using an online platform to enable the flow of information to other stakeholders. However, some customers tend to value other things more, for instance, quality of service, integration of systems and the way data is provided. Customers want unrestricted access to data coming in from their operations for their own personal use.

In service design and service management, some co-creation activities were present although sub-theme four was lacking since there were no specific meeting focused on testing value propositions apart from the truck exhibition show which occurs once a year for the display of new products.

In regards to interactions, involvement, and relationships, value co-creation activities can be seen in three sub-themes and are transitional in one sub-theme. Their relationship is long-term oriented, and there appears to be mutual trust amongst stakeholders. The respondents acknowledge that the truck industry is small and stakeholders seem to know each other well. Although there is the online service platform, which enables 24hours access to service information, both manufacture and customers agreed that there is a need for more personal contact, as the nature of interactions seems to be reactive and only proactive when there is a customer demand, an issue to resolve, or through the yearly exhibition. These enables them to have proactive multi-actors communication.

Table 6.1: The summarised result for case TruckPro1

Theme 1: Strategic objectives	Traditional approach	Transitional approach	Customer co-created approach
Business goals			Present
Perception of value			Present
Strategic process		Present	
Co-production of service activities			Present
Total in Theme 1		**1**	**3**
Theme 2: Service design and innovation	**Traditional approach**	**Transitional approach**	**Customer co-created approach**
Resources integration			Present
Collecting information on the customer			Present
Creating value propositions			Present
Testing and launching the value proposition		Present	
Total in Theme 2		**1**	**3**
Theme 3: Interactions, collaborations and relationships	**Traditional approach**	**Transitional approach**	**Customer co-created approach**
Provider and customer relationship			Present
Nature of interaction			Present
Amount of interaction		Present	
Level of access to information and other resources			Present
Total in Theme 3			**4**
Subtotal of theme 1,2 and 3		**3**	**9**

6.2 Case 2 –TruckPro2

6.2.1 Theme 1 – Strategic Objectives

6.2.1.1 Business goals (1A)

The data shows that the business goal of TruckPro2 follows a customer co-created approach. Their business goals are focused on increasing profitability (value-in-exchange), increasing market share and ability to know-how the products are performing, to ensure efficiency (value-in-use) and have the knowledge to build the next product. The underlying aim here is to create services comprehensive enough to achieve the above mentioned strategic needs of TruckPro2 and those of the customers. They also aim to maintain service level agreements (value-in-use) to increase customer retention. The Regional Executive Director of TruckPro2 explains:

> **TruckPro2, RED #87:** *"We have targets with our breakdowns and roadside assistance from my repair technicians we have, very clear goals and targets of our service level, we commit to never be more than an hour."*

In regards to business goals, the customers emphasised they prefer to jointly develop service processes with manufacturers, and as such, TruckPro2 organise various customer events to gain and jointly share knowledge, in an attempt to solve existing problems and create new value proposition (value-in-use). This implies that customer demand and need to motivate co-creation activities.

6.2.1.2 Perception of value (1B)

Their perception of value appears two fold, where the first is focused on customer retention and customer loyalty to improve or sustain market share, whereas the second revolves around understanding how the products are used, so the right measures can be taken to ensure efficiency of use (value-in-use). TruckPro2 put in place certain incentives for both the customers and dealer network in order to align business models and to motivate the right operational behaviours for a win-win outlook to value. The Regional Executive Director explains:

> **TruckPro2, RED #51:** *"We used at the time to incentivise customers and dealers. So for example, if we have a repair and maintenance contract, our risk on a fixed price is very much in our interest that the vehicles are driven well so that the maintenance cost is lower. So if I have got a range of customers where I say ok, every time where you drive the vehicle at 75% score, I will rebate you 5% of your RM premium every three months, so we all win. The customer wins, he trains his drivers, he gets better fuel consumptions, fewer accidents, less tyre wear and I get reduced maintenance cost under my contract. Same applies to the dealers."*

This demonstrates a perception of value network mind-set where the manufacturer not only considers their own interest, but the interest of the service network partners. This motivates both the customers and the dealers to achieve the expected operational efficiency. This implies that TruckPro2's perception of value is not solely focused on monetary gain but also includes value-in-use for other network partners.

6.2.1.3 Strategic processes (1C)

Competitive advantage emerged as the main attribute in regards to this sub-theme, strategic processes. The company follows an inside-out approach, with the quality of service as their main competitive advantage. Respondents from TruckPro2 believe that reliability and service delivery is most important to all customers. Therefore, this lays the foundation for the strategic process. In this regard, the company's strategy is developed internally, aiming to improve quality of service and become more competitive. As the Regional Executive Director explains:

> **TruckPro2, RED #79**: "*So our strategy is to work harder with the customers on the benefits than my competitors do, really get under their skin.*"

6.2.1.4 Co-production of service activities

Intrinsically, their co-production of service activities adheres to a dual approach. First, TruckPro2 seems to focus on combining internal and external functions to improve customer benefits and also increase their own competitiveness. Secondly, it follows an approach which is more focused on developing internal standards of business operations within the company. In this sub-theme, the case company emphasised the importance of collaboration to understand the customer's business and suggested that without good knowledge of the customer's viewpoint, it may be difficult to create a suitable proposition. For that reason, they actively increased their interactions with customers to help determine what is valuable.

Summary of Theme 1

In conclusion, with one sub-theme in the transitional approach and three in the customer co-created approach, TruckPro2 appears to be moving towards a co-create business approach. The data demonstrates that TruckPro2's mind-set is oriented toward a customer co-created approach, and

highlights an increased need to include customers' value creation process in the business goals, in the strategy of the organisation.

6.2.2   Theme 2 - Service design and service management

6.2.2.1 Resources integration (2A)

TruckPro2 views employees, digital technology and data as the vital resources that enable their service provision, with employees' specialised knowledge and intellectual property seen as an important resource. The case company focuses on using internal resources (technology and employees) and on gaining access to external resources (customer data) to provide services. Using this specialised knowledge, employees act on these other resources to create value for themselves and their customers. The Regional Executive Director explains:

> **TruckPro2, RED #110:** "*I have always thought that the technology piece in the middle is a small piece because of its [resources] people's intellectual property, therefore, a potential profitable business model where scale, if they can achieve scale then they are probably automatically profitable. It's a very nice business model.*"

When asked questions regarding the use of resources for service management, the respondents emphasised that their biggest challenge is not having enough resources to support the customers, because they are in a very marginal business. The Regional Executive Director states that:

> **TruckPro2, RED #96:** "*Our big challenge/risk is people, staff turnover, their satisfaction because that drives customer satisfaction. E.g., here is 24/7 operations, and we are very busy at the weekends because the customers want goods to arrive for the weekends. And it's absolutely catastrophic for us, very busy, we have got planned workload, and then something unplanned. And we just don't have the luxury and depth to resource to cope with 3, 4, shifts over a weekend falling over that's a risk to us.*"

Due to lack of human resources, TruckPro2 uses other types of resources (telematics technology) to substitute and accommodate customer needs in order to cope with demands.

6.2.2.3 Collecting information on the customer (2B)

TruckPro2 collects information on the customers through a consultative and participatory method to understand customer needs, which feeds into their service innovation (2B). The case company value this procedure, as it allows them to physically interact with the customers and comprehend what is most imperative to their business operation. This is a case of joint production of output between manufacturer and customer, which precedes value co-creation. Although customer information is collected using

technology, the non-technological aspect and direct communication with the customers allow TruckPro2 a better understanding of customer needs, and enabling joint participation to plan future activities and service innovation. The Regional Executive Director explains:

> **TruckPro2, RED #116:** "*We hold a number of customer events its very much peoples business. Tomorrow, am personally going to drive a [TruckPro2] milk lorry in Cornwall to gain myself a better understanding of customers' requirements and the [MD] is going to southwest. Am going on a north collection because I want to invest that level of interest and involvement in their business. So there's that non-technological side of it, but off the back of that we will use the data to make improvements.*"

6.2.2.3 Creating value propositions (2C)

These methods of collecting information on the customers enable TruckPro2 to create customised value propositions for various customers and to tailor these value propositions in different contexts. The outcome of this feedback and information collected from the customers is considered in creating a new value proposition and improving existing ones, a procedure geared towards a value co-creation approach. Respondents from the customer organisation indicated their willingness to engage in joint creation of value propositions and the testing of the new value propositions.

6.2.2.4 Testing and launching the value proposition (2D)

In contrast to the above sub-themes, there was not much data available for testing of value propositions within the case company. However, TruckPro2's approach to launching the value propositions incorporated customers' requirements. Various telemetry services were launched which the respondents believe cover different aspects of the customers' business operations.

Summary of theme 2

Finally, in relation to theme 2 of the value co-creation framework, TruckPro2 demonstrates that it follows a customer co-created approach, with evidence found in three out of four sub-themes. The analysis indicates the TruckPro2 values customers' input and follows a consultative process to gather and internally process such information, which is then incorporated in service design and innovation. During these regular consultations and customer events, both manufacturer and customers mutually listen, learn and process information, allowing value propositions to be developed together.

6.2.3 Theme 3 – Interactions, involvement, and Relationships

6.2.3.1 Provider and customer relationship (3A)

The result from the empirical data infers that TruckPro2 is willing to involve customers, therefore eager to develop customer relationships and relationships with other members of the service network. The respondents from TruckPro2 were asked questions concerning the importance of relationships in the service business, and their responses are mostly related to trust and personalised relationship with various customers. The stakeholders know each other very well and value long-term relationship on both sides. The Service and Technology Manager at TruckPro2 states:

> **TruckPro2, STM# 135**: "*Definitely, it is still very much to be quite honest it's still very much a person to person business, very much still. Despite all this here, these guys will tend to ring us as well, and that might be the guy who runs 400 fleet or the guy who runs four fleets. [TruckPro2] is very much, we tend to call it a family organisation, and our family is our customers.*"

> **TruckCus4, CEO #64**: "*I think their [TruckPro2] value comes from having a long term relationship where they get a level of confidence that we are worth investing in.*"

The participants added that trust and building personal relationships are the most important and highly valued in managing customer relationship within their business. They acknowledged the importance of maintaining customers' service level expectations. Long-term relationships enable active interactions and offer a foundation for transparency.

Additionally, respondents from the customer organisations emphasised they would like to have the flexibility to demonstrate the extent of their services and level of commitment to their own customer, i.e. the customers' customers. This to some extent implies that TruckPro2 lacks knowledge of what may be important to the customer. The CEO of TruckCus4 explains:

> **TruckCus4, CEO #80**: "*What I would love to be able to do is demonstrate how much flexibility am providing my suppliers relative to what they have asked for, to show them the level of service that I am actually giving them.*"

6.2.3.2 Nature of interactions (3D)

With regards to the nature of interactions, it appears that TruckPro2 uses different types of interaction channels (online portal, emails, phone, and face-to-face) depending on the type of customer (key account or SME). It appears that the customers are segmented into two main categories, where TruckPro2 seems

to mostly work harder, putting more effort into making the key account customers happy. As such, the nature of interactions appears to be different when dealing with high valued customers. For key account customers, the interaction channels are utilised flexibly, where there is two-way personal relationship with key account customers, but communications are focused on one or two representatives on both sides. By contrast, interaction with SME's are reactive in nature, mostly through sales of the product/service and prior to six to eight weekly maintenance checks. However, the online portal and service help desk provided by the manufacturer supports anytime communication amongst stakeholders and provides transparency to information related to services.

6.2.3.3 Amount of interactions (3C)

Apart from the weekly report sent out to customers, which provides them with an overview or summary of performance for the previous week to support their value creation process, TruckPro2 seem to have limited interactions with customers. Participants acknowledges the need to improve communications amongst the service network. TruckPro2 also acknowledge the importance of customer feedback, nonetheless, most of the feedback is collected during the sales pitch or when presenting a new service to customers.

6.2.3.4 The level of access to information and other resources (3D)

TruckPro2 uses a virtual service platform which enables customers to access the current situation of the driver or the field products. This allows TruckPro2 to solve customer problems proactively (3D). Moreover, the system is live 24 hours of the day and ready to assist both customers and the dealers for service and maintenance work. While there are monitoring reports, giving customers information on product use, TruckPro2 seem to agree that there is a lack of flexibility in the way information and operational data is presented to the customer.

> **TruckPro2, STM #73:** "*What we need to be as a manufacturer will be moving forward is to be much more flexible in the way we deliver data.*"

Summary of theme 3

In summary, it is justified to say that TruckPro2 is transitioning towards a customer co-created approach as regards to theme 3, with three out of the four sub-themes in the customer co-creation business

approach. While personalised customer relationships matter, mutual trust and regular communications are equally valued in their relationships with customers. TruckPro2 seems to put in more work for big customers and proactively tries to solve their problems, even though they lack active communication. It was also apparent that when customers are involved in service activities, whether through complaints or feedback, the relationship becomes collaborative and fosters value co-creation.

6.2.4   Outcome of TruckPro2

The results of TruckPro2 as relates to theme 1, 2, and 3 are combined and presented in Table 6.2. The data demonstrates that in general, TruckPro2 adopted a customer co-created mind-set to their business operations. Value co-creation seems valuable to their operation, as such they were found to be co-creative in most of the sub-themes.

Table 6.2: The summarised result for case TruckPro2

Theme 1: Strategic objectives	Traditional approach	Transitional approach	Customer co-created approach
Business goals			Present
Perception of value			Present
Strategic process		Present	
Co-production of service activities			Present
Total in Theme 1		**1**	**3**
Theme 2: Service design and management	Traditional approach	Transitional approach	Customer co-created approach
Resources integration			Present
Collecting information on the customer			Present
Creating value propositions			Present
Testing and launching the value proposition		Present	
Total in Theme 2		1	3
Theme 3: Interactions, involvement, and relationships	Traditional approach	Transitional approach	Customer co-created approach
Provider and customer relationship			Present
Nature of interaction			Present
Amount of interaction		Present	
Level of access to information and other resources			Present
Total in Theme 3		**1**	**3**
Subtotal of theme 1,2 and 3		**3**	**9**

6.3 Case 3 –TruckPro3

6.3.1 Theme 1 – Strategic Objectives

6.3.1.1 Business goals (1A)

In case TruckPro3, the manufacturer is mainly focused on selling services as an add-on to improve sales of products, with the aim of maximising value for the company and optimising its own processes, in other words, value-in-exchange. The respondents believe that value resides mainly in their product (trucks) and, as such, they view service as a way of improving sales of products, and relied on TruckTech to create added service which will help achieve TruckPro3's business goals. The Service and Technology Manager of TruckPro3 states:

> **TruckPro3, STM #6:** *"In most cases [goal] is more around how we can enhance our vehicle performance."*

> **TruckPro3, STM, #7: "***So a lot of our stuff is looking at how we can improve. What we offer to the customers, which is the web access, the telematics portal and how we can get a good return on investment as a company."*

6.3.1.2 Perception of value (1B)

The case company viewpoint on value is focused on economic value (monetary terms, increased sales, market shares, etc.), and their services are measured around this perception. When probed with questions concerning how valuable their service is to the customers, the respondents acknowledged the importance of understanding customer needs and insisted that they include customer opinion, although the economic gain is primarily the goal of their business model and this reflects in their value propositions. A respondent from TruckPro3 explains:

> **TruckPro3, STM #104:** *"So for us, [value] is understanding the performance of the vehicles certainly, fleet needs of a vehicle to the customer, understanding the performance, fuel consumption and how it's being driven because that could determine the purchase of anywhere between 50 to 200 vehicles."*

6.3.1.3 Strategic processes (1C)

In relation to this sub-theme, the company's strategy is developed and follows an inside-out process. The customers are not involved in strategy development. Therefore, in practice, the services are developed internally and sold to the customers. There was no indication of customers' influence on strategy. The company's values highlight the importance of customer collaboration, but in actuality, it

all revolves around improving their own processes and competitiveness. This also affects their value creation process, which is centred on buying service packages from TruckTech in order to sell their products (trucks). The Service and Technology Manager of TruckPro3 explains:

> **TruckPro3, STM #5:** "*So we have got two accounts managers, they go out and speak to the customers and sell the products. So they filter information from the customers on how they would like it to develop, and what enhancements we will need to bring, they also get to see other manufacturers products and services through their customers, and they can pick things up from there.*"

6.3.1.4 Co-production of service activities (1D)

From all indications, TruckPro3 mainly follows a traditional approach in their service creation processes. Although there is an acknowledgement of the desire to change in favour of adopting a value co-creation approach, there is no movement towards it. Their form of collaboration or customer involvement in service production only comes from information gathered during sales, and equally uses customers as informants to pick up new tips from other manufacturers. TruckPro3 focuses on improving internal functions, which is mainly the performance of the products. Therefore, TruckPro3 partners with its technology supplier's (TruckTech) and uses its resources to achieve this goal. As such, TruckPro3 favours ready-made solutions from its TruckTech as opposed to the holistic understanding of customers' value-in-use viewpoint and co-designing suitable solutions with customers. The Service Manager explains:

> **TruckPro3, STM #44**: "*Basically, the way it works is we get access to the telematics products that we can use and sell, and they [TruckTech] get access to our customer base, that's how it works. So we don't get any money from them [TruckTech], but they[TruckTech] get money from us, but a lot of time, to be able to sell a vehicle, in a tender you have to be able to provide a telematics products/services with it. So without that [Telematics], customers won't buy that [truck] from you.*"

The excerpt above demonstrates the TruckPro3 perception of their service model: it was seen as an avenue to sell more products to customers with a mind-set mainly focused on value-in-exchange.

Summary of Theme 1

In summary, the business approach of TruckPro3 in Theme 1 is traditional. Nonetheless, there seems to be a mind-set towards modification of business operations towards a value co-creation approach. TruckPro3 has a long history of operating successfully due to their market share acquired through a

merger with another UK truck manufacturing company; this may slow down any modification in TruckPro3's approach.

6.3.2 Theme 2 - Service design and management

6.3.2.1 Resources integration (2A)

With regards to resources integration, TruckPro3 relies on TruckTech to develop its telematics products and related services. However, it uses its own resources, such as the knowledge of its employees and customers response during sales in service design. The Service Manager explains:

> **TruckPro3, STM #12&14)**. *"[...&...] the two account managers, they are very good (#12). So the dealer sales person will go out to the customer, he will then introduce them to the telematics products, if they are interested he will then contact [...&...], and they will go in to the customers, demonstrate it, and hopefully make the sale."*

They have two account managers who are seen as their biggest resources because they interact with customers, gather customer opinion and most importantly have the opportunity to see how other manufacturers' products compare to their own, and hence, pick up tips from their competitors. This information is then fed back to the technology company [TruckTech] for upgrades. Therefore, customers are seen as informants during sales meetings. Apart from the sales meetings, there was no indication of any regular gathering between TruckPro3, customers or dealers to learn, share and jointly process information towards service development or innovation.

6.3.2.2 Collecting information on the customer (2B)

TruckPro3 collects information on the customer generally through the sales people at the point of sales. This unstructured method contains the customer's opinion of their user experience. However, it appears TruckPro3 understands the importance of a more open participatory feedback method and holds a yearly sales managers' workshops which is aimed at understanding customers' reactions to their services through these sales managers. Nevertheless, there is no opportunity for customer involvement in these workshops and in service design. A participant from TruckPro3 explains:

> **TruckPro3, STM #62:** *"A lot of time we have, say in the beginning of this year we had what we call a sales managers workshops, we do that every couple of years, it's an opportunity for the sales managers to give us feedbacks on what works and what doesn't work."*

6.3.2.3 Creating value propositions (2C)

With the creation of value propositions, TruckPro3 relies on the technology company to take the lead or sell an already designed service package to them, which is then sold to their customers. With the occasional workshops, where TruckPro3 collects feedback from the salesmen, it was not apparent how the feedback affects the design of the services (value propositions).

Additionally, there was an emphasis on the difficulties of outsourcing service development, as a lack of control over the resources slows down the company's response to customers. The Service and Technology Manager of TruckPro3 explains:

> **TruckPro3, STM #30**: "*We let [TruckTech] handle the majority of it. So when it comes to products development, when it comes to how we enhance it and how we get the best out of it, we rely on them [TruckTech] because they know more about what is going on in the industry more than we do*"

6.3.2.4 Testing and launching the value proposition (2D)

There was no indication of a customer's involvement in testing and launching of the value propositions.

Summary of Theme 2

In conclusion, service design and innovation (Theme 2) activities for TruckPro3 was mainly present in the traditional approach. Although the company acknowledged difficulty and expressed frustration with the technology company, they seem to understand the importance of moving from a traditional to a customer co-created approach.

6.3.3   Theme 3 – Interactions, involvement, and Relationships

6.3.3.1 Provider and customer relationship (3A)

TruckPro3 understands the importance of customer relationships and trust within the industry and aims to sustain a long-term relationship, yet the data indicates that customer interactions are mostly at the point of sales. The Service and Technology Manager explains:

> **TruckPro3, STM #57:** "*A lot of our work in the heavy good industry is done on relationships, and those relationships, all those conversations take place regarding what do you need it for, how are you going to use it, and a lot of the salesmen are very good, and in understanding what that customer will need that vehicle for.*"

It appears that stakeholders within the truck industry know each other both on business and personal level. The manufacturer and the dealers specify that the obstacle to their relationship is the lack of personal communication, though the online service portal supports active interaction and provides transparency between the stakeholders.

