Business model innovation for delivering product-service systems
a case at a supplier of heavy commercial vehicles

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Business Model Innovation for delivering Product-Service Systems:

A Case at a Supplier of Heavy Commercial Vehicles

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Abstract

This master thesis studied the development of business models in the context of product-service systems (PSS) at a case company, MAN Truck & Bus b.v. Four types of PSS business models have been developed based on theory. These business models can be positioned on a product-service continuum, which represent the theoretical framework. An internal analysis at MAN Truck & Bus b.v. identified the current position on the framework, while the study also included the customer's perspective to determine the desired position. Based on the desired position on the framework, a new PSS business model was developed.

Preface

This master thesis is the result of my graduation project for the degree of Master of Science in Innovation Management at the Eindhoven University of Technology (TU/e). The graduation project was carried out during an internship at MAN Truck & Bus b.v., the Dutch importer of MAN heavy commercial vehicles.

The completion of this project would not have been possible without the support of a number of people, who I would like to thank next. First of all, I would like to thank my first supervisor at the Eindhoven University of Technology, Joost Wouters. His valuable input and critical view on my work during the project challenged me to strive for maximum results. Also, I would like to thank my second TU/e supervisor, Thijs Peeters, for providing me supportive feedback on both my research proposal and draft thesis.

Furthermore, I would like to thank my company supervisor, Paul Doodkorte, for giving me the opportunity to graduate at MAN Truck & Bus b.v., and for providing helpful feedback based on his extensive knowledge and experience from the market. With excitement I look back on my master thesis project and the time at MAN Truck & Bus b.v. It has been a great period of personal development. Also many thanks to all colleagues at MAN Truck & Bus b.v. for their cooperation, their support, and above all, the fun time they've given me during my internship.

Last, but definitely not least I would like to thank my girlfriend, family, and friends for always being there for me over the years, and for providing support during my master thesis project and the study in general.

Niek Bilterijst
Eindhoven, July 23rd 2014

Executive Summary

Introduction

In times of recession, increasing competition, and advancing technology a lot of companies experience that their usual way of doing business is under pressure. These companies often begin to offer "bundles" of customer-focused combinations of goods, services, and knowledge in which the services are beginning to dominate (Vandermerwe & Rada, 1988). Vandermerwe & Rada (1988) used the term "servitization of business" to refer to this process of "creating value by adding services to products". Baines *et al.* (2008a) have described servitization as "*the innovation of an organisations capabilities and processes to better create mutual value through a shift from selling products to selling Product-Service Systems".* A Product-Service System, hereafter referred to as PSS, can be seen as a special case of servitization in which the performance or utilization of an asset is more important than ownership of the asset. The traditional functionality of a product is extended by including additional services and the focus shifts from the 'sale of product' to the 'sale of use' (Baines *et al.*, 2007). While the classification of various types of PSS by Tukker (2004) is considered as the most appropriate classification by many authors, some authors claim a different approach on categorizing PSS is required and consensus in the literature has to be reached (Beuren *et al.,* 2013). In addition, although many management practitioners recognize the potential benefits of a PSS service strategy, they still struggle to understand the implementation of this new strategic concept. The main reason for this is that adopting a PSS business approach requires significant organisational changes (Gebauer *et al.*, 2005; Baines *et al.*, 2009). The business model concept describes how firms 'do business' which makes it a suitable unit of analysis for describing PSS business (Kindström, 2010; Zott *et al.*, 2011). The scientific goal of this research paper is to investigate the use of the business model concept to shed a light on the classification of PSS, including its organizational aspects.

The research is performed during a research internship at MAN Truck & Bus b.v, hereafter referred to as MTB. MTB is the Dutch importer of MAN heavy commercial vehicles. To make this research practically relevant, a business goal has also been defined. Their current business model, aimed at selling vehicles and parts, is under pressure due to current market conditions. A decrease in truck sales, a lower installed base, and a lower after sales potential are the result of several market trends and lead to low performance of their current business model. MTB is looking for new ways of doing business and generate additional revenues. As a value added reseller, MTB realizes the importance of adding value through customer-oriented services. Therefore, the business goal of this research is to develop a new business model that allows them to apply a PSS service strategy. First, it was necessary to determine the current business model of MTB and compare this to the theoretical PSS business models. Second, based on an analysis of the customer's perspective, the desired PSS business model could be determined. Finally, recommendations were made for business model innovation.

Both the scientific and the business goal of this research paper will be achieved by answering the following research questions:

RQ 1: *What theoretical PSS business models exist on the product-service continuum?*

RQ 2: *How can the current business model of MTB be described and positioned on the product-service continuum?*

RQ 3: *How can customers in the truck industry be described in terms of their demands and their perspective towards PSS?*

RQ 4: *What changes are required in MTB's business model to support the desired PSS service strategy?*

Research Methodology

The following research methodology has been used to provide an answer to the research questions above. First, a literature review was conducted to create a theoretical framework which describes PSS business models as stages on a product-service continuum. This continuum describes a transition from selling products to selling integrated products and services (Oliva & Kallenberg, 2003). The literature on servitization, product-service systems, integrated solutions all describe this transition, but differ in the motivation for the transition. These three literature streams have been analysed to define the stages on the continuum. Second, a single case study investigated MTB to determine the current business model and the current position on the continuum. Data was collected through the use of semi-structured interviews with several managers of MTB and of their dealer organization, observations during the internship, and available company data reports and documents. Third, the customer's perspective has been analysed in two separate studies to determine the desired position on the continuum. The first study consisted of qualitative semi-structured interviews with a selection of MTB's customers. A variety of different types of customers were included in the analysis to get an understanding of the customer's demands and preferences from multiple perspectives. An initial conclusion about the desired position was drawn based on the interviews, which was tested with a quantitative conjoint analysis. A conjoint analysis is a suitable method for understanding a customer's evaluations and preferences of features that represent a potential product or service (Hair *et al.,* 2010). Thus, the purpose of this second study was to find additional validation for the desired PSS business model and for differences between various types of customers. Both internal interviews and customer interviews were used to construct an experimental design for the conjoint analysis. Finally, after both the current and the desired position on the continuum were identified, these could be compared to the theoretical framework in order to develop a new PSS business model.