6.3.3.2 Nature of interactions (3B)

Interactions with customers seem to be face-to-face. Moreover, it tends to be at the point of sales, basically to understand customer needs and complete the sales transactions. TruckPro3 provided an online service portal which allows stakeholders to interact actively. The Service and Technology Manager explains:

> **TruckPro3, STM #62:** *"So it boils down to the customers feeding back to the salesmen and the salesmen feeding back to us but we are very approachable and an open company. So if any customer rings us up and complains about anything thing, we will not say go by your dealer, we will listen to them and resolve."*

6.3.3.3 Amount of interactions (3C)

The number of interactions between customers and manufacturers is low. Most interaction with the customer for the case company is reactive when there is a dispute. When there is a customer complaint, TruckPro3 will communicate in order to resolve any issue that customer may have. Otherwise the interactions and relationships is periodic through sales people. TruckPro3 mostly uses a reactive mechanism to interact with customers, just to provide certain services or resolve certain issues.

6.3.3.4 The level of access to information and other resources (3D)

TruckPro3 has two ways in which customers gain access to information and other resources. The first is through a weekly or monthly report. Customers' access to resources is very limited, and customers have little knowledge of the service production process. The second is the web portal, which is a paid service, offers a platform for delivering services, allowing customers to get involved in service related activities, and have access to transparent information.

> **TruckPro3, STM #37:** *"They [customers] have to pay for access to the web portal, whereas the basic report is included in their contract price."*

Summary of theme 3

In summary, the business approach of TruckPro3 as related to Theme 3 seems to be moving from the traditional to a co-creation approach. Although they are not fully applying the customer co-created approach, they appear to understand the importance of customer relationships. Therefore, TruckPro3 organises workshops every couple of years to gather feedback. With regards to customers, TruckPro3 depends on the customer initiating interaction (reactive) when they have complaints rather than following a proactive approach.

6.3.4   Outcome of TruckPro3

To conclude, the result of the three themes in TruckPro3 is presented in Table 6.3. This shows that TruckPro3, in general, adopted a traditional approach. Although, when it comes to interactions, collaborations, and relationships, it can be said that TruckPro3 is making an effort towards building a better relationship with customers. In Theme 3, a transition into the co-creation approach can be seen, particularly in 3B (nature of interactions), where there are personal interactions at the point of sale to understand customers business, enabling proactive dialogue.

Table 6.3: The summarised result for case TruckPro3

Theme 1: Strategic objectives	Traditional approach	Transitional approach	Customer co-created approach
1A) Business goals	Present		
1B) Perception of value	Present		
1C) Strategic process	Present		
1D) Co-production of service activities	Present		
Total in Theme 1	**4**		
Theme 2: Service design and management	Traditional approach	Transitional approach	Customer co-created approach
2A) Resources integration	Present		
2B) Collecting information on the customer	Present		
2C) Creating value propositions	Present		
2D) Testing and launching the value proposition	Present		
Total in Theme 2	**4**		
Theme 3: Interactions, involvement, and relationships	Traditional approach	Transitional approach	Customer co-created approach
3A) Provider and customer relationship			Present
3B) Nature of interaction		Present	
3C) Amount of interaction	Present		
3D) Level of access to information and other resources		Present	
Total in Theme 3	**9**	**2**	**1**

6.4 CASE 4– TruckPro4

6.4.1 Theme 1 – Strategic objectives

The analysis and results of case company TruckPro4 are presented in the sub-sections below.

6.4.1.1 Business goals (1A)

The business goals of TruckPro4 appear to be two-fold, which is evident in their service model. The first goal is mainly focused on maximising sales of products and services (value-in-exchange) with the aim of increasing economic value for the company. Secondly, TruckPro4 progressively extends its services from basic to comprehensive services with an option to personalise these solutions to facilitate customers' value-in-use. The District Account Manager explains:

> **TruckPro4, DAM #57:** "*It [services] starts off basic, then progresses, you have got different tier levels effectively. There is nothing that [TruckPro4] will not look at, nothing at all. There's absolutely no limits to [services]. You put in and take out anything you want, it's a completely tailor made solution with no limits.*"

6.4.1.2 Perception of value (1B)

Results of the analysis show a number of perceptions of how various actors see the value, which in some cases had mutual underlying features. TruckPro4 demonstrated an understanding of customers' business, in essence, they focused on creating value for the customers (value-in-use), to increasing their market share and profitability. The case company explained that they regularly communicate with the dealers to have a better understanding of their and customers' perspective of value. Therefore, there were clear indications of interactive exchanges within the network to understand what is valuable from dealers' and customers' perspectives. Nevertheless, at the core of all these interactions is the aim to increase economic value. The District Account Manager explains:

> **TruckPro4**, **DAM #10)** "*The three main form of service, probably the most important one is finance. And so its [trucks] a difficult product to sell so for us it's the finance is the most important part because it's the finance element that makes the truck competitive.*"

From the dealer's perspective, they acknowledge that TruckPro4 consults them in an effort to understand what is valuable to them. The Managing Director of TruckSup3 explains:

> **TruckSup3, MD #11:** "*The particular manufacturer we work with [TruckPro4], has certain strategies to help and support the dealers to put the vehicles into the market place. So they will have regular meetings with the dealer networks and say this is what we are proposing do you think Mr. Dealers this will work in the retail market.*"

6.4.1.3 Strategic processes (1C)

The company's strategy relies on inside-out approach, where TruckPro4 follows a defined contractual agreement around product and services, and customers are not involved in this contract development. Based on this contract, the customers are penalised and charged at a certain rate. The complexity involved in service provision at times undermines this contractual agreement due to many uncertainties. For example, certain aspects of the contract are easier to measure, such as mileage. Furthermore, it is difficult to predict all possible scenarios in a contract, even though TruckPro4 attempts to be flexible with the terms of the contract through reasonable negotiations.

> **TruckPro4, DAM #124:** "*Its [products and service conditions] contractual, it's as simple as that. So the customer has a contract, and he signs it.*"

> **TruckPro4, DAM #127:** "*We had expect [products], to come back in reasonable condition we understand that that truck has worked hard. If it comes back and it's damaged, we negotiate with the company. What we will then do is say we will get a second hand used door, and I will split the cost with you 50/50 because it's a nominal fee.*"

6.4.1.4 Co-production of service activities (1D)

TruckPro4 co-production of services does not involve customers', rather it appears to focus on developing various services offerings, developing network functions and service operation for the customers. TruckPro4 mainly focusses on enhancing their service operations within the company and its associate network to ensure service efficiency. Additionally, TruckPro4 incorporates dealers' views in creating value propositions because they believe the dealers interact more with the customers and, therefore, understand the customers' better, showing consideration for the whole value network.

Summary of theme 1

In summary, TruckPro4 appears to use a dual business approach in regards to Theme 1. Strategically, the case company is transitional towards a customer co-created approach. With regards to sub-theme 1C, TruckPro4 seem to be more traditional, nonetheless, the data indicates that their mind-set is leaning towards a co-creation approach, and there is additional need for customer involvement in defining the business goals, strategy and co-production of service, in order to jointly achieve desired outcomes.

6.4.2   Theme 2 – Service design and service innovation

Theme 2 is focused on service design and service innovation of the conceptual framework.

6.4.2.1 Resources integration (2A)

With regards to resources, TruckPro4's main resource is their in-house technological solution, but the insight from data shows that TruckPro4's also consider their dealer network as important resources. The data does not show that TruckPro4 collects or uses any type of customer information in relation to service design and service innovation, apart from the information required during sales of the product. The dealers supply maintenance data and regularly update the systems with repair and maintenance information. This information is then processed by the manufacturer, and directs their actions regarding parts or components of the product. In as much as people's skills were vital in their service provision, a participant from TruckPro4 noted that resources are allocated differently, and preference is given to big customers (key accounts). The District Account Manager states:

> **TruckPro4, DAM #14:** "*it differs between retail key accounts, so retail is a local company down the road who's got 3,4,5 to 10 vehicles, and a key account is major accounts like [...], people who run 1000's of vehicles and the approaches are completely different.*"

6.4.2.2 Collecting information on the customer (2B)

With regards to collecting information on the customers to feed into the service design and service innovation, TruckPro4 basically gathers information at the point of sales (qualification stage) and provides a customer complaint line which is used to resolve issues regarding their services. During the customer qualification stage, both manufacturer and customers learn and mutually process information about customer service needs. Furthermore, the dealer network shares customers' data with the manufacturer to help respond to and resolve maintenance issues.

> **TruckPro4**, **DAM #196:** "*You get a lot of customers that will complain using a free phone number, customers services agent pick all the details and then feed it out to the team. So the aftersales person will then go and see the customer and get the customer's opinion.*"

The results of customer complaints are processed internally within the company with an occasional visit to check if the customers' satisfaction rate has improved. Although customers indicate that the manufacturer creates its service centred on their feedback, there seems to be a need to create a systemic approach for processing information on customers which feeds into service innovation to enable value co-creation.

6.4.2.3 Creating value propositions (2C)

Customers provide feedback and make suggestions, but they are not directly involved in the design and implementation of the services. As such, some of the functions included in the service package tend to be inadequate, unsuitable for them, or seen as a distraction to what they are trying to achieve. The National Distribution Manager from a customer organisation provides their view on the value proposition, he explains:

> **TruckCus7, NDM #38:** "*I mean the system was set up initially where there was a box that would actually shout at the driver if there were doing something wrong like harsh breaking etc. during debriefing, 99% of the driver found it a massive distraction in the cab because like I said to you, if you are actually driving in a country road and something crosses, you didn't want someone telling you, you have just done harsh breaking knowing you then get a little black mark on your driver score. So actually after about a year, we turn off.*"

6.4.2.4 Testing and launching the value proposition (2D)

There is a dual approach in the way TruckPro4 creates, tests and launches value propositions. Three main service packages are designed and proposed to the customers, which start from the entry package and can build up to the advanced service package.

Consequently, as highlighted in the quotes under collecting information on the customers (2B), it appears customers are not included in creating and launching value propositions. Instead, customers are used for the testing of the value propositions when there is a certain level of complaint or dissatisfaction. The District Account Manager explains:

> **TruckPro4, DAM #119:** "*We just went through a process based on telematics data for an 8X4, where we put our 8X4 truck into the customers, and we knew the fuel was bad, so we then decided to take all of the telematics data and figure out why fuel was bad. And it was because the configuration of the truck and the real axle ratio was wrong, it wasn't quite right for how the UK operators use the trucks. So we were then able to go back to the start, take it all apart, redesign it, come up with a new design that will suit the UK market and then happy days, the fuel is up and is absolutely fine.*"

Summary of theme 2

In summary, as regards to Theme 2 TruckPro4 appears to follow a traditional business approach. Under the second theme, TruckPro4 followed a traditional approach in some aspects of their service design and innovation, and a transitional approach in others. Theme 2 is more manufacturer focused and product-oriented. Analysis of the empirical data showed the dealers are more open to sharing and integrating the customer resources (data), though this was to help them settle warranty issues. In regards

to collecting customers' information, TruckPro4 depends on customer complaints to feed into their service innovation. Creating value propositions is developed from the manufacturer's end, which they believe covers all customer requirements. Some customers see certain aspects of the service content as a distraction to what they are trying to achieve. This prompts a negative response which may lead to abandonment. Ultimately, the data indicate the need to develop processes that lean towards a customer co-created servitised approach.

6.4.3 Theme 3 – Interactions, involvement, and relationships

The third theme of the value co-creation framework centres on provider customer interactions, involvement, and relationships.

6.4.3.1 Provider and customer relationship (3A)

The result of the analysis implies that TruckPro4 actively sustains customer relationships and fosters positive relationships within the service network. The company favours a long-term partnership for the whole service period. There seems to be mutual trust amongst the stakeholders, and they personally know each other well. TruckPro4 also acknowledge that the personal relationships are a big factor in their products and service sales. The District Account Manager explains:

> **TruckPro4, DAM #145:** *"When a customer is buying a truck, people buy from people. A customer will do a little bit of research on the internet may be, but he will never ever buy a truck on the internet, its relationship, and if you have got a relationship, you will be as involved as you want to be."*

Knowing customers in person allow proactive communication with the manufacturers, where contracts can be negotiated and customers' problems solved together. Respondents from the dealer's organisations equally agree that having personal relationships with TruckPro4 allows them the opportunity to enlighten each other, have a dialogue about service related issues and make suggestion on future plans.

6.4.3.1 Nature of interaction (3B)

TruckPro4 have two types of customers, the key account customers and retail customers which tends to affect the type of relationship. With key account customers, TruckPro4 seemed to have deeper relationships, have more knowledge of their business and are seen as strategic partners. The company has a dedicated team looking after the key account customers, while retail customers are referred to the

dealers, which TruckPro4 has limited control over. The case company believes that the online service portal enables transparency of information as both customers and dealers view and actively interact through this platform.

6.4.3.1 Amount of interactions (3C)

TruckPro4's nature and number of interactions are complicated, they have very proactive interactions with key account customers and use a reactive approach with retail customers. With SME's, TruckPro4 deliver services and only react when necessary or when a customer complains. As such, the quality of interactions varies, depending on the type of customers. The DAM states:

> **TruckPro4, DAM #34:** "[TruckPro4] *have got a key account team, which look after these big customers, and they've got the dealers who look after the small customers."*

6.4.3.1 The level of access to information and other resources (3D)

TruckPro4 believes that customers have access to information relating to the services they have purchased, though there are indications from the customer's side of a need to increase access to information or present the information in a "sensible form" that they can understand. The National Distribution Manager of TruckCus7 explains:

> **TruckCus7, NDM #28:** *"We [TruckCus7) have such a diverse type of vehicle that it was very difficult to get that information into a sensible form that we can do anything with. The only thing that was really useful after about three years of trying to get all these data into some form of understanding was basically speeding."*

Although, when asked how information facilitates value co-creation with the customers, the respondent from TruckPro4 articulated that information enables the manufacturer to develop partnerships and identify experiences shared between the service networks, giving customers the impression that providers care. The District Account Manager explains:

> TruckPro4, **DAM, #120**. "*Its partnership, not the case of- I want to sell you a truck because I want to see your name at the side of my truck driving down the road. It's about I want to sell you my truck because I think it's the best machine on the market, it going to deliver the best value for you and overall we care. That's why we have got a driver training report, that's why I want to repair and maintain your vehicle; that's why I want to finance your truck."*

In doing so, the manufacturer demonstrates to the customers that they share common organisational goals and interests, though some customers do not view it that way. This builds on the detail given in

sub-theme 3C which shows that the level of interaction affects the intended collaboration and relationships with the customers.

Summary of theme 3

In summary, TruckPro4's business approach in relation to Theme 3 appears to be moving from a transitional to a customer co-created approach. Theme 3 is more customer related, TruckPro4 and TruckCus7 seem to have different opinions in regards to information access and information resources. TruckPro4 believes it is up to the customer to use the information provided without examining whether the format in which this information is presented is suitable to various customers, as above. Put differently, with some customers TruckPro4 has a more traditional relationship and a co-creative relationship with others.

6.4.4   Outcome and conclusion of TruckPro4

A summary table of case TruckPro4 is provided below, where results from the three themes 1, 2 and 3 are incorporated (see Table 6.4). The table illustrates that TruckPro4 is generally in transition from a traditional approach to a customer co-created approach, with three sub-themes present in the traditional approach, six in transitional and three in the co-created approach. While this demonstrates TruckPro4 is largely transitioning to a co-created approach, TruckPro4 currently operates in a dual approach based on the categories.

Table 6.4: The summarised result for case TruckPro4

Theme 1: Strategic objectives	Traditional approach	Transitional approach	Customer co-created approach
1A) Business goals		Present	
1B) Perception of value			Present
1C) Strategic process	Present		
1D) Co-production of services activities		Present	
Total in Theme 1	**1**	**2**	**1**
Theme 2: Service design and service management	**Traditional approach**	**Transitional approach**	**Customer co-created approach**
2A) Resources integration		Present	
2B) Collecting information on the customer		Present	
2C) Creating value propositions	Present		
2D) Testing and launching the value proposition	Present		
Total in Theme 2	**2**	**2**	
Theme 3: Interactions, involvement, and relationships	**Traditional approach**	**Transitional approach**	**Customer co-created approach**
3A) Provider and customer relationship			Present
3B) Nature of interaction			Present
3C) Amount of interaction		Present	
3D) Level of access to information and other resources		Present	
Total in Theme 3		**2**	**2**
Subtotal for case TruckPro4	**3**	**6**	**3**

6.5   Findings of the analysis

The findings demonstrate that the case organisations apply the principles of value co-creation at many different stages within servitisation. The assessment of how the case organisations currently co-create value implied that it was difficult to do in practice. Findings are discussed in detail as to how the insight gained from this analysis could assist to improve and refine the conceptual framework of value co-creation.

First, the findings from data demonstrate that the case organisations appear to appreciate value co-creation activities, and aim to adopt, or have adopted, a value co-creation approach in some cases. As regards to the sub-themes, it was apparent that the case organisations' approach changes depending on these identified factors: complexity and level of access to data, customer feedback loop and market intelligence, adaptability and flexibility of service configuration, lack of resources, the customer size and level of interactions, circumstance of business relationship and alignment of strategic objectives with customers.

Although TruckPro1 and TruckPro2 adopt a value co-creation approach, it was observed that with smaller customers, TruckPro1 use a more traditional approach. For TruckPro4, the value co-creation approach was used within certain sub-themes, for some customers, and traditional approach was used for other customers. The identified factors are discussed below.

Complexity and level of access to data

Information regarding problems with the field products (trucks) were often managed and exchanged with the customers through online portals or weekly summarised reports. For the case of TruckPro1, the customers emphasised a restricted level of access to data. As such, they highlighted information asymmetry as a barrier to value co-creation. TruckCus2 acknowledged the need for more data and open information to be exchanged. This factor was equally observed in the case of TruckPro4, where a key account customer stated that [TruckCus7, NDM #28] *"we [TruckCus7] have such diverse types of vehicle that it was very difficult to get that information into a sensible form that we can do anything with. The only thing that was really useful after about three years of trying to get all these data into some form of understanding was basically speeding"*. In relation to cases TruckPro1 and TruckPro4,

the analysis of the data demonstrate that their customers are overwhelmed by the complexity of data exchange and delivery.

Customer feedback loop and market intelligence

It is difficult for the case companies to get feedback and market intelligence from the customers due to lack of feedback loops. TruckPro4 believe customers will make it known when they are not satisfied, hence there is no need for a feedback system. The customers perceive this as a way of avoiding the truth. Moreover, many customers do not have the resources and capacity to chase events with the manufacturers. Hence, the key account customers, who have the capacity, are more involved in value co-creation activities. Furthermore, customer feedback can be valuable in product and service development as it helps to design services that meet the customer's actual need and usage.

Adaptability and flexibility of the services

As has been emphasised in the previous chapter, lack of flexibility in service configuration prevents successful collaboration and limits activities for value co-creation. TruckPro1 needed to protect its services by restricting customer system integration, which guarantees the customer will use them for maintenance. This was perceived by the customers, as TruckPro1 following its own opportunistic agenda. However, respondents from TruckPro2 and TruckPro4 agreed that their companies needed to be more flexible in their approach. The quote "*we also have the constraints of flexibility, and this is where the big decisions come in*" and later in connection with the level of access: "*what we need to be as a manufacturer will be moving forward is to be much more flexible in the way we deliver data.*"

Lack of resources:

Particularly for TruckPro3 and TruckPro4, the lack of resources was mainly the reason why they did not adopt a value co-creation approach. Even for TruckPro1 and TruckPro2, though the findings suggest they adopt a co-creative approach, they also emphasised that they lack sufficient personnel to support value co-creation activities. Yet, the respondents often felt that "*we are only limited by the availability of the resources programmer, analysts, development managers, and testing results. They will always be new and new ideas*". Although the leadership of the CEO of TruckPro1 was found to be fundamental to the success of servitised offerings, the lack of adequate staff affected their co-creation activities.

TruckPro2 also felt that value co-creation activities to an extent necessitate more human and financial resources, in essence, makes it "*very difficult because we are in a marginal business as well, we don't make a fortune from it so we can't have the luxury of overcapacity to resources*". TruckPro3 and TruckPro4 appear to see co-creation approach as expensive activity, hence respondents feel inadequate for not taking that approach.

Customer size and level of interaction

The data suggests that the customer size matters a lot, and influences the level of the value co-creation approach adopted. When asked questions around resource management, the quote "*it differs between retail key accounts, so retail is a local company down the road who's got 3,4,5 to 10 vehicles, and a key account is major accounts like [...], people who run 1000's of vehicles and the approaches are completely different*" exposes this thinking. Subsequently, another quote reveals the divide in the way co-creation activities are managed among big and small customers: "*We have got a key account team, which look after these big customers, and they've got the dealers who look after the small customers.*" This is pertinent with all the cases organisations as there seem to be more value co-creation activities with big customers, as opposed to small or medium sized customers. There were always dedicated teams to cater to the needs of key account customers and meet them more frequently. In essence, respondents from the key account customer organisations equally indicate that "*we have planners and what we call progress chasers*". With this, it can be observed that big sized customers co-create more value with the manufacturers and exploit maximum benefit from the value propositions.

Circumstance of the business relationship:

The status of the manufacturer and customer relationship appears to have a strong effect on the level of value co-creation activities and also influences the customer's willingness to participate in co-creation. With a good relationship, more customers are proactively willing to partake, share opinions and business intelligence with the manufacturers. In some other cases, the condition of the relationship deters customers' involvement in value co-creation activities. The cases demonstrates a customer divide, this is where the case companies strive to have and maintain better communication and relationship with big customers. As a key account customer stated "*So in the UK we are probably one of the top 20 businesses*

in the UK, so we are big enough to be worth talking to, we are valuable enough as a customer". Data revealed that relationships with small customers are predominantly at the start of the sales process or when a service need arises (reactive mechanism), while, with high valued customers, the relationships continues and appears to be a greater drive to co-create.

Alignment of strategic objectives with customers

The data suggests there is a need to align the manufacturer's strategic processes with customers in order to consolidate value. For the manufacturers, economic value and driving profitability matter most to them, while the customers are more focused on value-in-use, reduced cost of service and alignment of business objectives, so that value can be mutually captured between both parties.

At the end of the analysis, the theoretical framework of value co-creation was reviewed in comparison with the outcome of the case studies. It became apparent that the framework required improvement to incorporate new findings and simplify understanding. It was notable that the sub-themes required detailed explanation to show the steps and methods. In doing so, the framework would show what companies co-creating value in servitisation should do, essentially portraying the activities involved in value co-creation. The next chapter refines the framework in an attempt to simplify, improve and show what servitised companies ought to do in order to co-create value.

Chapter 7 Refining the research framework and cross-case analysis

Overview of chapter

The conceptual framework of value co-creation described at the end of Chapter 2 was designed to understand literature around value co-creation, and to help with the data analysis and presentation of the findings. Initially, at the end of the chapter (see Figure 2.6), the conceptual framework of value co-creation consisted of two opposite poles (traditional and customer co-created approach). During the analysis in the previous chapter (see Chapter 6), it became apparent that a middle category (transitional approach) was needed to capture responses in-between. Therefore, the conceptual framework was updated.

Also, the outcome of the case analysis indicated that the case organisations' value co-creation approaches differed concerning the various factors identified above (see section 6.5), which can be interpreted as a lack of full understanding of what value co-creation entails and what activities a value co-creation approach requires. For TruckPro3 and TruckPro4, their responses show that their current approach and systems follow a traditional approach, although, when it comes to theme 3, both cases acknowledge the importance of interactions and relationships as the basis of what they do. Acknowledging the importance of relationships in this context, can be attributed to a lack of understanding of the process of value co-creation.

Therefore, to provide better insight on value co-creation, a comprehensive research framework is needed which demonstrates a clearer meaning and characteristics of each theme of value co-creation, what activities are embedded in it and how value co-creation can be achieved. This is discussed in the following section.

7.1   Refining the research framework

The opposite poles of the framework were removed, leaving only the value co-creation approach, since the aim now is to provide better insight into value co-creation in servitised businesses, and no longer about assessing or evaluating the current situation in the case organisations. To achieve this, a column

was added see Tables 7.1-7.3 to help describe, in detail, attributes of each theme, by showing what actions or activities are required to adopt a value co-creation approach in servitised businesses. The following sub-sections introduce the refined value co-creation framework in the service business model from theme 1 to 3.

7.1.1 Theme one: Strategic Objectives

Operationally, strategic objectives communicate an organisation's clear and long-term goals, which determine the unique direction of how investments, skills, and competencies should be combined for competitive advantage, growth, and success. Strategic objectives and understanding of value co-creation determine organisations' goals, their perspective on value creation, and provide direction for a successful service delivery approach.

On this basis, a servitised company needs to understand its own value creation processes, and those of the customers and service networks. While traditional business strategy posits value is embedded in goods or services (value-in-exchange), and such value delivered by selling to customers, a co-creative business strategy focuses on providing customer solutions through collaboration, where the value is derived in use (value-in-use). The co-creation based strategy emphasises that service is a relational process for creating mutual benefits (Gronroos and Voima 2013). With value co-creation, the establishment of strategy begins by understanding customers' value creation processes and choosing how the services aim to provide greater support to these processes. The understanding and incorporation of customer's value-creating processes then delineate the extent of the value propositions. In essence, the initial planning for value co-creation follows an outside-in strategy as it begins with an understanding of customers' strategic needs for their business, and then aims to support customers in co-creating desired value (Gronroos and Ravald 2011). Therefore, to adopt a value co-creation approach for theme 1: strategic objectives it is important to:

    i)   Develop service solutions which consolidate both manufacturer and customer value, and as such emphasise value delivery (value-in-use) and value capture, as opposed to a focus on sales (value-in-exchange).

ii) Align strategic objectives with customers by designing processes, where customers can mutually join in the development and adjustment of strategies, as opposed to inside-out design in a company.

iii) Emphasis on better insight and complete understanding of customers', and their customer's, businesses and how best to complement them to design suitable value propositions.

iv) Understand and view the companies role as part of a value network, as opposed to an individual actor in a value chain.

Ultimately, for theme 1 (strategic objectives), a summary table of the sub-themes and its supporting attributes is shown in Figure 7.1.

Table 7.1: Theme 1 – Strategic objectives

Theme 1: Strategic objectives		
Sub-themes	**Customer co-created approach**	**To co-create will necessitate:**
Business goals	Consolidation of both manufacturer and customer value	Emphasize mutual business objectives and activities of both servitising firm and customer firms.
Perception of value	Value-in-use	Integrate customer opinion of value
Strategic process	An outside-in approach including the customers	Integrate in-house professionals and customers at every stage of the strategy development.
Co-production of service activities	Solutions which support value delivery and value capture	Involve customer in the process of design, co-production of value and service activities.

7.1.2   Theme two: Service design and service innovation

In value co-creation, service design is viewed as the activities in relation to the service design process, where customers are proactively partaking and are involved at every stage of the service development.

As such, the customer plays a dual role in service design and innovation: a) co-developers - utilisation of customer's resources for service development, and b) source of information (Jaakkola and Hakanen 2013). In a co-creation approach, both the servitised manufacturers and customers actively integrate their resources and improve their capabilities for value creation. Furthermore, customers are an important source of information, creativity, and innovation. Through interactions, deep customer insight is developed, and knowledge can be shared. Early integration of customers in service development is seen as a challenge; therefore, rather than produce, sell and service, it is important to integrate, learn, and develop together. Value is co-created by integrating and complementing resources, learning together and active dialogue as part of the interactive process (Vargo 2008). Additionally, it is vital to develop complete knowledge of what creates value for the customers and to anticipate their underlying needs (Akaka and Vargo (2014)). The focus on the underlying needs provides an increased possibility for competitive advantage. By co-learning and co-sharing of knowledge, there is a flow of information between servitised manufacturer and customers, which provides the ability to learn new things and may lead to novel value propositions. Furthermore, customers should be directly involved in co-development and co-designing of new service offerings (Barnett, Parry et al. 2013). When servitised manufacturers design and innovate existing services with their customers, the customers become active partners of the design process at all levels, rather than simple observers of the outcome. As a result, to adopt a value co-creation business approach in a servitised company, it is vital to:

i) Design value creation processes that mutually integrate key stakeholder resources and test with customers during the development process.

ii) Gather and process all customer information, and make it available to them to illustrate their influence in service design.

iii) Concentrate on value creating activities that allow co-learning and sharing of knowledge with customers, rather than solely using structured feedback methods.

iv) Through the relationship established during service development, launch the value proposition.

A refined summary table of Theme 2 is presented in Table 7.2 below.

Table 7.2: Theme 2 – Service design and service management

Theme 2: Service design and service innovation		
Sub-themes	**Customer co-created approach**	**To co-create will necessitate:**
Resources integration	Effectively combine and share several resources for value co-creation	Design value creation process that mutually integrates key stakeholder resources and tests with customers during the development process.
Collecting information on the customer	Jointly participate in co-sharing and co-learning	Gather and carefully process all customer information, make it available to show their influence on service design.
Creating value propositions	A bottom-up approach which includes the customers	Customer involvement in at all stages of the development of value propositions that allow co-learning and sharing of knowledge with customers.
Testing and launching the value proposition	Provide service solutions and externally test with customers	Externally test value proposition with customers

7.1.3   Theme 3: Interactions, involvement and relationships

The value co-creation approach favors a change, where customers are no longer passive receivers of value; instead, customers proactively partake in value creation with interaction as the main focus. Interactions are circumstances where the servitised manufacturer and its customers are involved in one another's value creation processes and have the opportunity to learn and influence each other's businesses (Gronroos and Voima 2013). Developing a value proposition which is expected to support customer value creation processes requires a long-term relationship rooted in mutual trust with the

customers (Bastl, Johnson et al. 2012). Customers interact with manufacturers through multiple channels in a complex service environment specified by processes, people and physical elements (Storbacka, Brodie et al. 2016). These various points of interaction within the service system are all important and offer an opportunity for value creation between the service provider and the customer (Prahalad and Ramaswamy 2002). Service providers can offer different platforms that enable customers to interact, share their experience and have dialogues, which can result in the co-creation of unique value (Prahalad and Ramaswamy 2004). Interactions channels such as customer service helpline, free complaint phone line, and online portal, enable active interaction. Nonetheless, transparency is enhanced through personal contacts like meetings, etc. on this basis, to adopt a value co-creation business approach within a servitised company's customer interactions, involvement, and relationships, it is essential to:

i) Aim to build and establish a long-term relationship embedded in mutual trust.

ii) Aim to have a good knowledge and understanding of customers' business and that of their customers.

iii) Develop an interaction and multi-way communication processes to enable proactive dialogue with the service network.

iv) Encourage transparency of information regarding business dealings and relationship.

The summary of theme 3 is presented in Table 7.3.

Table 7.3: Theme 3 – Interactions, involvement and relationships

Theme 3: Interactions, involvement and relationships		
Sub-themes	**Customer co-created approach**	**To co-create will necessitate:**
Provider and customer relationship	Aimed at building long term business relationships with customers and having deep customer insight.	Establish long term relationships with customer which are rooted in trust and aim to understand customers' business and their business challenges.
Nature of interaction	Proactive dialogue among multiple actors.	Create interactions and communication processes to support honest feedback.
Amount of interaction	Multidirectional interaction within the service network.	Develop multiple communication processes with customers which allow active dialogue.
Level of access to information and other resources	Transparency	Provide transparent information regarding business relationship to the customers.

7.1.4   Summary of the refined framework

The findings of the study illustrate that the case companies apply different views of value co-creation on various levels. Although the exploratory study answered the research question, the data provided an in-depth understanding which will help foster better knowledge of the value co-creation phenomenon in servitisation. To clarify the results, it shows that, a) the case organisations recognise the importance of value co-creation, but they believe it requires additional resources which they lack, b) the case organisations use different approaches in parallel depending on the size of the customer and circumstance of the relationship, and c) the value co-creation framework needed improvement to demonstrate the levels of value co-creation clearly and how it can be achieved in servitisation. These initial findings improved understanding by providing a more detailed description of the cases. Table 7.1-7.3 offered insight into what is expected in order to adopt a value co-creation approach by providing

details of each attribute. Therefore, to verify the final research framework, a cross-case analysis was carried out from a network perspective to examine the value co-creation attributes, and to understand how strongly the participant from service network feels about each. The details of the cross-case analysis is discussed in the next section.

7.2: The cross case analysis from the network perspective

Overview of section

This chapter is built upon the situational elements and the detailed attributes from the four case studies – TruckPro1, TruckPro2, TruckPro3 and TruckPro4, and their service network. The cross-case analysis refers to the findings related to each case organisation, using the established attributes of value co-creation found in the cases. Establishing how the attributes of value co-creation are applied in practise, will help group similar situational elements together, and the findings may cultivate a better understanding of value co-creation.

The cross-case analysis includes two stages, i) vertical analysis where the attributes and value co-creation activities, per case, are detected and observations recorded and ii) horizontal analysis, where the occurrence level of value co-creation attributes under each sub-theme are analysed and assigned a score using the classification in Table 7.5 (see page 228) to identify patterns, evaluate the extent and degree to which the case organisations engage in value co-creation activities. These analysis are detailed in the subsequent sections.

Objectives

The objective of the cross-case analysis was to identify patterns in the value co-creation processes, relationships and relevant attributes of value co-creation amongst these case companies, and to synthesise the finding to cultivate a holistic understanding of the final value co-creation framework (Miles, Huberman et al. 2014). Considering the sheer volume of data collected from the case organisations, a decision was made to categorise the cases. To achieve this, and ensure a representation of the service networks perspective, selected participants' responses were included to identify patterns in their value co-creation processes and group similar outcome together. A total of eight organisations were selected, comprised of the four manufacturers, two customer organisations (see Chapter 3 for

justification) for each manufacturer, except for TruckPro3 where two suppliers (dealer company) were selected, and TruckPro4 where one customer and one supplier were selected in an effort to provide supplier and customer perspectives. The selection criteria are described below and a summary table of the selected case organisation is presented in Table 7.4.

Selection criteria

The selection criteria were:

a) A high-value customer (key account). These are customers that purchase between 200-300 vehicles in a year.

b) A small, medium customer (SME's). These are typically retail customers that interact mostly through the dealers.

c) A supplier (Dealer Company) who has a contract with more than one manufacturer. Dealers were selected to provide a well-rounded view of the service network.

Table 7.4: Selected case companies

Manufacturers	Customers/Dealers	Size
TruckPro1	TruckCus1	High-value customer
	TruckCus2	Small/Medium customer
TruckPro2	TruckCus4	High-value customer
	TruckCus5	Small/Medium customer
TruckPro3	TruckSup1	High-value dealer company
	TruckSup2	Small-medium dealer company
TruckPro4	TruckCus7	High-value customer
	TruckSup3	Small-medium dealer company

7.2.1 Vertical analysis of value co-creation attributes from a network perspective

The quality of data collected was rich, and could allow various aspects to be explored. Nonetheless, the research question (RQ2*: How is value co-creation manifested in servitisation based on existing*

theoretical attributes) was placed in view to provide a guide to the analysis. Besides the large volume of data, it was also obvious that many of conditions identified in one case were very similar to the situations of another case. The study has synthesised and translated the key themes in different levels or phases, even when there participant's response are expressed in different wordings.

Additionally, a figure for each case (manufacturer, customer, dealer and technology provider) was designed to summarise the network view and observation from the primary data about the characteristics of value co-creation. The section below shows the analysis and discusses the findings. For clarity, stakeholders refer to actors in the service network (dealers, manufacturer, customers, and Technology Company). The next sub-section presents the empirical data and introduces an interpretation of the findings.

7.2.1.1 TruckPro1 and customers (TruckCus1&TruckCus2)

TruckPro1 provides various services to customer organisations. TruckPro1 sells supportive services to the customers for a fixed amount and contracted period, usually three to five years. Within this time, all agreed maintenance activities are carried out by the manufacturer's dealer network. The analysis identifies value co-creation activities, a strong emphasis on multi-actor context (i.e., the service network), and a focus on manufacturer-customer mutual creation and collaboration. The findings are discussed under each theme; Figure 7.1 shows the network activities and a summary of the study's observations.

Strategic objectives

Value co-creation activities can be seen in sub-themes related to strategic objectives. TruckPro1's motivation towards the service business model was largely linked to 'total cost of ownership' and improving profitability for the customers and for the whole service network. The Service and Technology Manager of TruckPro1 states:

> **TRUCKPRO1, STM #22**: *"Why telemetry is important is because it is a big part of our total cost of ownership"*

Their business goal aimed to help customers become more efficient and effective by using their service solutions to become more profitable. The CEO of TruckPro1 explains the drive to becoming a solution provider was customer demand for increased reliability of their product. He indicates:

> **TRUCKPRO1, CEO #12**: "*And then we can actually start helping the customers become more efficient and effective using the product, and so, that was the big change where we then saw the business develop from a product centric vehicle supplier to a service centric solutions provider*"

The use of telemetry and working closely enables them to understand service from a value-in-use perspective. To ensure added value to the customers, TruckPro1 partnered with TruckTech to develop the right solution for the customers. Telematics configured in the truck enables data flow from the customers to the technology partner (TruckTech), who then supply these data to TruckPro1 for further analysis and, eventually provided to the dealer for maintenance purpose and to the customers in the form of report for their own evaluation of their driver performance.

> **TruckCus2, MD #13**: "*We use the [...] telematics system for improving efficiency, driver safety, considerate driving, we use it to make sure the drivers are driving the vehicle in the most efficient way they can, so we maximise the fuel consumption, reduce the wear and tear.*"

An important observation in these themes was the emphasis on multi-actors context, which highlights how information is shared among partners to improve knowledge and supports the co-production of service activities. The customers also emphasise that regular communications and meetings gives them the opportunity to develop solutions together, especially when there is an issues to resolve.

> **TruckCus1, OpM #67**: "*we communicate on daily basis. We will speak to the manufacturer on whether its procurements or buying the asset and things they won't fit into the asset or it may be ongoing issues with vehicles or even telematics maybe, so it's a constant-constant communication. Communication is key.*"

In respect to strategic objectives, many respondents in the service network of Truckpro1 viewed regular meetings and regular communications as a key attributes which enable them to achieve their objectives, because it aids understanding of customer demand, allows customers to evaluate their operational performance for improvement, and allows stakeholders to make plans for future service activities to create value for the customers. In other words, understanding of customers' processes enables the creation of value-in-use and enables proactive dialogue among the network partners

especially when a customer has a need. The network activities and a summary of these observations is provided in Figure 7.1.

Service design and service management

In service design and service management, value co-creation activities can be seen as constant exchange of information and knowledge shared in the web portal and during regular communications. The respondents also emphasised that when using the online web portal, information and knowledge is shared on a real-time basis. For example, the repair and maintenance services required the manufacturer, dealers and customers to work together on service related activities. As such, the information coming from the customers can be seen as resources contributing to support services received from the dealers, etc. This is in-line with S-D logic, which proposes that when resources are integrated, the value gets co-created. Notably, customers value the online service portal as it facilitates processes and allows them to reduce cost and also provides better services to their customers. The Managing Director of TruckCus2 explains:

> **TruckCus2, MD #14**: "*We use [data] to measure, from the data you can see how professionally and how safely they are driving the vehicle. From the data you can see, are they harsh breaking, are they harsh accelerating? Not only does that increase the maintenance cost, reduce fuel consumption but it also makes them a higher risk for an accident. You want a steady, professional courteous driver, so we can use that data, and it allows us to see that.*"

Through telematics systems, multiple stakeholders are connected, and information is exchanged among the service network, improving adaptability towards specific customer needs. This information is jointly processed during the meetings, and communication, in turn, enables actors in the service network to listen and learn together, so that service developments are based on customers' needs. Additionally, listening and learning how to get the best out of the services increases profitability, and more importantly, drives further collaborations for both parties. The CEO of TruckPro1 explained:

> *Truckpro1, CEO #16: "We were able to identify to the customers as to how to make them more profitable. And so when we started to discussing with the customer, what are the most important for you? Do you want a better product or do you want a more profitable operation and the answer was- Fuel and uptime. The two things a truck operator wanted more than anything – better fuel consumption and better reliability so more uptime."*

In other word, the findings illustrate that information related to operations, performance and service activities can be leveraged to reduce total cost and co-create a value proposition suitable for the customer's context.

Interactions, involvement, and relationships

Value co-creation activities are prevalent in all sub-themes, as seen in the excerpts provided. The two customer companies, TruckCus1 and TruckCus2 have long-term relationships with the manufacturer, embedded in mutual trust. There are also personal relationships between the manufacturer and various customers. These relationships encourage communication where they have proactive dialogue among the service network. The key activities in services delivering to the customers largely involve the manufacturers, the dealers, customers, and the technology company where applicable. These service components increase the interaction between the manufacturing organisations and their associated service network partners. The dealers are mainly in charge of delivering repair and maintenance services, routine checks and spare parts to the customers, therefore, play an integrating role in maintaining relationships among the network partners. For key account customers (TruckCus1), where they own their maintenance workshop, the technology partner plays the integrating role, as they provide the vital information required by service operations.

Specifically, TruckPro1 made its telematics system standard in all of its trucks, which primarily provided operational data and the basic report to customers. The Service and Technology Manager shared a view of the importance of data in helping them develop good relationships with customers.

> **Truckpro1, STM #10**: *"We have a base solution and basically we now make it standard on every vehicle."*
>
> **Truckpro1, STM #33**: *"If customers says, I like the system it's fantastic, can you fit it to my two [..] trucks, that I have had for two years, we say yes no problem, we can do that. It benefits us because we are helping the customer, establishing a good relationship with the customers."*

It can be seen that standardised service offerings underpin manufacturer customer relationships which allows future collaboration into the next value co-creation process. The customers similarly reflected this view when asked why there was a particular reason why they seem to support a particular manufacturer (TruckPro1). The Operational Manager of TruckCus1 stated that:

> **TruckCus1, OpM #30:** *"TRUCKPRO1 is the main product, no specific reason apart from, just the relationship that we've built with the manufacturer"*

TruckCus2 shares the same view, explaining their relationship with the manufacturer and dealers have developed over time. The Managing Director at TruckPro2 explains:

> **TruckCus2, MD #42:** *"Am very lucky that I built a good relationship with local dealers who represent the manufacturers, I also have very good relationships with key people at all the manufacturers we use"*

The customers have 24 hours access to the online portal proving them with service related information, which enables anytime communication among the stakeholders and supports transparency of service relates operations.

In summary, the findings emphasised the importance of relationships as a foundation for engaging the customers into collaborative value co-creation activities. A summary of the network activities and finding from this case are presented in Figure 7.1.