Results

The theoretical framework that was developed by the literature review, described four PSS business models as stages on the product-service continuum; 'Transactional business', 'Product-oriented PSS', 'Use-oriented PSS', and 'Result-oriented PSS'. These business models were described using nine business model elements as defined by Osterwalder & Pigneur (2010); customer segment, value proposition, channels, customer relationship, key activities, key resources, key partners, revenue mechanism, and cost structure. These represent the organizational and financial architecture of a business (Teece, 2010). The case analysis showed that MTB has currently applied a 'Transactional business' and a 'Product-oriented PSS'. The first business model is applied to the majority of customers who are approached by the dealer organization. Ad-hoc repair & maintenance services are provided by the dealers, while MTB sells the spare parts for performing service interventions. The

second business model is applied to MTB's direct customers, the international key accounts (IKA). A contractual relationship is engaged with the customer through the delivery of service contracts. The customer pays a fixed monthly fee, while MTB is responsible for repair & maintenance on the vehicles. The actual service intervention is still performed by the dealers, but MTB carries the risk of equipment failures.

The concept of customer maturity (Kindström, 2010) was used to analyse the customer's preferences towards the PSS business models. This concept describes the customer's willingness to adopt advanced services. The more mature a customer is, the more he is willing to apply for a PSS offering. It was found that the maturity level of customers is determined by the following factors; the degree to which trucks are viewed as part of the core business, the preferred independency of the supplier independency, and the degree of risk aversion. Overall, it was found that larger organizations (>100 trucks) and own transporters, whose core business is not transportation services, score highest in terms of their maturity level. Three groups of customers were identified that share similar demands and preferences, of which each can be targeted with a different PSS business model. The two largest groups of customers demand either a 'Transactional business' or a 'Product-oriented PSS'. This was also confirmed by the conjoint analysis, which showed strongest preferences towards 'Transactional business' models. A very small third group of customers seem to exist based on the customer interviews. These customers prefer to outsource all fleet-related issues to a supplier, and be unburdened as much as possible. In addition, the customer analysis showed that total cost of ownership (TCO) and utilization levels are the two most important value aspects for the customers. Improvement of the utilization levels depends a lot on the customer's logistical processes, which is the customer's core business. However, MTB can support them by providing flexibility in their fleet capacity and functionality. This flexibility and taking total care for the smallest group of customers can be delivered by a 'Use-oriented PSS'. This business model will be discussed next as a recommendation.

Recommendations

MTB has currently applied two business models that are together able to serve the largest share of the market. Most of the customers prefer one of the first two business models, thus MTB should continue their current business practices. However, some recommendations in relation to these two business models were made. First, as short-term recommendations, SLA's on equipment availability should be included in service contracts, and MTB should more proactively focus on the customer's processes when delivering services. Second, as a mid-term recommendation, MTB should improve their capabilities to become the full maintenance outsourcing partner, as well as to become the customer's fleet manager by delivering operational services.

Next to their current business, they should develop a use-oriented PSS, such as a Pay-As-You-Drive rental solution, which provides customers with additional flexibility and total care. In this business model, the customer gets all-inclusive usage rights to a vehicle and is charged monthly based on their actual usage. This can be both short- or long-term rentals, depending on the customer's demands. MTB becomes the customer's strategic partner and only central point of contact for their fleet, while they have fully responsible for ownership, vehicle management, and the vehicle's performance. The challenge in delivering this business model is the ability to deliver vehicles that match the requirements of multiple customers, in order to maximize the utilization levels of the fleet owned by MTB. It needs to be investigated whether customer segments can be created that use similar vehicles and whether their demand fluctuations complement each other.

Discussion

As mentioned before, the aim of this research was to investigate the use of the business model concept to describe a typology of PSS. Although Tukker's (2004) classification of PSS is widely acknowledged, the literature contained some misunderstandings about the actual differences between these types of PSS. The use of the business model canvas (Osterwalder & Pigneur, 2010) allowed the features of a PSS to be broken down in more manageable and understandable separate elements. This makes it easier to describe the actual differences between types of PSS and categorize a company's business models under either one of the PSS. Thus, the business model concept has proven to be a useful framework in describing a PSS typology.

In addition, the research project was able to portray the current position of MTB on the theoretical framework, and identify the desired position based on the preferences and demands of their customers. Possibilities for a new use-oriented PSS business model, as described above, were found in the analysis, which allow MTB to move along the product-service continuum. This forms the practical contribution towards MTB. The developed theoretical framework contributes also to management practitioners in general. It allows them to follow a business innovation cycle as was applied in this research project. First, management practitioners can determine the current position using the framework. Then, by analysing their customer's demands and preferences, and comparing these to the customer maturity factors, the desired position can be determined. Third, a new business model can be developed that supports the desired position on the continuum. After implementation of the business model, it can be reviewed and the process starts all over again.

This study also has its limitations. The developed theoretical framework was only applied at a single case company. Therefore, distribution of cases on the product-service continuum, which could truly validate the framework's practical applicability, was not achieved. Multiple case studies involving different industries should be investigated in the future. Furthermore, given the qualitative nature of the study, this study only explored the factors that affect a customer's maturity level. Future empirical analysis must validate and test the causal relationships between these factors and the maturity level.