Figure 7.1: The service network characteristics and summary of the findings
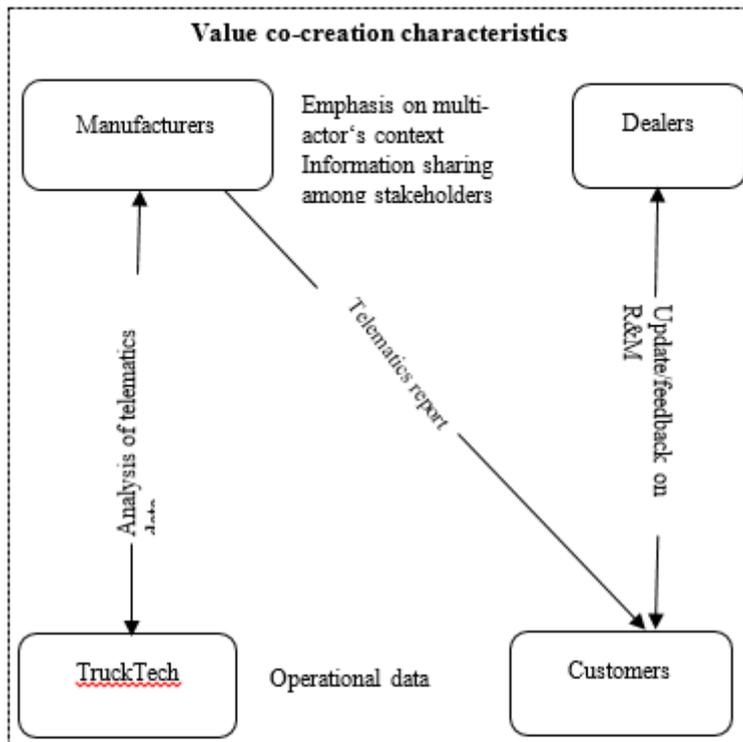
Findings

-There is long-term and personal relationships between the stakeholders and they appear to have mutual trust.

-Standardised solution offers an opportunity to develop closer relationship with customers.

-Information and knowledge facilitate value co-creation.

-Uses online platform to collaborate and access vital information anytime

-Regular review meeting promotes learning and knowledge sharing amongst the service network

TruckPro2 provides different types of services to their customers; their services range from base to advanced service offerings. TruckCus4 is a high-value customer (key account customer) while TruckCus5 is a small to the medium-sized customer (retail customer) with the base service offering. TruckCus4 and the manufacturer (TruckPro2), have a long-term relationship, whereas the relationship with TruckCus5 is still developing, with less than a third of their vehicles being TruckPro2's brand. Value co-creation activities are seen across three themes (strategic objectives, service design and service management, and interactions, involvement and relationships). The findings from this case are detailed below and Figure 7.2 provides a summary of the findings.

Strategic objectives

Business goals: Under strategic objectives, value co-creation characteristics can be seen in their business goal, perception of value, and co-production of service activities, except in the strategic process. For their business goal, the manufacturers and TruckCus4 aim to mutually create suitable solutions, and also resolve problems through regular development meetings, especially when TruckCus4 has a rising need to customise an existing service or develop a new one. The manufacturer and customers highlighted that value co-creation activities are strongly related to customers' demand or need to create new value propositions. The respondents explain:

> **TruckCus4, HoF #32**: *"We meet once every six to or eight weeks to review and because it's me [HoF], I get the meetings, I get the communication, that's kind of all we need really."*

Through regular communications, the stakeholders seems to understand and generate better knowledge of each other's businesses, which, therefore, leads to better value-in-use for the whole service network.

> **TruckPro2, RED #94:** *"We have three core values; customer first, quality in everything we do and respect for the individual within the company, Doing things in real-time, striving for our customers to be profitable, in our roles, driving their efficiency and therefore their profitability."*
>
> **TruckCus5, MD #37:** *"[Service] is perfect. It fits into our system, it comes at the right time, right information and its factual and its perfect"*

The stakeholders' perception of value is focused on value-in-use, therefore, emphasis is on the joint creation of solutions in every phase of the service and business relationship. With TruckCus5, it

appeared that they are content with the services they receive, and seemed reluctant to ask for more. As such, their responses to questions related to the sub-themes were found to be low.

> **TruckPro2, RED #81:** *"Trucks it's a hardware, what's interesting now is the software and the value of providing of services. Understand what the customer needs, which is uptime, fuel consumption, and so we work very hard at that."*

> **TruckCus4, CEO #56:** *"Value for me is working together with the supplier/manufacturer to find a reduced total cost. I recognise that the suppliers will have to make profit so its not about beating them up on price, its about finding those opportunities where genuinely together add value."*

Their strategy follows an outside in approach in the way the respondent from TruckPro2 described it, but no specific involvement was observed from the customers' perspective.

> **TruckPro2, STM #44:** *"With all sales process, we identify the main triggers for the customer, it may be that they want to know where they [vehicles] are [etc.]"*

Co-production of service activities: TruckPro2 focuses on collaborating with customers to create a suitable service through regular communications. Some of the respondents indicated that TruckPro2 offered specific training to their dealers' technicians to keep them up-to-date with the latest technology, and to also be able to provide better services to the customers. This implies that the stakeholders' outlook on service offerings is understood from a value-in-use perspective with active communications among multiple actors.

> **TruckCus4, CEO #93:** *"What we try to do is write a very detailed specification, define what we do to our suppliers [TruckPro2], and say, this is what we want the systems to do, [...] we will try and describe our operations distributions processes."*

> **TruckPro2, STM #26:** *"We tend to get feedback from our networks, we do have customer involvement because we do get involved in selling what the customer wants, its always a conversation we have. So, it really is feeding back what the customer wants."*

Examining their responses, as seen in Figure 7.2, the actors in the service network appeared to have a good understanding of each other's businesses, and TruckPro2 focus on creating value to support customers. There is also an emphasis on multiple-actors interest, the dealers are trained on the latest technology in order to offer better maintenance services to the customer, and this leads to better financial income for the dealers.

Service design and service management

In relation to service design, collaborations and joint development of new services enable beneficial outcomes to both manufacturer and customers through the integration of resources. Value co-creation activities were seen in the sub-themes related to service design. When there is a customer demand, the stakeholders meet, which enables them to jointly process available information, observe each other's concerns, and share resources. This supports participation where learning and co-sharing of knowledge are achieved together, and manufacturers and customer are joined in the service design process for value co-creation. The Head of Operations inTruckCus4 provided an example where they had a need to co-design with the manufacturer and modify a product to suit their operation. He explains:

> **TruckCus4, HoF # 58**: "*We built and designed a new trailer, we had a specific trailer that could only do certain things, because of the mechanisms that where inside it, we couldn't do anything conventionally because all the mechanisms. So we designed a floor that comes out of the ceiling on the roof of the trailer and covered it up, so it can be used in the conventional one.*"

The manufacturer also acknowledge that holding regular events with the customers enables them to teach and learn from each other.

> **TruckPro2, RED #66**: "*what we have done is we have held customers events we call fuel clinic, because fuel was the biggest cost to our operators, so we have invited them to fuel clinic in a hotel or conference, we make a presentation to them about all the benefits, teaching them about what the data can do and what it means in relation to their costs. A truck will double its annual earning by following a few of these protocols. Because the fuel takes about 40% of the operators cost, we can save 10% of that quite easily by adopting a few of these protocols and cash is double the earnings of your vehicle because it's a marginal business.*"

Advanced service offerings are uniquely customised to fit a customer's needs, and therefore, are very different from the next customer's need. This points to an ever changing customer demand for truck manufacturing industry, which may be influenced by legal and environmental factors. The Service and Technology Manager of TruckPro2 points to the importance of collaborating with customers to adjust and achieve this levels of customisation, the STM explains:

> **TruckPro2, STM #62**: "*customers use understanding, and I put customer's customers in legislative area. A lot of food customers we as customers now expect to be green and part of that process is actually documenting the impact throughout the delivery process and so now we do. Food companies are now imposing that their logistics partners the requirement that*

you need to tell me what the carbon offset value is of that delivery. And we had to work together to change that type of reporting now."

The explanation above shows that various contextual factors trigger manufacturers and customers into a joint process where new services are developed together, or a situation where an update of existing service actually occur. These factors, such as change in legislation, acted as a significant driver influencing customer's demands.

The customers' equally agree that closely working with the manufacturers, in order to specify their requirement and business needs, enables them to obtain suitable solutions for their business context. Notably, TruckPro2 and its customer TruckCus2 was the only case where testing and launching of value propositions were manifested.

Importantly, customer demand was seen as the main driver to proactively adopt other value co-creation activities. A summary of the network activities and findings are presented in Figure 7.2 below.

Interactions, involvement and relationships

This case is based on mutual trust and the long-term relationships amongst the service network. In regards to relationships, it was found that having personal relationships amongst the stakeholders enables deep insight into customer needs, and offers a foundation for more collaborations. Having personal contact through regular communication encourages proactive dialogue among multiple actors in the service network.

> **TruckPro2, RED #51:** *"the entry package is all free of charge to introduce the customers to the data, and show them what's possible. And actually we can do a lot of work just on the monitor package with the customers to help identify the vehicles that has not been driven as well as they could."*

It can be seen that TruckPro2 uses basic data as a tool to develop closer relationships with the customers, which then helps them understand their needs.

With respect to the nature and level of interaction with the customers, more effort can be seen with high-value customers, although, TruckPro2 emphasised that the online service portal and 24 hours

customer service helpdesk provides all their customers access to real-time information, and offers

transparency to improve of their operational efficiency. The Technology Manager states:

> **TruckPro2, STM #89:** *"So telemetry now gives us a vision most of the important things that has to be ascertained before you can start servicing it, is available to the dealer before the truck even arrives."*

As regards to access to information and other resources, TruckPro2 and customers were consistently

involved in communication, which maybe through phone calls, and/or formal or informal meetings to

discuss ways to improve telematics technology. These meetings were not always challenge-based,

instead it was more around creating new avenues for using operational data obtained from the

telematics, with the aim of improving end performance of the service stakeholders. At the same time

TruckPro2 was developing closer personal relationship with these customers and using them as

advocates for potential customers. The Managing Director of TruckCus5 summarises their relations

with TruckPro2 in the following excerpt:

> **TruckCus5, MD #95**: *"I was in [....] with them last week for the launch of their new vehicles, I was in Paris with them [TruckPro2] for the same launch, we have a prototype [TruckPro2] attic in our factory [...] last year, so our drivers are field test driver for them."*

In conclusion, this case can be said to be co-creation with value co-creation characteristics seen in

most sub-themes. In regards to strategic objectives, the stakeholders jointly resolve problems and

discuss future activities through regular meetings, therefore, it enables opportunities to understand

each other's businesses from a value-in-use perspective. For service design and management,

resources are integrated, where information is mutually processed, and knowledge shared to enhance

joint development of new solutions. In particular, long-term personal relationships and mutual trust

emerged as foundation to engage and understand customer demands. Also regular communications

and the online web portal allows proactive dialogues among the stakeholder and provides transparency

of information. The findings are summarised in Figure 7.2.

Figure 7.2: The service network characteristics and summary of the findings

Value co-creation characteristics

Manufacturers

Emphasis on the whole service network

Information sharing among stakeholders

Dealers

Co-development of solutions
Analysis of operational data.
Update/feedback on R&M Online service portal
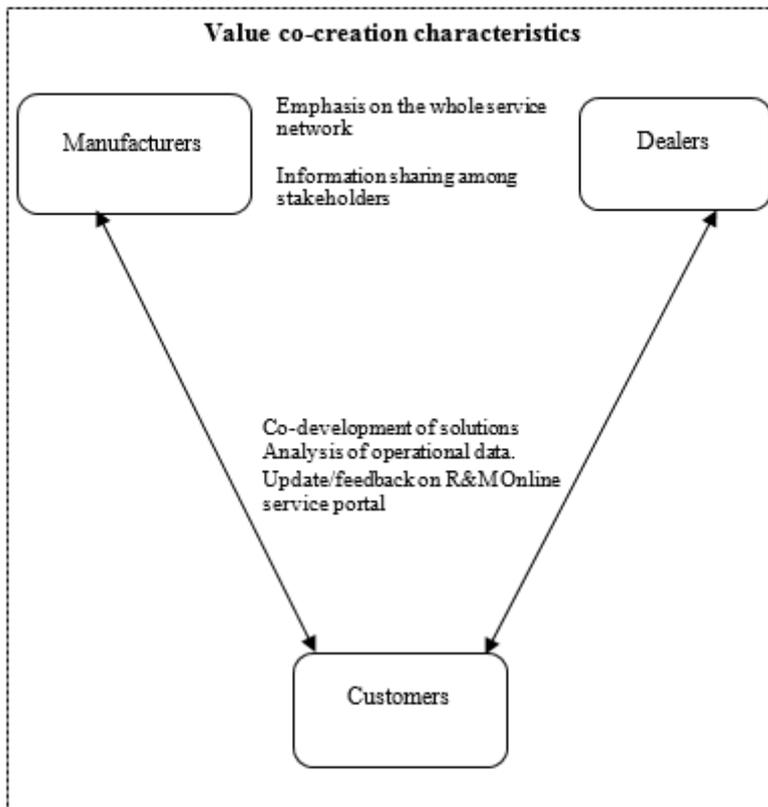
Customers

Findings

- Practical need develop value proposition drives collaborations among the service network

- Regular meeting with customer to co-design new services or update existing one enhances other value co-creation activities

- Through these meetings the stakeholders are continually integrating resources, sharing knowledge, and learning together.

- They seem to have and value long-term personal relationships and trust.

- There is multi-actors communication

- Online service portal enable transparency and allow anytime access to vital information

- Regular customers' feedback is valued which promotes co-creating

7.2.1.3 TruckPro3 and two suppliers (TruckSup1 & TruckSup2)

The case of TurckPro3 included two supplier companies (dealers) in order to offer a rounded understanding of the value chain. The first supplier (TruckSup1) is an independently owned business that offers maintenance services solely on TruckPro3's products. The second supplier (TruckSup2) is independently owned, although they offer repair and maintenance services to a number of brands, including all other manufacturers in this study.

Strategic objectives

TruckPro3 was found to be the least co-creative case, and the two supplier companies associated with this manufacturer confirmed this. Their strategy was focused on value-in-exchange and how to increase market share. Although they offer a telematics service to their customer, the underlying aim for collecting customer information was to trace the duration of repair and maintenance. TruckPro3 appeared to have limited knowledge of what may be most important to the customer or their customers (customer's customer). The Service and Technology Manager explained that they use telematics technology to monitor how the dealers are maintain the trucks and also use it to compare their performance against that of their competitors. The STM explains:

> **TruckPro3, STM #11**: *"We use that to monitor how we are in comparison with our competitors, because without telematics, we have to rely on customers giving you certain information."*
>
> **TruckPro3, STM #7: "***We can measure how long the vehicle has been in the dealership for, so we can use that in measuring for example if the dealership was in or a vehicle was in dealership for more than six hours."*

Here the dealer companies were found to have a different perception of value, compared to what the manufacturer expects. Examining the excerpt in Figure 7.3, TruckPro3 is focused on using operational data to improve their process and, monitor the dealers, and takes very little consideration of customer needs. As well as TruckPro3, the dealers, TruckSup1, and TruckSup2 also have the same mind-set, where they aim to maximise profit with the view that the more of TruckPro3's product they sell, the more revenue they make. The approach within this case is mainly focused on creating value-in-exchange. The Managing Director of TruckSup1 pointed out that selling telematics to the customers was more of a passive sale for them, he explains:

> **TruckSup1, MD #13**: *"well the Telematics get fitted on some vehicles, so if a customer has a maintenance contract on the vehicle through [TruckPro3] they get a Telematics box put onto a vehicle and then we can up sell that to include services that come through the box [telematics]. So, it's probably a passive sale for us."*

TruckPro3 adopts a strategy where the majority of service related developments are handled by the technology company. There were no activities involving the customer or the dealers, although, the respondents explained that customer feedback is collected through the dealers.

> **TruckPro3, STM #34: "***we are playing catch-up. So we have only been in the telematics business for four years, whereas all the other truck manufacturers have been in it for ten to fifteen years.*"

Service design and service management

There were no value co-creation activities related to service design and management evident in this case.

Interactions, involvement and relationships

Even though this case is based on value-in-exchange, responses to this sub-themes show the manufacturer and dealers (TruckSup's) value long-term personal relationships.

> **TruckSup1, MD #108**: "*I mean [*TruckPro*3] are great at doing what they do, it's a very two way relationship so we are very lucky to – to represent the brand."*
>
> **TruckPro3, STM #62:** "*And the reason we as [TruckPro3] is doing so well is because of the relationships we have, between us and the dealer network, between us and the customers and between the dealers and the customers. There's like 20 customers that buy nearly 50% of all the trucks in the UK. So when you have got that small amount of customer's base it becomes very personal"*

The quote below shows how TruckPro3 uses basic data to develop a working relationship with customers. Respondents from TruckPro3 explain that basic customer data provides the foundation for forming a relationship with customers and explains that web-portal help provides service related information to the customer, which enables them to lock down the customers.

> **TruckPro3, PMD #53:** *[Manufacturer] have to have a relationship with the customer in some way or other. So if [TruckPro3] has got the data to know about, even if he doesn't know him personally, but there is some data exchange, maybe via the dealer salesman or again through the service side, there is a relationship. So that data allows you to develop and have is the personal relationships."*
>
> **TruckPro3, STM #12:** "*The web-portal, the customers use is beneficial to [TruckPro3] because all it does is [..] it also keeps us closer to the customers as well. Its another reason for us to call them, for us to make them aware of what we are doing, what's available, just to keep us in the forefront of their mind, and that's what its all about for [TruckPro3].*

TruckSup2 explains that occasionally they collect customer feedback through questionnaires and this information is reported back to TruckPro3 during one of their quarterly review meetings. However, data does not show how customers' knowledge or opinion are integrated to enhance service solutions, and as such, the interaction seems to be reactive rather than proactive. The Service Director of TruckSup2 explains:

> **TruckSup2, SD #60:** "*What we do as a dealership part, service, sales and we will send out a questionnaire to customers. It gives us some useful information and most of the time it's positive but there are some negative things in there so we look at the negatives so we pass that information down to the people who need to know it, like what we have done operationally. And we do have to report that on our quarterly management review meetings where we report on customer feedback and whatever, my department so that we can analyse.*"

A summary of findings is presented in Figure 7.3.

Figure 7.3: The service network characteristics and summary of the findings
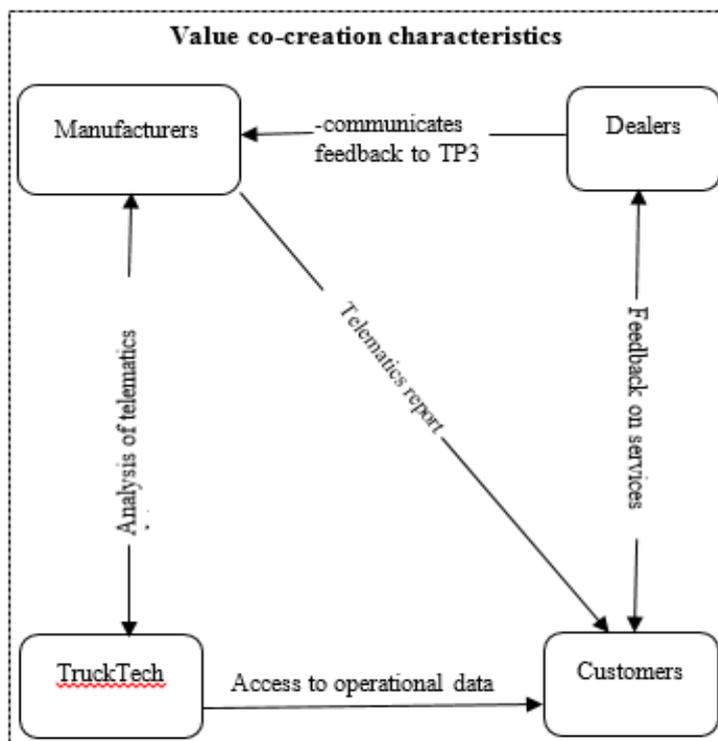
Findings

- Uses service offering as a means of locking down the customer

- Long-term personal relationship appear to be the foundation for success

-- Data provides basic information used to develop working relationships with customers

- There was no value co-creation seen in service design

TruckPro4 appear to have more co-creative activities than TruckPro3.

In relation to strategic objectives, certain value co-creation activities can be seen in their business goal and perception of value. Since TruckPro4 seems to focus on their own business goals, this, in turn, affects their customer involvement in service co-production activities. TruckPro4 emphasised the importance of working closely with the customers to understand their needs especially at the beginning of the business relationship. This implies that there is proactive communication at the beginning of the business relationship. The District Account Manager explains:

> **TruckPro4, DAM #109**: "*A lot of effort goes in at the start, an awful lot of effort because the customer needs to understand every aspect of what you are telling him, every aspect of what you are selling him and every aspect of every service contract, telematics and driver data report.*"

Understanding customers' demand appears to trigger other value co-creating activities. TruckPro4's perception of value can be said to be focused more on value-in-use, though, there was no evidence of customer involvement. Instead, TruckPro4 believes that creating multiple services, as modules, will cover every aspect of its customers' businesses, and therefore, it will provide choice and selection of the most suitable solution for their business. In line with this, The District Account Manager points to the importance of understanding the customer demand to provide suitable solution.