Contents

1 Introduction

1.1 Theoretical Background

In times of recession, increasing competition, and advancing technology a lot of companies experience that their usual way of doing business is under pressure. These companies often change the focus from manufacturing products to delivering services; they begin to offer "bundles" of customer-focused combinations of goods, services, and knowledge in which the services are beginning to dominate (Vandermerwe & Rada, 1988). Vandermerwe & Rada (1988) used the term "servitization of business" to refer to this process of "creating value by adding services to products". Oliva & Kallenberg (2003) developed a framework that describes this process as the product-service continuum. Companies undergoing servitization move gradually along this continuum from being a product manufacturer regarding services as an add-on to the product, to being a pure service provider that sees a product as an add-on to the delivered service.

The drive from companies to apply a servitization strategy arises from three categories of benefits; marketing-, strategic-, and financial benefits (Gebauer, 2008; Oliva & Kallenberg, 2003). Servitized business strategies provide a sustainable source of competitive advantage, since services are less visible, more difficult to imitate, and create strong relationships with customers that bind them to the company on the long term (Oliva & Kallenberg, 2003). Customer allegiance is considered to be one of the sturdiest barriers to competition (Wise & Baumgarter, 1999). Furthermore, services often have higher margins than products and provide a more stable source of revenue, since they are counter-cyclical with equipment purchases. Baines *et al.* (2008a) have described servitization as "*the innovation of an organisations capabilities and processes to better create mutual value through a shift from selling products to selling Product-Service Systems".* A Product-Service System, hereafter referred to as PSS, can be seen as a special case of servitization in which the performance or utilization of an asset is more important than ownership of the asset. The traditional functionality of a product is extended by including additional services and the focus shifts from the 'sale of product' to the 'sale of use' (Baines *et al.*, 2007).

While many management practitioners are recognizing the need to embrace a PSS service strategy, they still struggle to understand the implementation of this new strategic concept. The main reason for this is that adopting a PSS business approach requires significant organisational changes (Gebauer *et al.*, 2005; Baines *et al.*, 2009). Therefore, managers need to move from 'product thinking' to 'system thinking', looking at the complete system when designing the organisation and its product-service offerings for this strategic concept (Baines *et al.*, 2007; Beuren *et al.*, 2013). The business model approach is able to describe how firms 'do business', making it a suitable unit of analysis for describing PSS business (Kindström, 2010; Zott *et al.*, 2011). Hence, new service-based business models must be developed that support a PSS strategy. One of the most accepted classifications of PSS types comes from the research paper by Tukker (2004), where he describes three categories of PSSs as different business models; these are product-, use-, and result-oriented PSS business models. In his distinction he mainly describes the differences in value proposition that is being delivered and the applied revenue mechanism. However, complete and accurate descriptions of business models that can act as an organizational template for delivering a PSS seem to be lacking in the literature. The scientific goal of this research paper is to develop a framework that describes possible PSS business models, including the organizational aspects of a PSS.

1.2 Business Context

The research will be performed during a research internship at MAN Truck & Bus b.v. situated in Leusden, hereafter referred to as simply MTB. MTB is a subsidiary company of Pon under the Pon Commercial Vehicles (PCV) group. Pon is an international trading and service organization located in the Netherlands. Pon performs a large diversity of activities with most of the activities focused on import, logistics, marketing, service and maintenance of products such as passenger cars, commercial vehicles, off-shore -, and shipping products. MTB is the Dutch importer of MAN commercial vehicles and has taken the position of a value added reseller on the value chain between the original equipment manufacturer (OEM), MAN Truck & Bus AG, and the network of dealers. Appendix C provides a view of the position of MTB on the value chain and its position within the PCV group. The company's core business is the import and sales of trucks, buses and parts. A strategy in the area of marketing, sales, and service, is developed and aims at maximizing customer loyalty and dealer loyalty in order to improve the turnover on sales of vehicles and parts. MTB's customers range from governmental organizations, large- and small transport organizations, and construction organizations, to self-employed drivers. The mission of MTB is to excel in terms of sustainability, quality, and customer relationships. The emphasis is on continuous improvement in terms of environmental performance to reduce the environmental burden and prevent further pollution. Besides controlling their own activities on environmental performance, MTB also aims to realize this same environmental performance within their network of partners and customers.

1.3 Problem Statement

Interviews have been held with managers from MTB prior to the research project to formulate the problem statement and it can be concluded that the current business model for their truck division is under pressure. The transport sector is characterized by tough competition and low margins, leading to a demand for increased efficiency and lower costs. MTB´s customers are looking for other ways of providing transport, i.e. other transportation modalities, and find ways to improve the efficiency of vehicle deployment. This results in a decrease of new truck sales and the installed base is getting smaller, reducing the after sales potential. In addition, the increasing technical quality of the commercial vehicles further reduces the after sales potential in the future. Since margins on transportation services are decreasing, the demand for lower costs and increased efficiency is also being reflected on the margins of new truck sales and on the margins of after sales.

As MTB's current business model is geared to the sales of new trucks and spare parts, the above market trends have led to low financial performance of the current business model. The company needs to know if another business model can be applied that is less influenced by declining product sales and that allows the company to engage in new ways of doing business and generate additional revenues. Being the importer of trucks, MTB has taken the position of a value added reseller on the value chain and therefore they realize the potential benefits of adding value through customer-oriented services, moving further along the product-service continuum. MTB needs to know which business model allows them to apply a service strategy that provides additional value and that allows them to move along the product-service continuum. The following problem statement is formulated:

The truck market can currently be characterized by declining product sales and low margins, resulting in low financial performance of the current business model of MAN Truck & Bus b.v. The company needs to know if another business model can be applied that enables new ways of doing business and earning revenues, making them less vulnerable to the current market trends.