> **TruckPro4, DAM #60:** "*There's no limits to what we can do. Which is why when you turn to the customer, and the qualification process is so important. So important because you have to deliver him absolutely what he requires.*"

In regards to strategic process, TruckPro4 relies on the market intelligence of the dealers as a strategy to engage the customers. From the dealer's perspective, they acknowledge that TruckPro4 consults them in an effort to understand what is valuable to them as well as the customers through regular meetings. The Managing Director of TruckSup3 explains:

> **TruckSup3, MD #11:** "*The particular manufacturer we work with [TruckPro4], has certain strategies to help and support the dealers to put the vehicles into the market place. So they will have regular meetings with the dealer networks and say this is what we are proposing do you think Mr Dealers this will work in the retail market.*"

This reflects on the customer perception of the services provided by TruckPro4. TruckCus7 particularly highlighted the issue of getting '*information [in] a sensible form*'. This implies a lack of co-production of service activities in this case. TruckCus7 stressed that customisation is the main issue which may affect increased collaboration with TruckPro4. The National Distribution Manager explains:

> **TruckCus7, NMD #90:** *"Challenge is the number of things that we then add to the vehicle to put it on the fleet. That should be done by whether that's even possible but by the manufacturers because potentially if something is done incorrectly within the vehicle wiring or whatever, it could be a warranty issue. If I actually go to the manufacturer and say, we would order 10 [....], 10 [....], we want reversing cameras fit in and we want forward facing cameras fit in. I had like to be able to say, include them in those vehicles, so when they come to me it's already done. That will be on my wish list."*

In summary, the dealer (TruckSup3) emphasised having good knowledge of both customers' and manufacturers' service business, allowing them to focus on creating value for the customer (value-in-use). A regular planning meeting with the manufacturer was equally highlighted, which allows a better understanding of each other's business, with suggestions about how to support each other. Following this understanding, there was an emphasis on multi-actors' perspective and an indication of the importance of active dialogue.

Service design and service management

In regards to service design, value co-creation activities can be seen, where the network partners integrate resources through regular meetings in which the dealers and manufacturer listen to each other, process and share service related information, and as such, they learn from each other's knowledge.

> **TruckPro4, DAM #170:** *"In terms of the management of [TruckPro4's] systems and processes with the customers' and dealers, is just about education. And just educating them to the max. To understand why it's a benefit, how it can benefit, what it can do and how to use it."*

The dealer seems to have more contact with the customers to address service related issues, where they can resolve issues and amend existing solutions. And the manufacturer feels that customers would let you know if they are not happy with the services and, therefore, they rely on the dealers for service-related feedback from the customers. The Managing Director of TruckSup3 states:

> **TruckSup3, MD #85**: *"Some customers we have monthly meetings and he says well this is going to be a quick meeting because I haven't got a lot to say. And other time a customer has got 5 or 6 issues."*

The customer specified that, based on their operational data which TruckPro4 has access to, they design and provide solutions to them, the customer, but TruckCus7 acknowledge that they have face to face meetings and active communications with the dealer (TruckSup3). The National Distribution Manager explains:

> **TruckCus7, NDM #73:** "*we try to log any issues, anything that goes wrong anywhere, we log them in, and we have fairly regular meeting with them. I talk to [TruckSup3] not every day but regularly, the reasons we do, I have a colleague who helps me manage the fleet, and between him and myself we would have regular conversations with [TruckSup3], and we do have face to face meetings. We have them every 2 months at the minute, either they come to me or I go to them, depending on where we are.*"

In summary, the service network participate in regular meetings where customers' issues are resolved together, through proactive dialogue, where customers' feedback are processed together, and knowledge is shared by listening and learning together.

Interactions, involvement, and relationships

As related to interaction, involvement and relationships, value co-creation activities become more apparent. There appear to be a long-term relationship and trust among the network partners. The stakeholders appeared to know each other very well, acknowledging that the truck industry is highly based on personal relationships which allows them to understand each other's business. It was also observed that basic information is particularly mentioned as a facilitator for developing close relationship with customers, which the respondents emphasized is a precondition for further collaborations. The District Account Manager at TruckPro4 explains:

> **TruckPro4, DAM #65:** "*Whenever you buy a product from [TruckPro4], it's got telematics built into it, the customer can use it. It comes with a subscription service that the customer has to sign and agree to, because the data is also visible to the manufacturer. So it's visible to the customer but the manufacturer uses it.*"

> **TruckPro4, DAM #104:** "*As soon as the truck is then sold, then is more about account management and relationship building.*"

> T**ruckPro4, DAM #114:** *"It's a good talking point for you to go and see a customer and it's a good talking point to engage. So if you are looking at the data and you can see that the driver is not driving the truck in the correct way, you can then go back into the customer and say I estimate that if you reduce your idling hours by 10 hours, and your driver drives the*

truck slightly better, uses the exhausts break rather than the pedal break, I think your miles per gallon would increase by 0.5. It's just a good talking point."

TruckSup3 also emphasised that customer relationship is a pre-condition to further customer collaborations, which also enables them to understand customer demand and have good knowledge of each other's business. These personal relationships equally enable proactive dialogue within the service network. The Managing Director of TruckSup3 explains the three most important deciding factors for a customer are:

TruckSup3, MD #33: *"The top three were reliability, customer relationships, and fuel consumptions. If there's no customer relationship, that man isn't going to buy another vehicle from you. And that's where me and [....] have made a living for years, relationships"*

In conclusion, the nature of interactions with the dealers is proactive through the regular meetings, although, it seems more reactive between the manufacturer and the customer. The online web-portal and 24 hours customer services helpdesk enable active interaction among multiple actors at any time. This also supports transparency of operations and at time aids personal interactions. A summary of the findings is shown in Figure 7.4.

Figure 7.4: The service network characteristics and summary of the findings

Value co-creation characteristics

Manufacturers

Dealers

Information sharing
among multi-actor

Analysis of operational
data.
Telematics report

Service related feedback
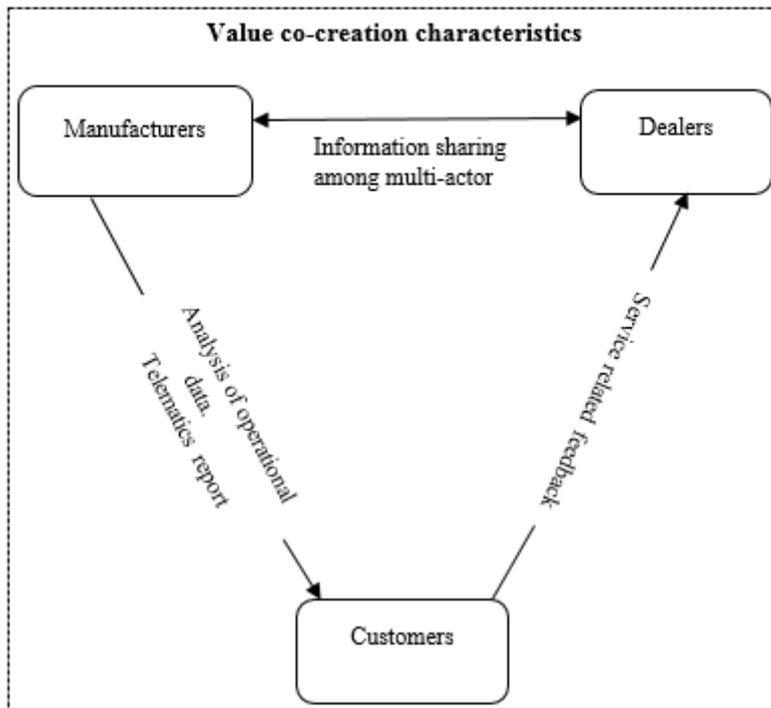
Customers

<u>Findings</u>

-Modular approach to service design with the aim to provide variety to the customer

-Regular meeting between manufacturer and dealer to discuss customer feedback

-Although this case is not very co-creative, attributes of value co-creation is apparent in relationships, interactions and collaboration.

-Co-production of service activities is necessary especially when customer has a need.

-Customer relationship is seen a core pre-condition for more collaboration

-Online service portal enable transparency and information sharing among stakeholders

7.2.1.5 Summary and interpretation of results

Examining the findings, a clear divide can be seen in the four cases which are similar to the findings in Chapter 6. The two co-creative cases were TruckPro1 and TruckPro2, while TruckPro3 follows a more traditional approach, and TruckPro4 can be said to be transitioning, although this can be attributed to its suppliers who help manage customer relationships.

The co-creative cases (TruckPro1 and TruckPro2) appeared to mutually develop comprehensive service solutions to improve customers' business processes, with their perception of value focused on value-in-use. The solutions are developed through regular meetings and mostly in a situation where the customer has the demand or has a need to create suitable solutions. All the co-creative cases focus on the service network, including the dealers' network, and they all value long-term customer relationships which enable them to develop knowledge of customers business and, therefore, the results appear to correlate.

Similar to strategic objectives, the data in in service design and management shows that through regular meetings, customer demands are understood, and issues resolved together. It was noticed that customers' need to create new solutions and amend existing ones and certain factors such as change in legislation influences customer demands. Ultimately, customer demands *drives* value co-creation activities under *service co-design* into effect and they are i) resources integration through listening, learning and knowledge sharing, ii) processing customer information and feedback, and iii) developing new service solutions.

Additionally, all four cases appeared to value a long-term personal relationship with trust. It was noted that both co-creative and traditional cases use basic telematics data gathered from customer operations to develop a good knowledge of the customer business activities and, therefore, allows them to develop a closer relationship with the customers. Thus, factors under interactions, involvement and relationships appear to be *prerequisites* for the value co-creation approach. It seems that the co-creative cases have proactive dialogue whereas the traditional cases tend to be more reactive with interactions. The customers and dealers have access to the online web-portal which provides transparent access to service information and other useful resources. In the case of TruckPro3,

although not co-creative, quarterly meetings with customers led to a situation where testing of value propositions was achieved together. It was apparent that adopting the value co-creation approach appeared to generate good knowledge to stakeholders' businesses which in turn leads to better value-in-use for the service network.

In conclusion, it seems that customer demand, particularly when a customer has a need to create new or adapt existing solution, *drive* other value co-creation activities to appear. Following this understanding, it can be said that customer demand seem, to be fundamental to adopting value co-creation. As a result manufacturers work towards having good knowledge of customers' businesses in order to understand what matters to them (value-in-use).

7.2.2   Horizontal analysis of value co-creation characteristics across each theme and sub-themes

Table 7.5 was used to assemble the relevant attributes of the sub-themes. Each of these attributes was then analysed and evaluated by the researcher to assign a score of 3 for the most co-creative, 2 to a situation where co-creation is partially identified, in other words transitional, and 1 in situations where no or very little value co-creation activity is indicated. Then, a clustered summary of the themes, as regards to the response, was presented in Table 7.6. This enabled the identification of the characteristics of value co-creation.

Table 7.5: Description of key attributes used for cross-case analysis

Main themes	Key attributes	Score		
		1 (Traditional)	2 (Transitional)	3 (Customer co-created)
Theme 1: Strategic objectives	Business goals	No co-creation activities indicated	Little consideration of customers outcome	Consolidation of both manufacturer and customer value
	Perception of value	Manufacturer focused	Partial consideration of customer value	Customer focused
	Strategic process	Inside-out approach	Restricted customer involvement	Outside-in approach
	Co-production of service activities	No co-production activities indicated	Partial co-production indicated	Customer involvement in innovation and development of new services
Theme 2: Service design and service innovation	Resources integration	Single resource	Partial integration indicated	Integration of several resources
	Collecting information on the customer	Limited information shared	Partial information exchange	Jointly participate in co-sharing of information and co-learning with good customer understanding
	Creating value propositions	Top-down approach	Mix of both	A bottom-up approach which includes the customers
	Testing and launching the value proposition	No testing of the value proposition	Partial testing of the value proposition	Provide service solutions and externally tested with customers
Theme 3: Interactions, involvement and relationships	Provider and customer relationship	Transactional relationship	Partial relationship	Aimed towards long-term business relationships
	Nature of interaction	One way and reactive	Partial interaction	Proactive dialogue among multiple actors
	Amount of interaction	Very little interaction	Online only	Active interaction among multiple actors
	Level of access to information and other resources	Poorly defined	Partly defined	Information clearly defined and Transparent

Figures 7.1 to 7.4 provided a detailed view of all the cases and offered an understanding of the findings, and the quotes were added to generate insight. Nonetheless, to precisely identify the characteristics of these value co-creation attributes per sub-theme, Table 7.6 was used to show a simplified summary of the response according to the score assigned and this was discussed to help synthesise the findings.

Exploring the summary of tables of the cross-case analysis (see Table 7.6) and scores according to the three themes, it appears that theme three: *interactions, relationships, and collaborations* have the highest scores and indicates the level of development of the value co-creation attributes. Therefore, integrating the results and summary of the findings in Section 7.1.5 with the result of Table 7.6, a reasonable interpretations is that *interactions, involvement and relationships* create the *prerequisites* for the value co-creation approach. These sub-themes of each category are explored according to their level of development. This reinforces what we know from the literature.

Table 7.6: Illustrating the detail sub-theme of value co-creation attributes

Network	Themes/ Case companies	Strategic objectives				Service design and service innovation				Interactions, involvement and relationships			
		Business goals	Perception of value	Strategic process	Co-production of service activities	Resources integration	Collecting information on the customer	Creating value propositions	Testing and launching the value proposition	Provider and customer relationship	Nature of interaction	Amount of interaction	Level of access to information and other resources
TruckPro1	**TruckPro1**	3	3	2	3	3	3	3	2	3	3	3	3
	TruckCus1	3	3	1	3	3	3	2	2	3	3	3	3
	TruckCus2	3	2	1	3	3	2	3	2	3	3	3	3
TruckPro2	**TruckPro2**	3	3	2	2	3	3	3	2	3	3	3	3
	TruckCus4	3	3	2	3	3	3	3	2	3	3	3	3
	TruckCus5	1	1	1	2	2	1	1	1	3	3	2	3
TruckPro3	**TruckPro3**	1	1	1	1	1	2	1	1	3	3	3	3
	TruckSup1	1	1	1	1	1	1	1	1	2	3	2	3
	TruckSup2	1	1	1	1	1	1	1	1	2	3	2	2
TruckPro4	**TruckPro4**	2	2	2	2	3	3	1	2	3	3	3	3
	TruckCus7	2	2	1	2	1	1	1	1	3	3	3	2
	TruckSup3	2	2	2	2	3	3	1	2	3	3	3	3

Examining Table 7.6 above, it was noted that there is a high occurrence of co-creation attributes in theme three, with the highest ranking of 3 occurring most often in this theme. Interactions, involvement and relationships have the highest level of development of co-creation attributes. The co-creative cases display evidence of developing a more innovative strategy for their business by integrating resources through regular developmental meetings, and by actively collaborating with customers, especially to jointly create new solutions. Additionally, the plan and action towards jointly creating new solutions to target customer needs could be construed as a strategy. Therefore, when comparing the details of the grouped attributes, and the findings in Figures 7.1 to 7.4, it appeared that on-going and long-term customer relationships embedded in mutual trust, help cultivate value co-creation activities. This characteristic is seen across all cases, but especially in the co-creative cases which show that *interactions, involvement and relationships,* are strongly associated with value co-creation, perhaps, seen as a prerequisites of business partnership. Additionally, the findings demonstrate that emphasis on multiple actors' contexts (dealers, manufacturers, and customers) enhances the co-creation of service activities. This was equally evident in the previous chapter (Chapter 6), interactions and communication on a regular basis enable discussion on how data can be used to add more value to the customers' businesses. Telematics and data related knowledge increase the frequency of communication allowing the creation of customised service offerings like driver training, preventive services etc. Additionally, customers with advanced service offerings expect the manufacturer's service networks to provide these innovative services proactively, a focus on customer's business demand.

Moreover, examining the remarks in section 7.1 above, it can be seen that even the cases using traditional approach appear to use data as a foundation to understand the customer, and work towards developing a personal relationship with customers which, in turn, provides a platform for more collaboration in the joint sphere.

Furthermore, another important finding was equally notable under interaction, involvement and relationships which relates to customer size and level of interaction. There appears to be a divide in the way value co-creation activities are managed among large and small customers. The data demonstrates

that the customer size matters a lot, and influences the level of the value co-creation approach adopted. Questions on how resource are managed expose this thinking, revealing the divide in value co-creation activities among these two types of customers: This was notable in all the case organisations, where high-valued customers are considered the target for the manufacturers.

With large customer organisations, there seem to be more value co-creation activities. There were always dedicated teams to cater to the needs of key account customers and meet them more frequently. In essence, respondents from the key account customer organisations equally agree that having a long-term relational interaction with the manufacturers increases their roles as future partners.

For small or medium sized customers their perceptions of value are driven by price of the products and short term benefit of the product. The responses from the manufacturers and their service networks denote a difficulty to understand smaller customers' rationale for demanding and focusing more on product offerings rather than service offerings.

Contrary to the manufacturers' claims, this issue was not solely dependent on smaller customers' demand for the product offering, but rather on the manufacturers' approach towards these customers. For example, some of the quotes depicted above demonstrate that top managements are reluctant to engage with smaller customers.

With this, it can be observed that large customers co-create more value with the manufacturers and exploit maximum benefit from the value propositions.

7.2.2.2 Examining the medium level development in Theme: strategic objectives

Service design and service management

Data relating to Theme 2 shows that, in regular face-to-face meetings, resources are shared, especially when a customer needs to develop a new proposition or improve an existing one (customer demand). This customer demand drives value co-creation activities in service design. Regular sessions occur where information on the customers is collected and processed together, and feeds into the development of the value proposition. For instance active collaboration, where both manufacturer and customers listen, learn and share knowledge. This enable joint processing of external information and developing

of new service ideas with customers. In TruckPro1 and TruckPro2, the value co-creating cases, customers are invited for regular development meetings which leads to problems being solved together. New ideas are shared, and new services can be tested. In the case of TruckPro3, the manufacturer creates service solutions based on visibility of customer's business operations and needs enabled through digitalisation, and they do not seem to have much interaction with customers, except for occasional meetings and through the online service system. For TruckPro4, the manufacturers processes customer data and customers' feedback to understand their needs and based on these identified needs create and launch new value propositions.

7.2.2.3 Examining the low level development in the Themes: strategic objectives

Strategic objectives

For the co-creative cases, their business goals appear to mainly focus on developing comprehensive customer solutions, which enable them to provide better services, i.e. value-in-use. In other words, their business goals are focused on achieving customers' needs. It was noticed that their perceptions of value slightly differ, but customers seem to be involved in co-production of service activities, where activities largely focused on supporting customer's value creation processes, especially when there is a need to jointly develop new services. The manufacturers seemed to have good knowledge of customers' businesses through the virtual system and aim to actively support them, apart from TruckPro3 who appears to have limited knowledge of what may be most important to the customer or their customers (customer's customer). It can be observed that the strategic process, was the sub-theme which was ranked the lowest, indicating that none of the case organisations are completely co-creative about strategy development.

Indeed, it appears that the *prerequisites,* or the conditions, for a value co-creation approach in servitisation are: i) on-going and long-term relationships, ii) mutual trust iii) active collaboration between multiple actors, and iv) transparency. On-going and long-term relationships appear to be a vital *prerequisite* to focus on, as it allows the manufacturer and customer to learn about each other's businesses. Nonetheless, as much as it would be difficult to co-create value in the absence of these attributes, it appears that having them does not automatically lead to a value co-creation approach. For

instance, TruckPro3 which follows a traditional approach, has adopted some of these attributes as well, hence, there must be other activities to facilitate value co-creation.

The result of the study demonstrates that regular developmental meetings to collaborate with customers especially when customer's need to develop new solutions (i.e., *customer demand*), activate other value co-creation activities in a B2B relationship. Therefore, if strategic needs and customer demands constitute the **drivers** of other value co-creation activities including the **prerequisites**, it implies that the rest of the attributes could constitute the next operative phase of value co-creation, which is **service co-design**. These service co-creation indicators could be: i) *focus on the service network*, ii) *sharing knowledge and resources*, iii) *creating, listening and learning together*, and iv) *adopting a proactive outlook*.

7.3   The summary and findings

A vital reason for cross-case analysis is to deepen understanding and explanation in order to strengthen a theory developed through examination of similarities and differences across cases (Miles, Huberman et al. 2014). In conclusion, the findings of the cross-case analysis suggest that:

Firstly, for the value co-creation approach to occur, there is a need for some *prerequisites* before other co-creation attributes appear. These prerequisites are: an *on-going and long-term personal relationship, mutual trust, active collaboration, and transparency*.

Secondly, the findings indicate that a certain *driver* activates other value co-creation attributes to manifest. This *driver* is customers' demand, which leads to development of new solutions (value propositions).

Thirdly, the findings show that real value co-creation activities are marked by some *service co-design* behaviours, which include proactive outlook, learning and developing together, sharing and integrating of knowledge and other resources, and a focus on the value network.

Ultimately, the findings indicate that following these steps and adopting the attributes of value co-creation enables the alignment of manufacturers' and customers' strategic objectives. These attributes seem to be: consolidation of internal and external value and comprehensive understanding of each other's businesses.

In conclusion, the findings enabled the second research question to be answered (2): *How is value co-creation manifested in servitisation based on existing theoretical attributes*? by showing that businesses which adopt the value co-creation approach display certain attributes. These can be assembled into four main groups a) *prerequisites*, b) *drivers*, c) *service co-design behaviour*, which ultimately enable them to d) align their strategic objectives. Table 7.7 depicts quotes supporting the main findings.

These findings have helped improve the understanding of value co-creation, as it is manifested in the case industry. These empirical findings are next synthesised with the theoretical findings to form the final research framework. The next chapter will focus on merging the empirical results and theoretical understanding into a value co-creation framework for servitisation.