1.4 Assignment

The main objective of this research project is to develop a business model specifically for MTB that enables the company to move further along the product-service continuum. A framework needs to be developed that describes the business models for the possible stages on the product-service continuum according to academic literature, which then can be adapted to make it applicable to the market of heavy commercial vehicles. Furthermore, the truck industry can be characterized as a much dispersed heterogeneous and complex market where a lot of different types of customers exist, each possibly requiring a different type of service strategy. MTB would like to know which type of customers can be addressed with which type of service strategy. Thus, MTB's customers need to be examined in terms of their demands and their perspective towards an advanced PSS. This could identify the desired position on the product-service continuum for the company. A specific business model for MTB can then be developed based on the framework to address that service strategy. This forms the practical contribution of the research project.

Based on the problem statement, the gaps in the literature, and the research assignment the following research questions are formulated:

RQ 1: *What theoretical PSS business models exist on the product-service continuum?*

RQ 2: *How can the current business model of MTB be described and positioned on the product-service continuum?*

RQ 3: *How can customers in the truck industry be described in terms of their demands and their perspective towards PSS?*

RQ 4: *What changes are required in MTB's business model to support the desired PSS service strategy?*

1.5 Research Design

The first research question will be answered by performing a literature review on the topics of servitization, PSS, and business models to create the PSS business model framework which can be used to innovate or develop a company's business model for successfully transitioning along the product-service continuum. The second research question will be answered by investigating the case company; MAN Truck & Bus b.v. Qualitative data will be collected with the use of semi-structured interviews, observations at the company, and available company data reports, to describe the business model currently applied by MTB. The business model characteristics that will be identified in the case analysis will be compared to the conceptual framework to determine MTB's current position on the continuum. The approach to answer the third research question is twofold. First, qualitative data will be obtained by semi-structured interviews at customer organizations of different customer segments to identify the customer's preferences towards PSS, and the most important value that a customer is looking for in an offering. Based on this information an initial desired position on the product-service continuum can be identified. Second, a conjoint analysis will be performed to determine the importance and relevance of certain PSS characteristics that could identify which type of PSS business model would best fit for the customers. A conjoint analysis is a suitable method for understanding a customer's evaluations and preferences of features that represent a potential product or service, thus in this case a PSS. This could test the desired position as determined by the customer interviews in a quantitative manner. The qualitative customer interviews prior to executing the conjoint analysis are used to formulate the experimental design of the conjoint analysis. The experimental design consists of a representation of the possible PSS business models in this industry.

Finally, based on the results from the market research the desired position of MTB on the continuum can be determined. Comparing this desired position to MTB's current position and the theoretical framework provides an answer to the last research question. It will describe the business model that needs to be implemented to achieve the desired position and identify the changes that have to be made to the current business model.
The used methodology for answering each research question will be described in more detail in the corresponding chapters.

1.6 Deliverables

The contribution of this research is of both theoretical and of practical nature. The main theoretical contribution lies in the link between business models and servitization. A theoretical framework will be developed that describes a typology of PSS business models. By investigating the possibilities for PSS at a case company in the industry of heavy commercial vehicles the theoretical framework can be examined for its applicability and insight is provided on the state-of-the-art regarding PSS in this industry. Furthermore, most of the previous literature examined PSS only from the internal company's perspective, while this study also included the customer's perspective. The customer perspective provides a positioning of the type of customers along the continuum which contributes to the business practices of the case company. Finally, based on the analysis a new business model is developed which forms the practical deliverable.

1.7 Thesis Outline

This thesis starts with the literature review and the development of the theoretical framework in the next chapter. After that, chapter 3 will discuss the results of the case analysis that describes MTB's current business model and the position on the framework. Chapter 4 and 5 will together describe the market analysis. Chapter 4 is all about the qualitative interviews with customers, determining the preferences of customers towards PSS and the value they are looking for. A desired position is established based on this information, which is then tested in chapter 5 that discusses the conjoint analysis. Based on both the qualitative and quantitative analysis a final desired position for MTB on the product-service continuum can be defined. The implications for MTB's business model in relation to this position is describe in chapter 6 and acts as the recommendations towards the case company. Finally, chapter 7 discusses the theoretical and managerial implications of the research project and it provides limitations and possibilities for future research.

2 Literature Review

2.1 Introduction

This chapter describes the literature review on business models for a PSS context. The possible service strategies on the product-service continuum are identified and combined with the business model characteristics. The result of this literature review is a theoretical framework that describes the business models that exist on the product-service continuum and will provide an answer to the first research question:

RQ 1: *What theoretical PSS business models exist on the product-service continuum?*

2.2 Methodology

This chapter consists of a shortened version of the literature review of Bilterijst (2013). The purpose of this literature review was to develop a framework that provides a detailed overview of the type of PSS business models on the product-service continuum. Figure 2.1 provides an initial outline of what the theoretical framework should look like. The horizontal axis describes the possible service strategies as the stages on the product-service continuum as defined by Oliva & Kallenberg (2003). The vertical axis describes the business models that correspond with these service strategies based on the business model elements.

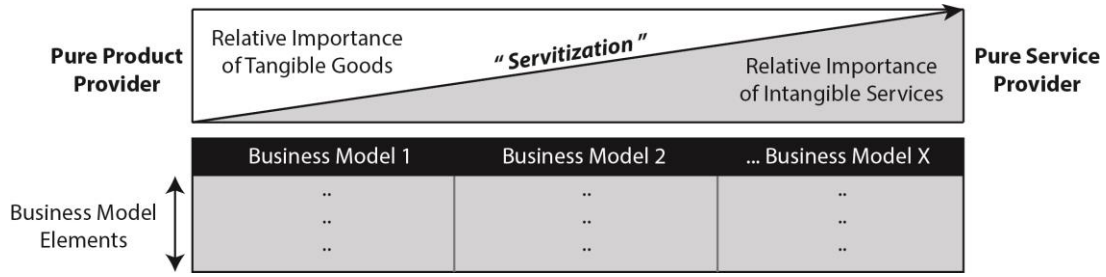

Figure 2.1 - Outline of the conceptual framework.