Table 7.7: Quotes supporting the study's findings

Prerequisites		**TruckPro3, PMD #53:** *[Manufacturer] have to have a relationship with the customer in some way or other. So if [TruckPro3] has got the data to know about, even if he doesn't know him personally, but there is some data exchange, maybe via the dealer salesman or again through the service side, there is a relationship. So that data allows you to develop and have is the personal relationships."* **TruckPro1, STM #33**: *It [telematics], benefits us because we are helping the customer, establishing a good relationship with the customers."* **TruckCus1, OpM #67**: "*we communicate on daily basis. We will speak to the manufacturer on whether its procurements or buying the asset and things they won't fit into the asset or it may be ongoing issues with vehicles or even telematics maybe, so it's a constant-constant communication. Communication is key."* **TruckPro4, DAM #104:** "*As soon as the truck is then sold, then is more about account management and relationship building."* **TruckPro4, DAM #114:** *"It's a good talking point for you to go and see a customer and it's a good talking point to engage. So if you are looking at the data and you can see that the driver is not driving the truck in the correct way, you can then go back into the customer and say I estimate that if you reduce your idling hours by 10 hours, and your driver drives the truck slightly better, uses the exhausts break rather than the pedal break, I think your miles per gallon would increase by 0.5. It's just a good talking point."* **TruckSup3, MD #33:** *"The top three were reliability, customer relationships, and fuel consumptions. If there's no customer relationship, that man isn't going to buy another vehicle from you. And that's where me and [....] have made a living for years, relationships"*
Drivers		**TruckCus2, MD #13**: *"We use the [...] telematics system for improving efficiency, driver safety, considerate driving, we use it to make sure the drivers are driving the vehicle in the most efficient way they can, so we maximise the fuel consumption, reduce the wear and tear."* ***TruckPro1, CEO #16:*** *"We were able to identify to the customers as to how to make them more profitable. And so when we started to discussing with the customer, what are the most important for you? Do you want a better product or do you want a more profitable operation and the answer was- Fuel and uptime. The two things a truck operator wanted more than anything – better fuel consumption and better reliability so more uptime."* **TruckPro2, RED #81:** *"Trucks it's a hardware, what's interesting now is the software and the value of providing of services. Understand what the customer needs, which is uptime, fuel consumption, and so we work very hard at that."* **TruckPro2, STM #44:** *"With all sales process, we identify the main triggers for the customer, it may be that they want to know where they [vehicles] are [etc.]"*
Service co-design		**TruckCus2, MD #14**: *"We use [data] to measure, from the data you can see how professionally and how safely they are driving the vehicle. From the data you can see, are they harsh breaking, are they harsh accelerating? Not only does that increase the maintenance cost, reduce fuel consumption but it also makes them a higher risk for an accident. You want a steady, professional courteous driver, so we can use that data, and it allows us to see that."* ***TruckCus4, CEO #93:*** *"What we try to do is write a very detailed specification, define what we do to our suppliers [TruckPro2], and say, this is what we want the systems to do, [...] we will try and describe our operations distributions processes."* ***TruckPro2, STM #26:*** *"We tend to get feedback from our networks, we do have customer involvement because we do get involved in selling what the customer wants, its always a conversation we have. So, it really is feeding back what the customer wants."* **TruckSup2, SD #60:** *"What we do as a dealership part, service, sales and we will send out a questionnaire to customers. It gives us some useful information and most of the time it's positive but there are some negative things in there so we look at the negatives so we pass that information down to the people who need to know it, like what we have done operationally. And we do have to report that on our quarterly management review meetings where we report on customer feedback and whatever, my department so that we can analyse."*

|	
	TruckPro4, DAM #170: *"In terms of the management of [TruckPro4's] systems and processes with the customers' and dealers, is just about education. And just educating them to the max. To understand why it's a benefit, how it can benefit, what it can do and how to use it."*
Strategic objectives	**TruckPro1, STM #22**: *"Why telemetry is important is because it is a big part of our total cost of ownership"* **TruckPro2, RED #94:** *"We have three core values; customer first, quality in everything we do and respect for the individual within the company, Doing things in real-time, striving for our customers to be profitable, in our roles, driving their efficiency and therefore their profitability."* **TruckCus4, CEO #56:** *"Value for me is working together with the supplier/manufacturer to find a reduced total cost. I recognise that the suppliers will have to make profit so its not about beating them up on price, its about finding those opportunities where genuinely together add value."*

Chapter 8: Toward a conceptualisation of value co-creation framework in servitisation

8.1 Reiteration of findings and modification of the framework

This chapter aims to merge empirical and theoretical insights into a final value co-creation framework for servitisation. Underpinning this study are the digital capabilities, identified as enabling value co-creation in servitisation (see Chapter 5), and the conceptual framework of value co-creation which consolidated current knowledge, aided the empirical data analysis (see Chapter 6) and the analysis from a network perspective (see Chapter 7). The findings, in turn, led to some refinements to the framework providing a deeper understanding of the inherent attributes of value co-creation. The final research framework incorporates the current knowledge of value co-creation and explains the path which connects the *prerequisites*, *drivers*, *service co-design behaviour* and *strategic alignment* of value co-creation in servitisation. Figure 8.1 reflects the properties of the *prerequisites* and also shows what *drives* value co-creation in the second level of the joint sphere (Gronroos and Voima 2013).

Figure 8.1: The driver and prerequisites of value co-creation
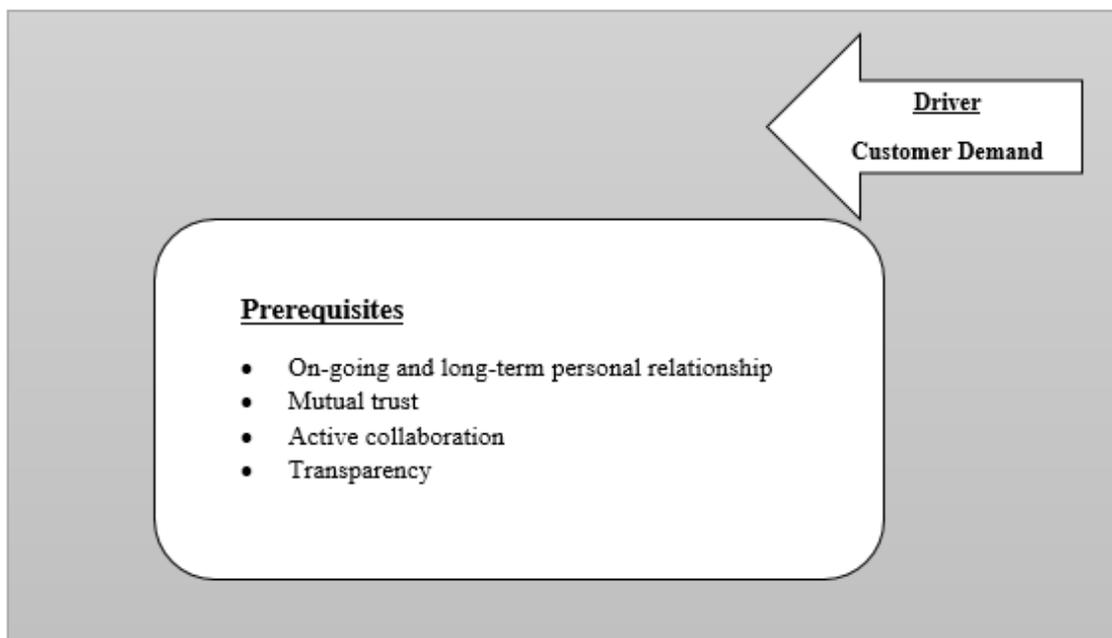
Research concepts in relation to characteristics of servitisation

The core characteristics of servitisation include a) reliance on digital technologies and its digital capabilities to support services, b) a focus on information services for value co-creation, and c) relational exchange between providers and customers. Value co-creation provides an underlying logic of servitisation in manufacturing industries, and past studies have started to define and conceptualise value co-creation (Gronroos and Voima 2013, Jaakkola and Hakanen 2013). These place emphasis on the customers' role as active participants and collaborators rather than passive receivers of value.

Overview of the findings

This study revealed that the case organisations that adopt a value co-creation strategy demonstrate attributes which were assembled into four aspects' *prerequisites*, *drivers*, *service co-design behaviours* and *strategic alignment*. The findings also showed that the case companies representatives believe that some attributes of value co-creation require additional resources. Manufacturers use different approaches depending on the size of the customer and the type of customer relationships. This implies a need to clarify the research framework to clearly show new approaches for engaging, interacting with customers' resources and integrating their processes to co-create value in the joint sphere. The previous refinement of the framework in section 7.1, clarified the nature and attributes of value co-creation, showing the type of activities necessary to be co-creative, and was summarised in Table 7.1 and 7.3. As such, it is now necessary to consider which aspects of the framework to retain, remove or modify to produce the final framework. Therefore, the discussion starts with the three main themes of the framework: a) strategic objectives, b) service design and service management, and c) interactions, involvement and relationships. When the findings were interpreted (see chapter 7), it showed that Theme 3: *interactions, involvement* and *relationships*, provides the strongest indicator for initiating value co-creation approach. Additionally, the analysis indicated that Theme 2: *service design and service management* cultivate the *behaviours* of value co-creation and Theme 1: *strategic objectives drives* the need and motivation to co-create value to achieve *strategic alignment* of the provider's and the customer's value in servitisation. Therefore, for improvement of the final framework, it was logical, to

begin with the *driver* and then the *prerequisites* which seems to establish the foundation for value co-creation.

8.1.1   Driver

The identified *driver* of value co-creation is *customer demand,* and this is briefly explained below.

Customer demand

The value co-creation model according to Gronroos and Voima (2013), consists of the provider's sphere, the customer's sphere and the joint sphere. The model further suggests that providers and customers co-create value in the joint sphere when value creation activities are merged into a single process through interaction (see Chapter 2 for a detailed explanation of the model). Correspondingly, the empirical findings of the present study demonstrated that in servitisation, the customer's need to develop a new solution, *drive* a merged process, where manufacturer and customer jointly interact to integrate resources. This is shown in Figure 8.4 as customer demand.

8.1.2   The prerequisites

Prerequisites are the foundational elements necessary for the value co-creation approach. These *enables understanding* of customer demand and other contextual factors.

The findings identified the prerequisites for value co-creation; these are: *on-going* and *long-term personal relationship, mutual trust, active collaboration and transparency* (see Figure 8.1).

On-going and long-term personal relationship

Overall, on-going and long-term personal relationships manifested as one of the significant prerequisites of value co-creation in servitisation. For advanced service offerings, the relational dimension is complex, and gradually increases to become more personal. For example, the service network for advanced service offering includes relationships to supply telematics (TruckTech), and relationships to deliver repair and maintenance, which include dealer networks and customers. With high-value customers (key account customers), there is an on-going orientation toward long-term personal relationships, in particular, regarding the quality of service that they receive from other service network partners. The long-term relationship enables a better understanding of the customer's need. The case

studies showed that this type of customer viewed manufacturers as partners, rather than just "value facilitators" (Gronroos and Voima 2013, pp.140). The empirical findings of the study showed that the circumstance of the business relationship strongly affects and influences the level of value co-creation activities and the customers' willingness to participate in co-creation.

Mutual trust

Mutual trust within the relationship is a fundamental prerequisite for the success of various aspects of the services. For example, trusting the performance of the dealer network could be the reason for gaining further service contracts for the manufacturers. According to Gronroos and Ravald (2011), value creation process is explained from different viewpoint depending on who creates value and who co-creates value, and emphasis that value is measured based on stakeholders perception. This places more emphasis on commitment and mutual trust, because these attributes have an effect on how customers perceive the manufacturer and how value can be co-created. The customers trust the manufacturers and dealers to maintain the expected service level at the expected time, and they make plans around that agreement. In servitisation, customer value relates to reliability and immediacy of service; for instance, manufacturers agree to a turnaround time of 60 minutes for any roadside breakdown, and the customers rely on that promise. Bastl, Johnson et al. (2012) found similar results, showing evidence that increased complexity of exchange and activities in servitisation makes legal contract ineffective therefore trust and joint cooperation is used to complement these legal contracts in servitised contexts.

Similarly, the manufacturers also trust that customers to maintain the product to an agreed condition up to the end of the contract, so that they can buy it back. Mutual trust is also expected between the manufacturers and the dealers about time spent on each maintenance task or claims for parts changed. Findings demonstrate that mutual trust is one of the most important *prerequisites* for value co-creation. As underlined in the previous sub-section, on-going and long-term personal relationship provides the required trust and mutual understanding which underpin value co-creation activities. Simply put, mutual trust in these partnerships allowed better understanding of customer demands.

Active collaboration

Findings indicate the importance of manufacturers actively collaborating with all customers. In the case companies, the findings demonstrate that the manufacturers' interaction patterns are two-fold: reactive with retail customers, hence adopting a traditional approach to value co-creation, and proactive with high valued customers. In essence, the findings demonstrate the importance of collaboration. For the case studies, it was found that the big customers make an effort to initiate interaction to collaborate and solve the problems, especially when things fail to go according to plan. However, retail customers who have adopted the traditional approach assume that the responsibility of initiating interaction is the manufacturers'. Additionally, Gronroos and Voima (2013), proposed two-way interactions, arguing that in B2B activities, customers should equally be responsible for creating and initiating communication/interactions in value co-creation. This is notable in the cases which adopt a co-creative approach, as the actors perceive themselves as collaborators, therefore, they are all responsible for initiating and creating communication amongst stakeholders. This is similar to other studies (Penttinen and Palmer 2006, Bastl, Johnson et al. 2012), which found that servitised offerings initiated the development of close operational systems amongst service network. However, the present study advanced this understanding by demonstrating how these support systems increase the breadth and depth of interaction and communication among stakeholders leading to value co-creation by actively collaborating and improved responsiveness of operations.

Transparency

The findings show that transparency was underpinned by online service support systems and proactive communication. It was found that, within the service network, proactive communication of information was the key activity for service operations. The actors in the network use the online service support systems, which enable connectivity, to increase the breadth and depth of communication. This provides transparency of information that is relevant for service operations. Additionally, with proactive communication, customers are more inclined to share an honest opinion, business intelligence and knowledge from their use experience. In other words, the transparent type of relationship stimulates innovative ideas for value co-creation activity within the service network.

Summary

In conclusion, the empirical findings indicate that these prerequisites are foundational elements necessary for the value co-creation approach. These prerequisites do not automatically lead to value co-creation, instead the empirical findings demonstrate that the prerequisites establishes the foundation to interact with customers' processes (Gronroos and Ravald 2011) and understanding of customers' needs lead to developing new solutions (Gronroos and Voima 2013).

8.1.3 Service co-design behaviours

While value co-creation can be viewed as a customer's use of a service offering to capture a beneficial outcome during use (value-in-use), service co-design is seen as a sub-set of value-creation, where customers' are involved in the creation of the providers' service offering (Green, Davies et al. 2017). In essence, service co-design is the next phase in the joint sphere, which is seen as a function of interaction (Mattelmäki and Visser 2011, Gronroos and Voima 2013). The findings show that servitised cases which adopted a value co-creation approach displayed certain *behaviours* in service co-design. These behaviours include: sharing knowledge and resources, focus on the service network, adopting proactive outlook, and learning and creating together (see Figure 8.2). These behaviours involve manufacturers and customers in service co-design processes which focus on creating and improving service offerings (value propositions) that create, not only value-in-use for the customers, but also value-in-exchange for the manufacturer. These indicative behaviours are detailed below.

Figure 8.2: Service co-design behavioural indicators
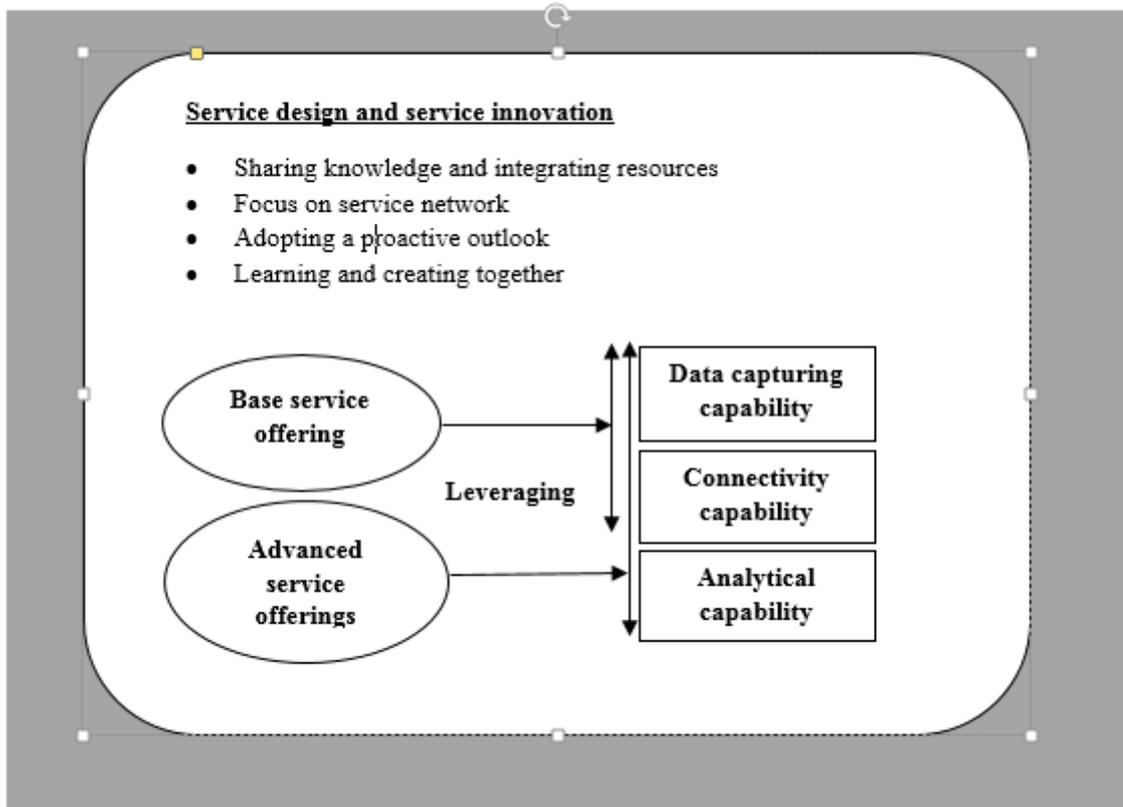
Digital capabilities influence on service co-design

The role of digitalisation as an enabler of servitisation is recognised by many studies (Neely 2008, Belvedere, Grando et al. 2013, Lerch and Gotsch 2015, Parida, Sjodin et al. 2015, Lenka, Parida et al. 2017), transforming the way manufacturers interact with customers. Although these studies recognise the importance of digital technologies in servitisation, they fail to provide a unique process model able to show how these technologies impact and enable value co-creation in servitisation through resources integration between manufacturers and customers for example co-design of services. Service co-design is the second level in the joint sphere of a value co-creation process. This service co-creation manifests itself in various forms; the findings (see Chapter 5) identified three digital capabilities which show the activities occurring in various stakeholders' contexts. The identified digital capabilities enable new ways of interacting with customers' resources. The emergent model above (Figure 8.2) consists of two stages of co-design, showing how existing service offerings (base and advanced service offerings) facilitate

co-design behaviour. The first level involves base service offerings, where manufacturers use data capturing and connectivity capability to gain access to customers' resources; this does not include the customers' involvement and participation. Advanced service offerings require all three identified digital capabilities and facilitate knowledge development among the service network.

Sharing knowledge and integrating resources

This information flow across the service network enables the stakeholders to have certain experience and develop knowledge, which is shared through face-to-face interaction, where existing problems can be mutually resolved, and new service ideas can be discussed proactively. The second stage is achievable through analytical capability, where solutions are tailored to customers' specific context, as such, knowledge is developed and can be shared leading to the incremental innovation of existing services. For a beneficial outcome of value co-creation to manifest, all actors in the service network must be involved, collaborate and proactively participate by sharing knowledge.

Focus on the service network

Extant literature on value co-creation in servitisation provides limited elaboration on co-creation activities for different stakeholders' business processes and their interconnections in the service network (Vargo, Maglio et al. 2008, Green, Davies et al. 2017, Lenka, Parida et al. 2017, Ruiz-Alba, Soares et al. 2017). The empirical findings of this study demonstrate that case organisations adopting a value co-created approach portray certain behaviours in service co-design, which are observed in the service network. The service networks, for the cases in this study, mainly focus on maintenance services offered by the dealers, and data related services provided by the manufacturers through their technology providers. The companies adopt a customer centred mind-set. However, no collaborative partnership was seen between TruckTech and TruckSup's, which may limit possibilities of further knowledge co-sharing through the integration of telematics data and maintenance data. The cases predominantly focus on creating added value for the customers through formal or informal interactions with customers for service innovation. The findings show that, although the manufacturers in co-creative cases collaborate with customers and the technology companies through development meetings, the potential of the whole

service network was still not realised and therefore limits possibilities of value co-creation across the entire service network.