The literature streams on servitization, PSS, and integrated solutions were used to describe the different stages on the continuum and to describe the corresponding business model characteristics. The search for relevant articles starts with selecting appropriate search engines. The used search engines were recommended by the TU/e library in the field of industrial engineering and are shown in table 2.1. This table also shows the key search strings that have been used. Combinations of these search strings by using 'AND' commands reduced the amount of hits in the search process. In addition, to find articles that describe specific organizational or business model aspects in this context and to further reduce the amount of hits, additional search strings were combined with the key search strings. These additional search strings are related to the business model elements.

Next, the remaining articles were sorted in the search engine on their relevance, based on the number of citations and the year of publication. Only recent papers were used in the literature review (published in 2000 or later). Older publications were only included when they were cited by many other authors. These sorted articles were screened on their title and abstract to assess their relevance to the topic being studied. Relevant articles were saved so that they could be read in full. Reading the selected articles often revealed new promising search strings which were used to find additional literature. In addition, reading the articles often provided references and citations to

additional interesting literature. This process of gathering additional literature through scanning references is referred to as a snowballing approach. This way the leading articles in the field of servitization and PSS were included in the literature review. Important findings and relevant parts or phrases of the fully read articles were copied to a work-document for later synthesis. These important parts and phrases were reorganized into categories that describe similar concepts or topics, which represent the different stages on the continuum and the corresponding business model elements. All the key findings and phrases could then be synthesized in a theoretical framework that answers the research question.

Table 2.1 - Search engines and strings used for collecting literature

Search engines used	***Key search strings***	***Additional search strings***
ABI/Inform, Scopus, JSTOR, Science Direct, Emerald, Google Scholar	*"Servitization", "product-service system", "integrated solution", "solution", "PSS", "services", "service strategy", "service transition",* and *"service orientation"*	*"business model", "innovation", "organizational aspects", "customer relationship", "revenues", "revenue mechanism", "pricing", "infrastructure", "channels", "organizational change", "organizational innovation"*, etc.

2.3 The Business Model Concept

The business model concept will be used to provide a description of the organizational characteristics that need to be implemented in support of the service strategies on the product-service continuum. Osterwalder & Pigneur (2010) wrote a book on the generation of business models in which they stated that: *"A business model describes the rationale of how an organization creates, delivers, and captures value."* According to Teece (2010), a business model includes: "*nothing less than the organizational and financial 'architecture' of a business".* Both the literature on business models and the literature on PSS have taken a central attitude towards customer value. The whole purpose of transitioning towards product-service offerings is to provide the customer with value-in-use (Tukker, 2004; Baines *et al.*, 2007). Therefore, the business model concept is considered a useful tool to analyse the organizational aspects of the service strategies on the product-service continuum. This section explains the elements that can be used to describe a company's business model and will define the vertical axis of the framework.

2.3.1 Business Model Elements

While many researchers have attempted to accurately describe the elements that make up a business model, it is the framework of Osterwalder & Pigneur (2010) that is being used in this research paper. It describes the four main themes of a business; the offering, the customer interface, the infrastructure, and the financial structure, and divides this into nine business model elements that represent the 'Business Model Canvas', see figure 2.2. When comparing the canvas with the business model elements as defined by other research papers, it seems that the canvas of Osterwalder & Pigneur (2010) is most complete. This is the main reason why their model has been used in this research paper. Appendix D provides an overview of the business model elements as described in literature.

The ***'Customers'*** element forms the heart of the business model. It defines one or more customer segments that the company aims to reach. It also defines the specific customer needs around which the other business model elements can be constructed in order to provide the customers with an offer that fulfils their needs. The ***'Value Proposition'*** describes the combination of products and services that together create value for the customer, solving the customer's problems or needs. ***'Channels'*** describes the communication, distribution and sales channels needed to deliver the value

proposition to the customers. Together with the ***'Customer Relationships'*** element, it comprises the company's interface with the customers. The type of relationships a company wishes to establish with its customers can be driven by the following motivations; customer acquisition, customer retention, and boosting sales. The ***'Revenue Mechanism'*** describes how the company generates revenues from targeting their customers. Various pricing mechanisms can be applied; revenues can be transactional, recurring, fixed pricing on predefined variables or dynamic pricing based on market conditions. The elements ***'Key Resources'***, ***'Key Activities'***, and ***'Key Partners'*** describe the company's essential infrastructural elements that are required to make the business model work. Finally, ***'Cost Structure',*** describes all costs incurred by the other business model elements during operation of the business model.

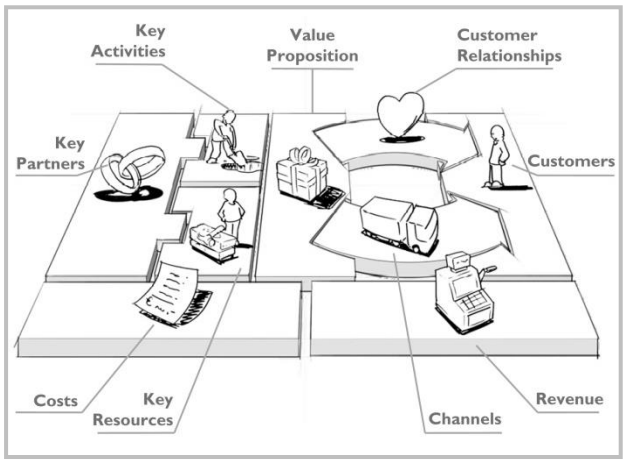

Figure 2.2 - The Business Model Canvas as described by Osterwalder & Pigneur (2010).

2.4 Servitization

Servitization has become a generic term in research literature to deal with the 'bundling', or integration of products and services. The available literature can be classified under three major literature streams that describe the same transition from an emphasis on delivering products to the provision of services; integrated solutions, product-service systems, and experiential services (Pawar *et al.,* 2009). The main difference between these literature streams is the motivation for making the transition, but the general concept remains the same. First, the literature stream on integrated solutions (IS) is mostly related to companies in the capital goods industry that are making the shift to services (Davies, 2004). This literature stream describes how companies can combat their decreasing profits from their manufacturing operations by adding services to their offering (Davies, 2004). The need to employ servitized business comes from reaching financial sustainability. Second, the literature on product-service systems (PSS) is applied in a context of environmental sustainability. Delivering these customized solutions is believed to have the potential to decouple economic success from material consumption, reducing the environmental impact of economic activities (Baines *et al.*, 2007). Finally, the literature stream on experiential services views the transition towards product-service offerings as an objective of creating 'memorable experiences' (Pawar *et al.,* 2009). As mentioned in the introduction of the report, Oliva & Kallenberg (2003) have described servitization as a process of extending the traditional product offering with additional services, moving on the product-service continuum from left to right. Different service strategies can be applied which represent the stages on the continuum. The next section describes these stages according to literature and completes the horizontal axis of the framework.

2.5 Characterizing the Stages on the Product-Service Continuum

When analysing the different literature streams, it seems that the literature on PSS covers the widest range of possible service strategies on the product-service continuum. Tukker (2004) has defined a classification of three types of PSS; product-oriented PSS, use-oriented PSS, and result-oriented PSS. The two main dimensions that are used to describe the differences among PSS in this typology are the ownership rights of the tangible product and the value offered in the PSS. The customer's needs are being formulated in more abstract terms and the product as a core component of the PSS is decreasing from first to the last type of PSS. Tukker's (2004) PSS typology is widely acknowledged by many authors as the best way to categorize PSS offerings. Therefore, this typology is used as the basis for the stages on the product-service continuum. However, analysis of the other literature streams revealed that the product-oriented PSS has lumped together many types of services. All type of services under the installed base service space as defined by Oliva & Kallenberg (2003) are geared to selling products the traditional way and providing additional services during the use phase of the product, which can all be compared to the product-oriented PSS. Given the definition of product-oriented PSS by Tukker (2004), many organizations could show quite a lot of differences in the type of services and how these are delivered, while still being categorized under this same business model (Van Ostaeyen *et al.,* 2013). Oliva & Kallenberg (2003) make a distinction in the type of revenue mechanism among the type of services; from transactional interactions and revenues to a long-term relationship including relational service revenues. In order to make a more nuanced distribution of possible business models on the product-service continuum, this distinction is used to describe a more conventional 'transactional business' model which can be positioned before the product-oriented PSS on the continuum.

The product-service continuum can now be described by four business models which represent the possible stages between the two extremes, see figure 2.3. An overview of the theoretical concepts found in literature that are similar to one of the four business models are presented in Appendix E. A more thorough description of the comparison of these concepts to one of the four business models is described in Bilterijst (2013).

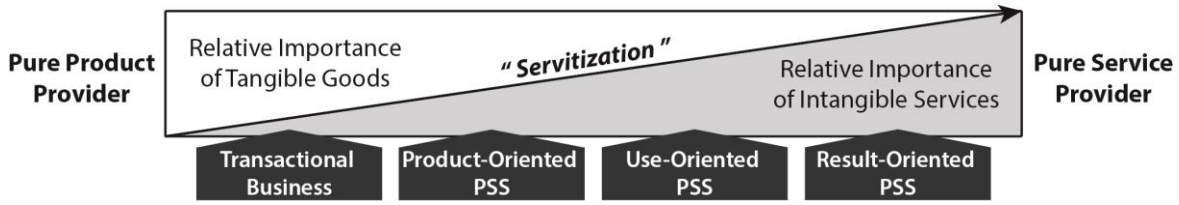

Figure 2.3 - Four business models; the stages on the product-service continuum.

2.6 The Theoretical Framework

Since both the horizontal and the vertical axis of the framework have been defined, the framework can now be completed by analysing the literature on the topics of servitization, integrated solutions, and product-service systems. By combining the literature form the different research streams a thorough understanding of the characteristics of these business models can be achieved. A detailed description of the four business models on all the business model elements, and the completed theoretical framework including concise descriptions of the business model elements is shown in Appendix F. However, table 2.2 provides an overview of the main differences between the four types of PSS business models. These business models and the differences among them will now shortly be described.

In the ***'transactional business'*** model, the product is sold to the customer and an ad-hoc approach on service intervention is applied. All kind of services that are related to the product's life-cycle can be delivered to the customer based on their demands, ranging from spare parts delivery, and repair and maintenance (R&M) services, or advice and consultancy services, up to take-back agreements (Tukker, 2004; Oliva & Kallenberg, 2003). Services are delivered upon request of the customer, and these are paid for per service intervention. A company that applies this business model receives transactional revenues on both the sale of product, and on the sales of services (Oliva & Kallenberg, 2003). The customer and the supplier have an indirect relationship that is based on transactional interactions in which both parties are relatively independent from each other (Helander & Möller, 2008).