Adopting a proactive outlook

The study found that adopting a proactive outlook to service design, especially when a customer needs to co-create, solidifies the business relationship, and also allows the manufacturer to observe how the service offering suits various customer contexts. The empirical findings demonstrated that, through visibility of customer operations, valuable information is provided, and connectivity triggers proactive interactions between a manufacturer and its customers for value co-creation. Raja, Bourne et al. (2013) supports this finding by highlighting the importance of two main attributes of value-in-use for customer satisfaction. This was equally in line with an earlier exploratory study by Carbonell and Rodriguez-Escudero (2014), which confirmed how imperative it is to involve customers in new service development. Their result emphasised that the use of customer information in new service development improves understanding of customer demand. Additionally, this information allows knowledge integration from other stakeholders to create mutual value. In essence, it was found that adopting a proactive outlook in service design and innovation means actively creating a shared view with the customer to deliver solutions that better fulfil the customer's needs. By providing detailed evidence from the truck manufacturing industry, this study extends the literature in servitisation to offer the foundations for manufacturers to adopt a proactive outlook to customer's requirements and contexts, because this drives effective co-design and delivery of suitable solution (Kowalkowski 2011).

Learning and creating together

For advanced services, knowledge is co-created and also exchanged, through learning and creating solutions together. The case companies acknowledged that some problems are easily resolved by working together with customers in one place through face-to-face meetings, indicating that this offers an opportunity to create and learn together. Additionally, better quality can be achieved when customers are provided with solutions and knowledge about further adjustments to and design of new products, giving customers the opportunity to contribute, which creates value-in-use for them.

Summary

Based on these behaviours, the joint sphere of value co-creation is increased through interactions. It was identified that the manufacturing firms leverage their digital resources and capabilities (see Chapter 5) in order to deepen interaction with the customers, enabling the sharing and integrating of resources in order to co-design service offerings. This allows the integration of processes, leading to mutual benefits for the manufacturing firms and their customers for value co-creation. These digital capabilities enable manufacturers to perceive and react to customers' needs. In essence, digital capabilities increase the interaction between manufacturer and customer, establishing close cooperation of resources and operational processes in the organisations.

8.1.4   Strategic alignment

Strategic objectives demonstrate that value co-creation at a strategic level seems to be embedded in service dominant logic (Vargo 2008, Gronroos and Voima 2013). In other words, to adopt a co-creative approach in servitisation entails adopting new strategic objectives, an approach which aligns with the customer's strategy. As such, the business model and the value creation approach need to incorporate the customer's value creation process. Bustinza, Vendrell-Herrero et al. (2017) equally supported this idea in their study, highlighting the importance of strategic partnerships.

The empirical findings of this study demonstrate that achieving strategic alignment completes the phases of value co-creation within the joint sphere as shown in Figure 8.3 below.

Figure 8.3: Strategic alignment

Strategic alignment

- Consolidation of internal and external value
- Better understanding and knowledge of each other's business
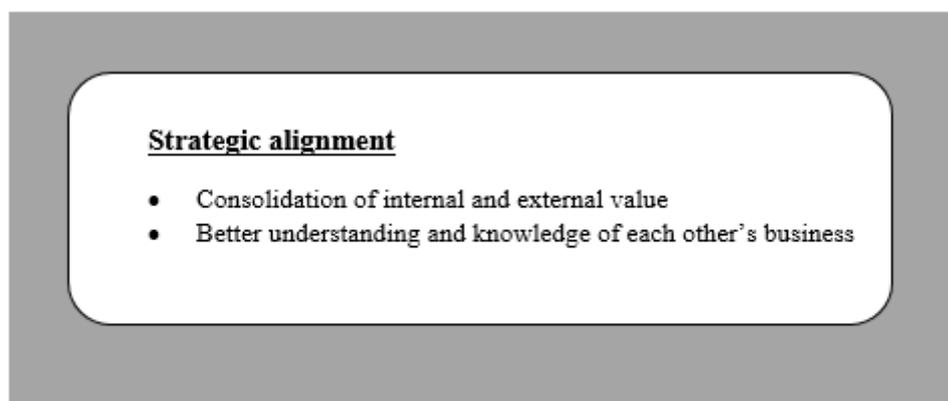
Consolidation of internal and external value

S-D logic posits that business strategy begins by understanding the customers' perception of value and value creation processes, and choosing which of these processes the manufacturer intends to support (Vargo and Lusch 2004, Payne, Storbacka et al. 2008, Kowalkowski, Kindstrom et al. 2013) in other words, an outside-in approach. It was apparent from the case studies, that there are various ways in which value is perceived. For the customers, value is seen as a quality of service, cost reduction and reliability. The service providers see value from an economic perspective, as increased market share etc. This study offers an important contribution to the servitisation literature by highlighting the role of consolidating internal and external value in a B2B relationship. Findings demonstrate that it is imperative to create a good relationship, as this provides the basis for creating mutual value with customers, especially when both parties agree upon a common business goal. The findings also show that the nature and circumstance of the relationship significantly affects the level of partnership, hence the level of strategic alignment. A perfect example is the relationship between TruckPro1 and TruckCus4. They are considered as equal strategic partners, therefore, TruckCus4 has more advanced technological access to data, in comparison to other customers. According to Tunisini and Sebastiani (2015) investigation of servitisation, which focuses on the role of integration of activities. As a company's business strategy becomes more focused on customer value, its success is strongly dependent on the development of customer-driven demands. In terms of strategy, consolidation of internal and external value emerged from data in line with past literature (Casadesus-Masanell and Ricart 2010, Baines and Lightfoot 2014, Tunisini and Sebastiani 2015, Ruiz-Alba, Soares et al. 2017).

Better understanding and knowledge of each other's business (value-in-use)

Service logic views value co-creation to be an interactive action by all participants in the service process with an intent of becoming better off (Prahalad and Ramaswamy 2004, Gronroos 2008, Gronroos and Voima 2013). However, some servitisation literature (Oliva and Kallenberg 2003, Baines, Lightfoot et al. 2009, Smith, Ng et al. 2012) uses the term value-in-use to underpin customer centricity in servitisation. Baines, Lightfoot et al. (2009) considers products as the main part of value and assumes "*services purely as an add-on to products*" and the "*main differentiator*" (p.555). This viewpoint of

value added considers value to be embedded in use (Ng and Briscoe 2012), therefore value is rooted in both products and services created by the manufacturer for customers' use. This notion, suggests that servitisation strategy is reliant on firm's performance in delivering value created to be used by the customer. This study supports this notion. However it extends this idea by empirically showing that direct interaction with customers changes the boundary between customers and manufacturing firms into a collaborative partnership essential for the viability of the value network. For the present study, some of the case companies have incorporated the prerequisites into their customer interactions, have adopted service co-design behaviour, and appear to have good knowledge of each other's businesses. It was noted that information triggers interaction between manufacturer and customers. However, face-to-face meetings with customers were perceived as more effective, as they enable better knowledge of each other's businesses. Service co-design behaviour creates a better understanding of value-in-use, enabling effective use of resources, to create new ideas, and plan future businesses. This extends beyond value proposition into participation and involvement which provides value to suit different contexts and drives economic value and profitability within the value network where stakeholders become accountable for achieving desired results (Smith, Maull et al. 2014, Frow, Nenonen et al. 2015).

## 8.2   Changing the structure of the framework

The earlier conceptual framework (see Figure 2.6) did not consider value co-creation processes. In other words, current knowledge posits that value co-creation should be established as a set of processes, where actors (stakeholders) jointly generate insight, understanding and knowledge to develop solutions to serve their needs (Gronroos and Voima 2013, Jaakkola and Hakanen 2013). Following this understanding, the framework provided a set of processes for value co-creation, but will also need to show what activities takes place at each levels. In as much as the themes created clarity, now the framework should demonstrate an improved process and how it can be used. Therefore, instead of just showing the value co-creation attributes which are a) prerequisites, b) drivers, c) service co-design behaviours/indicators and d) strategic alignment, the structure of the framework should exhibit flexibility. It includes refined steps and shows the process nature of the value co-creation approach. The new value co-creation framework now includes three steps which are interlinked for flexibility of use. These are a) the

prerequisites for actor's interactions, b) service co-design behaviour, and c) strategic alignment. Each step is further detailed in the next subsection to form a final value co-creation framework in servitisation.

### 8.2.1 Introducing the final value co-creation framework in servitised business.

Based on the study's findings, the overlaps in the themes were removed, and the empirical and theoretical findings combined to form the final framework. According to Gronroos and Voima (2013), the basis of value co-creation is to join stakeholders in a collaborative process to create new solutions or improve existing solutions, i.e. innovation. The value co-creation model according to the author depicts three spheres, the provider, the joint and the customer sphere as shown in Figure 8.4.

Figure 8.4: a framework of value co-creation
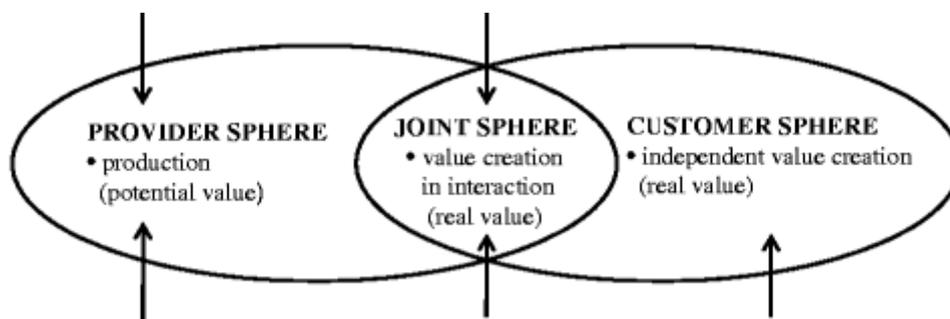
The present study introduces various attributes of value co-creation as a collaborative process which includes three levels (see Figure 8.5). The three levels reflect a comprehensive "joint sphere" and a bigger "interaction platform" (Gronroos and Voima 2013, pp. 141). The connecting arrows point to the idea that interaction within the three-level framework incorporates the manufacturer's, the customer's and other network partners innovation processes into a single value co-creation process. In essence, interaction creates a value co-creation opportunity for the stakeholders, working as service co-designers, using the co-design behaviours, and enabling value to be created for themselves and each other.

Figure 8.5: A multilevel process model of value co-creation in servitisation
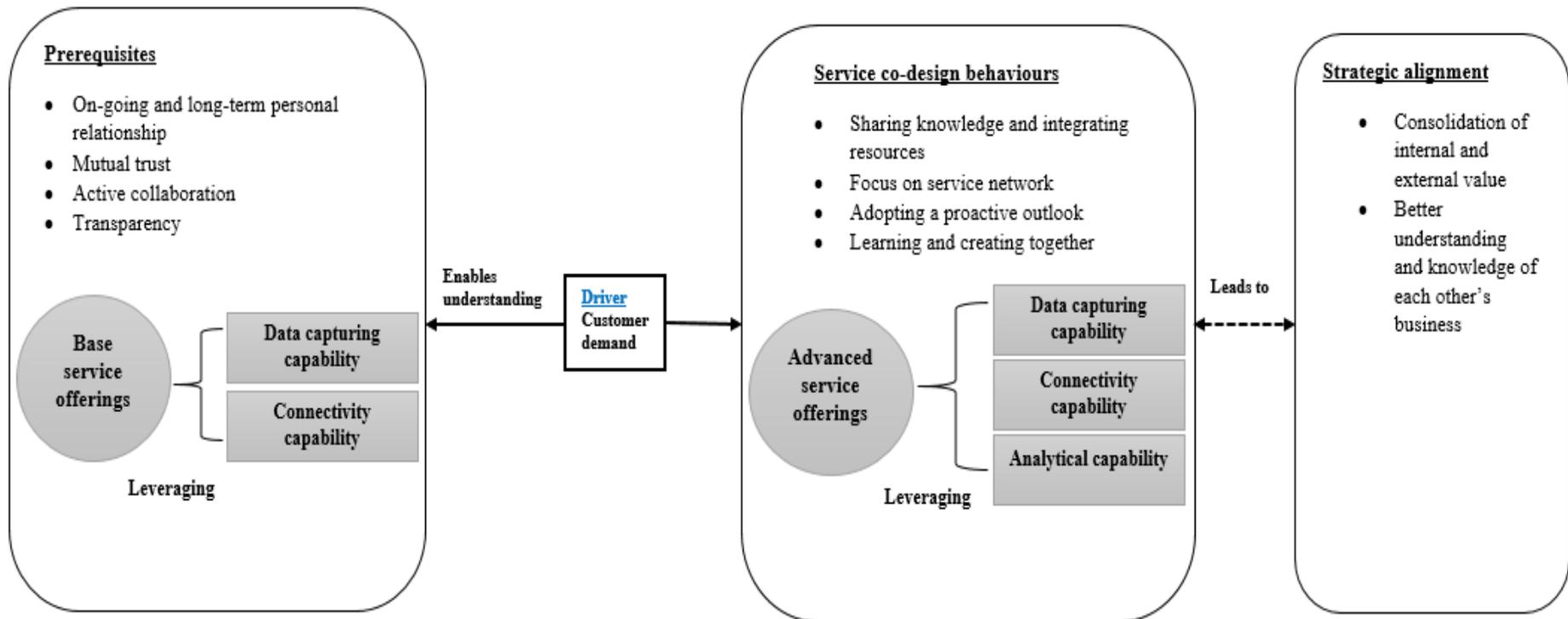
The first value co-creation level demonstrates an understanding that there are *prerequisites* for stakeholders to co-create value. These key conditions are on-going and long-term personal relationship, mutual trust, active collaboration, and transparency. These prerequisites *enables understanding* of the customer demands.

In-between the first and second level, there is the *driver* of value co-creation which seem to cultivate the adoption of service co-design behaviour in the second level. The empirical findings indicate that this driver is a need to collaborate and develop new value propositions, which is termed *customer demand*.

The arrow between the first and second level shows that the prerequisites enable the manufacturers to have better understanding of the customer demand which then facilitates the second stage of co-designing a tailored solution suitable for their context. The second level shows that certain service co-design behaviours need to be applied in the value co-creation approach, which are: sharing knowledge and integrating resource, focus on service network, adopting a proactive outlook, and learning and developing together. The technological capabilities allow adaptability of service co-design.

The dotted arrow between the second and third levels demonstrates that these co-design behaviours may lead to attaining a strategic objective where the parties evolved plans to achieve a future goal.

The third level of the framework demonstrates that new strategic alignment may occur when applying service co-design behaviour. Strategic alignment indicates that the applied service co-design behaviour can influence strategic processes and the business model. When this happens, the second and third levels manifest as a continuous process of innovation, where the manufacturer and customers jointly develop and innovate new solutions to co-create value. According to Vargo, Maglio et al. (2008), the service-driven viewpoint on innovation sees innovation as a process which consists of discovering new ways of co-creating value through effective participation in resources integration. Additionally, if the digital technology and customers' perspectives on innovation are mutually joined with the service-driven view, the result would conceptualise innovation as a co-creation process, within social and technological networks where stakeholders combine resources to create mutual value (Spohrer and Maglio 2008, Heiskala, Hiekkanen et al. 2011, Chowdhury 2017).

Moreover, the joint sphere involves three levels which can be used interchangeably. For instance, if the stakeholders wish to stay on the second level of value co-creation, and not use the knowledge gained when using the service co-design attributes to plan for future business collaborations (achieve *strategic objective*), they may do so. Besides, if it appears that the co-creation method does not promote mutual value creation, then the stakeholders may decide to step back to the initial process (the *prerequisites*). This it allows companies to choose the depth of their co-creation activities in the joint sphere.

8.3   Conclusion of chapter

In conclusion, the empirical findings of the study showed that the case organisations understand the importance of value co-creation, but believe it requires additional resources. For the case companies, various attributes were used in parallel. This observation highlighted the need for a simplified value co-creation framework to clearly show the levels, the meaning of value co-creation at each stage (what activities are involved), and how it can manifest. Furthermore, certain attributes appeared prominently in the case companies that adopt the value co-creation approach. Those attributes are assembled into prerequisites, drivers, service co-design behaviour and strategic alignment.

The attributes of value co-creation were refined into the final framework (see Figure 8.4), which demonstrates the process of value co-creation. The new framework provided more flexibility, allowing the servitised companies to join, or depart from, the co-creation process when the need arises. Moreover, it provided clarification of the essential process of value co-creation.

Ultimately, the new framework combines the in-depth empirical findings from the case studies, which include 15 organisations, with insight from current literature on value co-creation. The research framework offers a platform for value co-creation activities and sees value co-creation in servitisation as a joint value creation process (Gronroos and Voima 2013) of creating solutions (Jaakkola and Hakanen 2013), by facilitating innovations (Spohrer and Maglio 2008, Heiskala, Hiekkanen et al. 2011), and developing strategic alignment through service co-design behaviour.

This new framework of value co-creation in servitisation attempts to show that, rather than combining a set of processes, co-creation should be seen as a set of dynamic processes of innovating novel

ideas/solutions or improving existing ones. At the core of the value co-creation process is the second level which includes service co-design behaviours utilising digital resources. Furthermore, the framework enables servitised companies to step back to the base services process if they so wish. The framework provides a guide towards the practical implementation of value co-creation in servitisation and would allow other servitised companies to adopt this approach.

Chapter 9: Discussion and Conclusion

The aim of the chapter is to discuss contributions to theory, contributions to knowledge and practical implications. More particularly, it aims to synthesise the emerging findings in order to draw warranted assertions. As a result, the discussion of the findings in respect to past literature will offer the foundations to the study's identified contributions. This study was motivated by the need to understand what constitutes digital capability and how these capabilities provide new avenues for value co-creation by interacting with customers' resources in servitisation. Better understanding of the important process allows servitising manufacturers and service network to co-create and sustain value created in the joint sphere.

Servitisation literature is well established, however, is still at an early stage theoretically (Mostafa 2015, Kowalkowski, Gebauer et al. 2017, Zhang and Banerji 2017). This study primarily contributes to servitisation literature and provides a new theoretical perspective that offers better understanding of processes involved in value co-creation, relationships and service co-design that are referred to in servitisation literature.

9.1   Contribution to knowledge:

9.1.1   Identified digital capabilities

The model of digital capabilities represents the first theoretical contribution of the study. This contributes to the digitalisation literature. The identified digital capabilities are: i) *data capturing capability* enabling visibility of products and customers' operations among the service network; ii) *connectivity capability* allowing information flow and information exchange among the service network, providing new avenues for servitising manufacturers to actively interact with customers' resources, to collaborate and to facilitate value co-creation amongst the network partners; iii) *analytical capability,* enabling knowledge integration and effective management of knowledge within the service network (see chapter 5 for details). These findings helped to answer the first research question by identifying and offering an understanding of the constituents of digital capabilities in servitisation.

Past servitisation literature argues that the need to understand the customer's perspective is central to service provision (Tuli, Kohli et al. 2007, Vargo, Maglio et al. 2008). Therefore, manufacturers need first to understand customers' needs, and related contextual triggers, in order to effectively deliver service offerings (Kowalkowski 2011, Macdonald, Wilson et al. 2011). In light of this, the study's findings provide insight and offer sufficient evidence to show that value co-creation in servitisation occurs in a gradual and incremental manner, the servitising business comes to understand customer use contexts, in other words, a hierarchy exists in the ways the digital capabilities are used. This is further explained below.

9.1.2   Hierarchy in the manner of use

The second findings addressed the second research question by depicting a hierarchy in the manner in which manufacturers use digital capabilities. As discussed in the literature review (see chapter 2), the Gronroos and Voima (2013) value co-creation model suggests that firms and customers co-create value in the joint sphere when a service provider's (manufacturers) and customer's value creating activities are joined into a single process. Findings demonstrated a hierarchy in the ways digital capabilities are used for different service offerings. It was observed that in providing base service offerings, only data capturing and connectivity capability was used and less analytical capability, while advanced service offerings required all three identified capabilities to provide the outcome and to support customers' needs.

The empirical findings of the study demonstrate that data capturing capability allows visibility of customers' operations. The findings highlight how data capturing capability can be seen as the foundation for developing understanding of the customers' needs and managing relationships with customers, which were found to be the *prerequisites* for value co-creation. With advanced service offerings, flexibility was demonstrated, enabling increased adaptability and depth in the joint sphere, and this provides additional opportunity for value co-creation.

9.1.3   Customer size creates information asymmetry

The literature on servitisation underlines information exchange as a vital antecedent for effective service provision (Lockett, Johnson et al. 2011, Bastl, Johnson et al. 2012, Opresnik and Taisch 2015, Ardolino,

Rapaccini et al. 2017). Therefore, managing interactions and communications within the business relationship is key to understanding and responding to customers' needs (Romero and Molina 2011). In line with (Bastl, Johnson et al. 2012), the empirical findings of this study support the assertion that servitised networks require transparent and multi-directional information exchange.

Extant literatures put emphasis on the importance of delivering the right message to customers in the context of servitisation (Raja, Bourne et al. 2013). Nonetheless, this study shows that case companies considered large customers as the main target for value co-creation by demonstrating more flexibility in the manner at which information is exchanged. Throughout the analysis of the cases, differences in customer relationship were observed, and that they were dependent on the customer size. With large customers, they share partnerships for future collaboration. However, the truck manufacturers appeared reluctant to engage in partnerships with retail customers; this was attributed to a lack of resources. This demonstrated inconsistencies in their relationship with different types of customers. For example, big customers, who have the capacity to assign a team to focus on telematics, services or information needs, seem to demand increased access to data in order to explore their needs. While retail customers rely solely on standardised information coming from the manufacturers, which, in their customers' opinion, is limited. The findings demonstrate evidence of information asymmetry when the customer size is small as opposed to collaborative partnership seen with large customers.

Value co-creation has to be nurtured starting with relationship building. Although the findings showed that basic information is used for relationship building, this also affects customers' willingness to develop long lasting collaboration. The balance between shared information and required information may influence both parties since it can affect the development of long-term relationship, because the stakeholders have to know each other well before integrating resources for value co-creation.

9.2   Theoretical Contributions

9.2.1   A multilevel process framework of value co-creation in servitisation

This study explored the key characteristics of value co-creation in the literature and sought to understand their manifestation in a servitisation context. To do this, a service network perspective was adopted to accommodate customers', manufacturers' and dealers' views, for a holistic understanding

of this phenomenon. The framework (Figure 8.4) results from pulling together the empirical findings gathered from 15 servitised organisations and their four service networks, and theoretical findings, in order to form a multilevel framework of value co-creation in servitisation. This resulted from abductive reasoning and an iterative analytical process. According to (Gronroos and Voima 2013), the core of value co-creation is to combine stakeholders in a collaborative process so as to improve existing service solutions or develop a novel solution, in other words, innovation.

In the context of servitisation, digital capabilities are relied on for interaction with customers and other collaborations. Therefore, the study introduces a multilevel framework of value co-creation in servitisation, as a collaborative process embedding three levels of reflection interactions within the joint sphere (Gronroos and Voima 2013).

The first level shows the *prerequisites* for interactions and relationships to develop amongst the stakeholders. Based on these prerequisites, the stakeholders strategy and needs *drives* the adoption of the second level which is *service co-design* in the joint sphere (Gronroos and Voima 2013), by co-sharing of experiences, and knowledge, and by resources integration. The second level then lead to the third level, which is strategic alignment, where new innovative solutions can be jointly developed. Servitised manufacturing companies in a B2B context should concentrate on relationship building that leads to a sustainable way for economic gain and value co-creation. The findings provides evidence that there would be limited economic gain without the relationships, which means that manufacturers have to invest in building customer relationship when focusing on value co-creation, because when there is trust and commitment in the relationship this will often facilitate future collaboration (Walter and Ritter, 2003; Songailiene et al. 2011).

The research framework captures value co-creation activities in servitisation, showing that value co-creation in servitisation can be understood as a joint process (Gronroos and Voima 2013), of collaboration (Pirinen 2016), where actors apply and integrate resources to develop solutions (Jaakkola and Hakanen 2013), and create *strategic alignment* through *service co-design* by the actors involved. The third contribution offered a new framework and addressed the third research question.

9.2.2   Shared information and resource integration in servitisation

S-D logic emphasises the importance of interaction in value co-creation (Grönroos 2011, Gronroos and Voima 2013), and that resources are usually integrated through interaction. Pure service companies may not be able to co-create value without human interactions, but servitised companies are not necessarily depending on interaction alone, rather, they are integrating resources and processes through technological service systems. This implies that customers can interact with manufacturers' service systems. The case companies use fleet management systems, which leads to effective journey planning. These provide them, and their service network, with opportunities for better integration of resources without direct interaction. The use of technology without human interaction is one way of integrating resources for value co-creation. S-D logic depicts value as something which can be perceived, evaluated and achieved during usage or experience (Vargo and Lusch 2004). Moreover, Songailiene, Winklhofer et al. (2011) suggests that understanding of resources, customer capabilities and expectations of using services provided by the manufacturer enables value co-creation. The manufacturers share basic information with base service customers with the aim of interesting them and making an opportunity for long-term collaboration and value co-creation. Findings from the present study suggest that customer perceived value and expectations are dependent on the knowledge the customer has about the product and service manufacturing process.

Additionally, Kowalkowski (2011) asserts that manufacturers need to understand the motive behind the customers' decision to purchase servitised offerings, in order to satisfy those needs, support their customers' daily operations and aim for long-term strategic focus of the servitised offerings. The difference between the information shared and the information the customer actually required may influence both actors since it might affect the relationship-building. This implies that unwillingness to share knowledge at an early stage of the relationship can affect long-term relationship building, which can result in customer unwillingness to enter into further collaboration and value co-creation. On a further note, past studies argued that customers are more likely to engage in a long-term and collaborative relationship with manufacturers when the exchanged resource is highly critical to their operations (Van Weele 2004, Ford 2011). This study provides supporting evidence especially with for

large customers, where vital information and knowledge are exchanged through direct interaction unlike the basic reports the small customers receive which are not critical to their operations.

In line with this, the findings demonstrate that, in a B2B servitised context, value co-creation requires some prerequisites, which are driven by active interactions directed towards effectively integrating resources, based on each other's needs and requirements, while developing a long-term relationship for value co-creation. The manufacturer shares knowledge and skills with large customers who have already established relationships with the company, while using basic report to interest and develop relationships with smaller customers. Although, this approach means that small customers may have poor perception of their desired value because the received value can hinder value co-creation due to discontentment (Chen, Chiang et al. 2012).

9.2.3 Servitisation and Service Dominant logic

Service dominant logic implies that suppliers (manufacturers) work as value facilitators which contribute to customer value through interactions (Vargo, Maglio et al. 2008, Ulaga and Reinartz 2011, Gronroos and Voima 2013). In other words, customer value is not only about customer needs, but more about creating value during usage (Edvardsson, Tronvoll et al. 2010). The findings of the study acknowledged that value co-creation creates mutual value, hence value-in-use for all network partners. In a B2B context this becomes complex and more distinct, where customer are seen as receivers of value-in-use and manufacturers are viewed a value facilitators who receive value-in-exchange. This implies that manufacturers merely receive money in exchange for services. This study proposes that to successfully co-create value by servitisation both value-in-exchange and value-in-use are mutually received within context, in other word value-in-context. This included all stakeholders in the service network to a smaller or bigger degree and that all participants of value co-creation process are customers of that process.

Additionally, S-D logic highlights value creation as customer value-in-use (Gronroos and Voima 2013). Nevertheless, this blurs the boundaries of being value facilitator and value creator in the servitised B2B network. For example, in servitisation, the dealers and customers can be classed as customers of the manufacturer, yet the dealers use part of the resources provided by the manufacturer to create value for

the customers. Specifically, manufacturer is a value facilitator producing services to suppliers (the Dealers) who then creates value-in-use by providing services to its customers (both large and small customers). Similarly, the manufacturer is a value facilitator providing solutions to customers, who, in turn creates value-in-use by using part of the solution to provide services to its own customer. As such, suppliers (the dealers) or customer (the manufacturer's customers) are value facilitators of their own customer by using at least a portion of the service provided by manufacturer to provide services to their customer. This can be perceived as value-in-context in a B2B settings. As a result of the manufacturers' value propositions, customers have the opportunity to create value for themselves, and co-create value (Storbacka and Lehtinen 2001).

Moreover, in value co-creation process network partners such as manufacturer, dealers, customers and even the technology partners all share insight about each other's businesses which may allow mutual creation of a new service for manufacturers, enabling the manufacturer to provide better solutions (value-in-use) for its customers (dealers/customers) and the customers' customer. Exploring this further, when service network partners jointly create solutions this could possibly result in better value-in-use for all participants involved. This implies that, although S-D logic views value-in-exchange as a subsidiary of value-in-use, all service partners involved (manufacturers, dealers, customers and customers 'customers) would obtain better value-in-exchange and a win-win situation where everybody's business eventually grows. This suggestion validates the importance and significance of understanding customer's, their use context (value-in-context) and their customers' businesses to co-create value with them.

In addition, findings from TruckKPro1 and TruckPro2 the co-creative case companies, emphasised partnership with customers rather than seeing themselves as having supplier-customer relationships. Contrary to some findings in extant literature (Zwick, Bonsu et al. 2008, Cova, Dalli et al. 2011) the co-creative cases underlined that value co-creation activities not only include activities where the manufacturer benefits from the customer or the other way round; instead, the roles in regards to who is the recipient seem to vary. Therefore, it appears that during the value co-creation process the roles of the actors in the service network vary, occasionally taking the role of value facilitators and at times value

creators, depending on the project. Following this understanding, it seems that the network partners of co-creation process are the customers of co-creation processes and the activities of co-creation processes should address the needs of all partners, thereby creating value-in-use within their contexts.

9.3   Implications for practice

The research framework of "digital capabilities and value co-creation for servitisation" provides a practical understanding of value co-creation by showing its characteristics in B2B servitised business. It offers greater clarity on what kind of resources are needed, and allows companies to partially or fully adopt value co-creation approaches.

9.3.1   Activity-based framework of value co-creation in servitisation

The main practical contribution of this study is that managers need to understand different customer needs regardless of their size, related service offerings and the resultant impact on value co-creation. For this reason, managers first need to understand the *motivation* underlying customer requirements. In so doing, the core of the value co-creation process, which consists of *service co-design* utilising digital resources and capabilities, is triggered to achieve strategic alignment. This would enable manufacturers to offer customised and adaptable service offerings in accordance with the customer's priority. However, this cannot be achieved only by the manufacturers; in addition managers from the customer organisation need to align and integrate resources in order to sustain the value created.

The multilevel framework of value co-creation in servitisation could be used by managers in servitising companies to plan and coordinate different stages of value co-creation activities in servitisation. This will effectively create value, deliver value to the customer, and enable value capture among stakeholder in the service network.

Managers can focus on the identified *prerequisites* (see chapter 8 for details) in order to understand what drives customer needs. In regards to base service offerings, managers at the manufacturers can focus on communication around driver performance, with the aim of using this to interest and motivate the customer to adopt advanced service offering. For advanced service offerings, there is a need to put emphasis on multi-actor communication, which is fostered by working partnership, knowledge, preventive services, support systems, and resources integration through digital capabilities, as this increases the breadth and depth of interactions.

9.3.2 Mechanisms for consolidation of value

The findings also provided detailed insights in relation to the consolidation of internal factors (such as customer demands) and external contextual factors (such as dealer's quality of service, etc.) that need to be considered for the service network. The interplay between customer demand and dealer's quality of service was emphasised, and had substantial implications for value co-creation. For example, one customer organisation emphasised the importance of having a good dealer in a particular area as an important deciding factor on whether they choose to purchase a particular brand (positive mechanism) or end the business relationship (negative mechanism). Although these factors were, in some cases, out of the manufacturers' control, especially when a dealer is independently owned, they play an influential role in shaping the customers' relationships with the manufacturer. Therefore, prompt identification and proactive management of such contextual factors could possibly offer a competitive edge to the manufacturer. In one case, continuous customer events and visits to the customer were identified as primary examples of how to react effectively to contextual factors.

On a further note, the co-creative cases demonstrate a win-win mentality for all network partners. Here the managers from the co-creating manufacturers consider their challenges and those of other network partners. For example, the issue of service quality. The manufacturers are faced with the challenge of persuading and incentivising the dealers to align their business models with the servitising network, in order to foster the expected operational behaviours. To motivate them, one manufacturer introduced a reward system where dealers are rewarded when a certain level of service performance is achieved. The manufacturer leverages that to the customers' and dealers' benefit, and their own benefit as well. This was perceived by many customers, and the dealers, as a key motivation to achieve the needed service performance. Such an initiative underlines the importance of a proactive outlook and a win-win attitude in a service network.

Ultimately, managers need to understand that servitisation for value co-creation involves the participation of all network partners. Accordingly, value co-creation has significant implications for servitisation, and managers need to be aware of the interplay between *prerequisites*, *drivers*, and *service co-design* in order to achieve *strategic alignment*.

9.4   Limitations

This study is not without limitations and these limitations were briefly considered in the Methodology (see Chapter 3). For the present study, one of its objective was to examine value co-creation from a service network perspective, which therefore required access to other network members which includes customers, dealer etc. At the beginning, this proved to be difficult in terms of access, especially in regards to the customers. Many attempts to recruit the customers directly failed, only a handful of customers allowed access. The attempt finally materialised when the sampling approach changed to snowballing. Moreover, the researcher ensured that every customer organisation met the research criteria for case selection. Hence, it is important to highlight that the study is only based on servitising network in manufacturing industry.

Additionally, in case study research, it is vital to rely on analytical generalisation as opposed to statistical generalisation from surveys. Analytical generalisation allows findings to be replicated across cases which support the same theory (Yin 2014). As such the findings from each case were cross-analysed to demonstrate replication.

Another limitations was related to the chosen methodology. This study used an abductive multiple case approach which dictates continuous iteration between emerging data and theory. This approach was appropriate due the study, due to the study's objective and research questions and these contributed to the reliability. However, only few academic sources provided a guide for designing abductive studies especially in relation to changes when moving from date to theory. Therefore, is a need for more research in developing this research approach further.

9.5   Avenue for future research

The study covered numerous strand of knowledge of value co-creation, digital capabilities, and servitisation in manufacturing, and therefore, contributed by offering a framework which can be used a foundation upon which future studies can be built. To extend knowledge, future research directions are indicated below.

- First, to examine this framework with wider study and in different kind of business. Further studies should build on this framework by adding bigger sample size and including other aspects to make the framework more theoretical robust.

- Second, it will be important to examine different type of business models which may support value co-creation.

- Third, servitisation has gone global with most manufacturers providing services to customer in other countries. Companies may have difficulties performing value co-creation activities with such customer for instance developing relationships, integrating resources and interactions due to culture etc. Therefore, investigation value co-creation activities in such context will offer a more comprehensive representation of reality.

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Appendices

APPENDIX 1: ABS ETHICAL APPROVAL FORM

Aston Business School

ABS Research Student: C Ajaegbu

Date: 12/04/2016

Dear Cynthia

Title	Analysing how relational capability supports manufacturers and customers to co-create value from data.
REC REF	4:03/16

Confirmation of Ethical Approval

I am pleased to be able to inform you that the ABS Research Ethics Committee has approved the above research on the basis described in the Application Form, Protocol and supporting documentation as listed below.

Approved Documents

The final list of documents reviewed and approved by the committee is as follows:

Document	Version	Date
ABS Research Ethics Application	V1	14/03/16
Consent Form	V1	14/03/16
Research Interview Questions	V1	14/03/16
Participant Briefing Sheet	V1	14/03/16

Reporting Requirements

The details of the investigation will be retained. You should notify the ABS Ethics Committee of any adverse events which occur in connection with this study and/or which may alter its ethical consideration, and/or any difficulties experienced by the volunteer subjects.

If you intend to make any future protocol amendments these must be approved by the Ethics Committee prior to implementation

Good luck with your research.

Best wishes

Professor Richard Crisp

(Associate Dean of Research, Chair of the Ethics Committee)

Aston Business School

Informed Consent form - Interview

Full title of Project: Analysing how relational capability support manufacturers and customers to co-create value from data.

Name: Amara Cynthia Ajaegbu, PhD Researcher. Operations and Information Management Group. Aston Business School. Aston University. Birmingham B4 7ET. Email: ajaegbac@aston.ac.uk

	Please put your initials in the box if you agree with the statement

I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.

I agree to take part in this research.

I agree to have my data (after it has been anonymised) stored in a specialist data centre and potentially used for future research.

☐

Please tick box

	Yes	No
I allow the researcher to take notes during the interview	☐	☐
I agree to the interview being audio recorded	☐	☐
I give authorisation for the use of any quotes I have said provided that they do not reveal my identity and are strictly used within the framework of this doctoral research.	☐	☐

_____   _____   _____

Your name   Date   Your Signature

_____   _____   _____

Researcher's name   Date   Your Signature

Research participant briefing- Interviews
(Case Organisation employees)

Dear participant,

You are being invited to take part in a research study to understand the barriers that prevent manufacturers and their customers from utilizing benefits of Internet of Things (IOT) in advanced services they provide or receive. It also aims to understand the factors which influence value co-creation, innovation activities and the relational attributes required to enhance business relationships with customers. I am carrying out this research within the framework of my doctorate degree (PhD) at Aston University, Birmingham, United Kingdom.

Prior to deciding whether or not you would like to take part, it is essential that you understand the purpose and the procedure of the study. This page will provide you with details regarding why the study is being done and how it will be carried out, how you can give your informed consent, and information about data protection. If you have any additional questions regarding the study please contact the principal investigator,

What is the purpose of the study?

The main purpose of this research is to better understand how relational capability improve manufacturers and customers to co-create value from data. To this end, I would like to understand big data value co-creation, the organisational dynamics and its effect on co-creation process through interviewing you.

Why have I been invited to participate?

You are invited to participate in this research because you work and are involved in value co-creation process.

Do I have to take part?

Only if you want to. Taking part in this research is completely voluntary. If you decide to take part, you are free to withdraw at any time of the research. You may skip any questions that you do not want to answer in the interview. You are also free to interrupt, terminate the session or withdraw your participation entirely at any time during or after the interview.

If you decide to participate, you will be interviewed by me███████████████. The interview will last between 50 minutes and 60 minutes. The interview is a conversation between you and me. I will be asking you open questions. The main topics of the interview are your daily work with data analytics, data usage and your interactions with your customers/manufacturers. There are no right or wrong answers for any of the questions in the interview. You are the expert in what you do and I am keen to understand your viewpoint. I will interview you once. In case I have any follow-up questions, I would contact you again by phone or by e-mail. At that time, you may again freely decide whether or not you wish to answer my questions.

Are there any risks?

I do not anticipate any risks to you from participating in this research other than those encountered in day-to-day life.

What are the possible benefits of taking part?

Here are the most important benefits for you as a participant:

1. Dedicated time to reflect on your experience as an employee in value co-creation field.
2. Opportunity to inform academic research about the reality of value co-creation in the UK.
3. Opportunity to help other manufacturing employees locally and globally by sharing your own experience.
4. Opportunity to advance our knowledge about how we can improve value co-creation process from data more effectively.

What will happen to my data?

This study is anonymous and strictly confidential. All the records of this research, and the transcription of the interview will be kept private on secured drives and no one other than myself and my two supervisors,█████████████████████████ (whose contact details are at the end of this document) will have access to them.

Your name will not appear on the transcript of your interview. Instead, a pseudonym will be used. This is to ensure that your identity is protected. In addition, your participation in this study will not be shared with others and will not impact your relationships with your customer organisations.

All data generated by my research will be retained in accordance with Aston University's policy on Academic Integrity and will be kept securely in paper and electronic forms for a period of ten years after the completion of the research in accordance with that policy.

When I present the findings at conferences and publish papers in order to obtain my doctoral research, data will appear only fully anonymized, i.e., no one will be able to connect you to the research.

At the end of this research, I will send you an executive summary with the main findings. This summary will NOT include any information that will make it possible to identify you.

If you allow me, I would like to record the interview so that I can transcribe it and analyse it afterward.

If you decide to withdraw from this research, you can allow me to use the data I have already collected or ask me to delete all of your data.

What if I have questions in the future?

If you have questions, problems, concerns or comments at any point of this research, please contact me at ███████████████. You can also contact my supervisors, ████████████████ ████████████████████████████████

If you have any concerns regarding any ethical issues related with this research, you may contact the Committee Officer of the Aston Business School Research Ethics Committee ███████████ █████████████████

You will be given a copy of this form to keep for your records.

Thank you

Amara Cynthia Ajaegbu

Doctoral Researcher

Aston Business School

Birmingham

B4 7ET

Themes	• Questions
Background questions	• Please, briefly explain your background and your current role/position in the company? • What are your main responsibilities in particular with regards to services and how long have you worked here? (Add support question when needed)
Company's aims and Objectives	• Please, briefly tell me about your main products and particularly the services that you provide alongside? • What are the basic components of what you do? Do you sell all your products with service package? (Service contracts or transaction based? • What are your strategy and how are these developed? • What is value for you (Goals, target) • What value do you propose to your customer? • What is your competitive advantage over other manufacturers offering the same service? • What are the contractual agreements between your organisation and other network member's e.g. dealers, customers, Technology Company? • What level of importance do you attach to the contracts? Can issues be better managed due to good relationships?
Service development, Service delivery and Service innovation	• What do you offer your customer firms? (products and service package) • Could you briefly explain your services and work processes with your customer firm? • What is the timeline of your products and service? How long does a service last? (service contract details) • How do you get new customers? • What level of information exchange happens at the beginning of the partnerships and how does that affect or contribute to the delivery of your product and service? (E.g. your sales force, dealer's service, skills etc.) • Can you put your customer's involvement into context? And does the customer understand their role in the service process? • What is the role of the customer in your service offering? • What are the motivations for involving the customer into the service? • What does it give you? And how does it add to your service delivery? • What other plans do you have to increase the involvement of the customers? And why? Is there anything thing you think the organisation can do differently? • Who are your customers and are they segmented? If yes, which is most important? (probe question) • How do you communicate with your customers, dealers and technology company/partners? • What is your level of interaction with customers? Is it just at the beginning, during transaction or post purchase? • How long are your customer relationships, typically, and why do they usually end? • How do you define and measure your customer's satisfaction? • Can you describe the responsiveness of the customer's feedback?

	• How do you evaluate the current practice? Where are the limitations and what further opportunities for expanding the data capture/processing would you expect? • How do you manage conflicts and resolve issues?
Digital resources	• What are the most vital resources used in your company? • What main IT resources are put in place in order to carry out and deliver your services? (From the truck; telematics etc.) • What kind of customer data do you capture and how do you collect customer's data? How are they processed (analysed) within your organisation? • What does the data allow you to do? And how does it help with the service development of service delivery? • In what format are data presented and how are they presented to the customers? • From your perspective, how has data changed your business model over the years? And has the people and skills set changed with the digitisation? What is done differently now? • How does your company benefit from telematics, the data it provides and what operational benefits does it have for you and your customers? • Has exchange of information with the customers facilitated change or modification to your products and services? How can you use the data differently to derive more value? (Supporting question) • How do you create value together with the customers using those data? • How does this data allow you to look after the customer better and can you see how the data can help the customers?
Closing the interview	• Would you like to receive a summarised result of this research? • In your opinion, do you think there are issues that has been ignored or overlooked by me? • Can I contact you again in case I have further questions or clarification of understanding?