With the ***'product-oriented PSS'***, the business model is still geared to selling products and providing services during the life-cycle of the product (Baines *et al.,* 2007). However, the services that are delivered are now bundled as a complete service package; a service contract. Compared to the transactional ad-hoc interactions from the first business model, the customer and the supplier will now engage a long-term contractual relationship. The supplier still receives transactional revenues from the sale of the product. However, instead of transactional revenues for the services, recurring relational revenues are received for the bundled services under this business model. The supplier receives a fixed monthly fee, which implies that the supplier takes over risks of product break-downs, while providing a guarantee on equipment availability. Taking over the responsibility of a functioning product, providing up-time, and preventing failures, requires the supplier to engage in risk and cost management, as well as remotely monitoring the product's technical condition (Oliva & Kallenberg, 2003). Next to the R&M services, the supplier can now also provide operational services. In this case, the supplier takes over management of operations or maintenance, which is normally taken care of by the customer. This requires an intimate knowledge on the customer's processes.

The product still plays the most important role in the ***'use-oriented PSS'***. However, the product is no longer sold to the customer. Now, the access to the product or the value of using the product is delivered to the customer, without the responsibilities of ownership (Baines *et al.,* 2007). Typical examples of this type of business model are leasing, renting, or product pooling concepts (Tukker, 2004). This implies that the supplier no longer receives transactional revenues from selling the product. Instead, both product and accommodating services are integrated in one revenue model which is based on the actual usage of the product by the customer (Van Ostaeyen *et al.,* 2013; Baines *et al.,* 2007). The supplier is fully responsible for the proper functioning of the product, since the products are still owned by the supplier. To ensure optimal service delivery, the supplier must

engage strategic partnerships with third-party suppliers in which they share information, knowledge, risks, and capabilities (Barquet *et al.,* 2011). Additional financial resources should also be developed by the supplier to acquire the capital needed for retaining product ownership (Tukker, 2004).

In the last type of PSS, ***'result-oriented PSS'***, the customer and supplier agree on a certain functionality or result that is sold as a service (Tukker, 2004). The supplier has full responsibility to deliver the functionality or result as agreed upon, no pre-determined product is involved. An example is the delivery of a 'pleasant climate' as a service, instead of selling heating or cooling equipment (Baines *et al.*, 2007). Ownership of the products that are required for delivering the service is retained by the supplier. Revenues are related to functional performance or output, depending on the used level of abstraction to define functionality (Van Ostaeyen *et al.*, 2013). The customer and supplier become strategic partners, where the customer relies fully on the expertise of the supplier (Helander & Möller, 2008).

Table 2.2 - Comparison of the different PSS business models

Transactional Business	***Product-Oriented PSS***	***Use-Oriented PSS***	***Result-Oriented PSS***
Sale of product. Ad-hoc provision of life-cycle services. Examples: R&M services, spare parts, product training. Transactional revenues: - Sale of product. - Per service intervention. Indirect transactional interaction with service supplier.	Sale of product. Bundled package of life-cycle services. Examples: R&M service contract, operational services. Risk of failure or break-down for supplier. Guarantee on equipment availability. Transactional revenues: - Sale of product. Relational revenues: - Monthly fee for services bundle. Direct long-term relationship with supplier.	Product & Life-cycle services as integrated solution, providing the use of the product. Examples: Lease & Rental offerings. All-inclusive use-based revenues: includes product & services. Supplier is fully responsible for functioning product, ownership is retained by supplier.	The functionality or result of the product in use is provided as a service. Supplier is fully responsible for delivering the agreed upon functionality. No pre-determined product or services involved. Relational revenues based on functional performance indicators. Strategic partnership between customer and supplier.

2.7 Conclusion

The purpose of this literature review was to develop a theoretical framework, representing a PSS business model typology that defines the stages on the product-service continuum. This literature review followed the classification of product-service systems as defined by Tukker (2004) to describe the possible business models as stages on the product-service continuum. Four business models were found that can take a position on the continuum, these are; 'Transactional Business', 'Product-Oriented PSS', 'Use-Oriented PSS', and 'Result-Oriented PSS'. A business model can be analysed with the use of the nine business model elements as defined by Osterwalder & Pigneur (2010), these are; customer segments, value proposition, channels, customer relationships, revenue mechanism, key activities, key resources, key partnerships, and the cost structure. All literature streams have been analysed to find additional information on the business model elements that correspond with the PSS business models on the product-service continuum and to complete the theoretical framework. The completed theoretical framework and a detailed description of the PSS business models are shown in Appendix F.

3 Case Analysis

This chapter describes the business model currently applied by MTB. It will be compared to the theoretical framework as developed in chapter two to determine the current position of MTB on the product-service continuum. Therefore, an answer will be provided to the second research question:

RQ 2: *How can the current business model of MTB be described and positioned on the product-service continuum?*

3.1 Methodology

This chapter describes the methodology that has been applied for answering the second research question. The used methodology is a single-case study as defined by Yin (1994). This method is considered to be a useful method to get an in-depth understanding of the characteristics within the case, while also taking into account the context of the case. Single-case studies include only one level of analysis, which is MTB operating in the Dutch market of heavy commercial vehicles.

3.1.1 Data Collection

According to Yin (1994), multiple sources of evidence should be used in the data collection process to ensure the case study's construct validity and reliability. The process of comparing data from these multiple sources is referred to as triangulation of the data. Case study research commonly applies three sources of data, which are; interviews, documentation, and observations (Yin, 1994). Therefore, this case study also used these types of data collection methods as will be discussed next.

Semi-structured interviews

The main data collection method was the use of semi-structured interviews that have been held with several managers from different departments within MTB, and with managers from the dealer organization. The purpose of interviewing both types of respondents was to get a thorough understanding of MTB's current business model from multiple perspectives. This allowed comparing the data between the different types of respondents in order to increase validity of the case study. In order to enhance the further analysis of the data, all interviews were tape recorded with permission of the respondent. Selection of the respondents within MTB and the dealer organization was aimed at covering the complete business model on all the elements. Various respondents from the marketing, service, and sales departments have been included to investigate the complete business model. Since the dealers often form the interface with the customer, representatives of the dealer organization were also included in the sample of respondents. An overview of the interviewed respondents is shown in table 3.1, in total 14 interviews have been held.

A guideline consisting of open-ended questions was constructed for interviewing these respondents (Appendix G). The open-ended questions were structured along the business model elements as described by Osterwalder & Pigneur (2010). During the interviews the guideline was treated as a flexible checklist to guide the interview and assure that the most important aspects were discussed, while it also allowed the respondents to diverge from the questions and discuss aspects they considered were of importance. In addition, probing questions were asked during the interviews that were related to the business models as developed in the theoretical framework to identify the positioning of MTB on the product-service continuum.

Table 3.1 - The interviewed respondents.

Respondents	*Respondents cont'd*
1 Marketing Manager	*1 Sales Manager Bus*
1 Product Manager	*2 Sales Managers Trucks*
1 Director Service	*2 After Sales Managers MND (Dealer organization)*
2 Service Managers	*1 Director MND (Dealer organization)*
1 Service Manager Bus	*2 Directors Private Dealer*

Documentation

Additional data was used to validate the data from the interviews. This data included documentation, such as examples of service contracts, leasing contracts, company presentations, leaflets, brochures, marketing research papers, and other documents that provided insight in MTB's business and the market. MTB's intranet and the company's archive were used to obtain this data.

Observations

The internship at the case company provided a large amount of additional relevant information and insights on the company's structures and processes. This information was also used for selecting interesting respondents for the interviews. The information was obtained through informal conversations and observations, as well as participation to several after sales and service meetings within the company.

3.1.2 Data Analysis

All interviews were audio recorded so that they could be fully transcribed after conducting the interviews. The transcription process resulted in a large set of unstructured data. Summarising and categorising data as described by Saunders *et al.* (2009) are the two main analysis processes that are being used to support the interpretation of the data in this study. First, each individual interview transcript was carefully reviewed and summarized on its most important findings. This way a thorough understanding was achieved of the respondent's view on the business model and its characteristics. This also allowed for easy comparison of the key findings of other interview transcripts or summaries and notes of informal observations and additional documentation.

Next, the large amount of unstructured data from the interview transcripts has been categorised using a deductive approach. This approach uses a framework based on existing theory to organize the data analysis process (Saunders *et al.*, 2009). Nine categories have been developed based on the nine business model elements of the theoretical framework to structure the data in more manageable parts (Miles & Huberman, 1994). After reading the interview transcripts multiple times, large chunks of data were assigned with 'parent' codes, functioning as the categories. After this process, the data from the interview transcripts was structured along the nine business model elements allowing for easy comparison of the pieces of data to find similarities and differences within and between the interview transcripts. These larger chunks of data could then be 'splitted' (Saldana, 2012) by applying sub-codes to specify more specific findings within the business model elements. These concepts could then be analysed and compared to the characteristics of the four business models from the theoretical framework to assess the current position of MTB on the product-service continuum and the alignment of the business model characteristics with this position.

Data collection and analysis were performed simultaneously through an iterative process. New findings that resulted from the analysis were included in the further data collection process to find additional validation, for instance through asking additional probing questions during the interviews. This also solved some uncertainty issues related to contradicting findings; differences that were identified during interpretation of the data were given more clarity by collecting additional evidence through the interviews or informal conversations at the case company. This iterative process of collecting and analysing data increases the validity of the results. Finally, the CAQDAS (Computer Assisted Qualitative Data Analysis Software) Dedoose has been used for the coding process. The use of CAQDAS makes the coding process more manageable, since it is easier to go back and forth within the coding process and make changes to the earlier applied codes. This improves the iterative process of collecting and analysing data as was just described. The initial coding scheme that was used to structure the data in more manageable parts is shown in table H.1 of Appendix H. The nine business model elements formed the nine core categories. Based on the characteristics of the theoretical framework a few initial codes within these categories were used to check if these were found in the dataset. Eventually, the coding process resulted in the coding scheme as presented in table H.2 in Appendix H. New codes were added to the scheme, and the initial codes have been modified or removed from the scheme in case they were not correctly set in the initial scheme. An example of how the initial scheme was modified; the initial scheme included direct or indirect service channels, while the eventual analysis showed that a more nuanced description of service channels is necessary which describes the contracting, ordering, and expediting processes. It must be noted that the customer segment element in the coding scheme was also used to code the customer's perspective which is being analysed in the next chapter.

The two following sections will present the results of the case analysis; a description of the current business model based on the nine business model elements and the position of MTB's business model on the product-service continuum. The customer segment element will be described in a later stage of this paper where the customer's perspective on PSS is presented. This element will now only shortly be described since some descriptions of the other elements refer to the customer segments.

3.2 Current Business Model

3.2.1 Customer Segment

Two segmentation approaches can be used to describe customer segments in this market. First, segmenting on the type of industry a customer operates in and on the size of the customer's installed base, i.e. the fleet size. This segmentation represents a typical marketing segmentation. Another segmentation approach is used mainly by the service department, which divides the complete installed base into segments based on two main dimensions; whether a customer has own repair & maintenance (R&M) capabilities, and the vehicle's date of manufacturing. The latter makes a distinction between vehicles of 0-4 years, and 5-8 years old, or 9 years and older.

3.2.2 Value Proposition

MTB aims to best fulfil the needs and demands of each individual customer by offering a tailor-made bundle of products and services. ***"We reason from the customer's demands in what we're offering … based on their demands, we offer an appropriate proposition."*** The vehicles are to a high extent customizable for any type of application. Sometimes, merely a chassis is delivered, which is accommodated with a superstructure in corporation with external body builders. Next to the vehicles, MTB is able to deliver

a wide range of after sales and services. Services can be delivered during various stages of a vehicle's life-cycle; from pre-sales advice & support, and financing, up to end of life disposal. Figure 3.1 provides a graphical representation of the types of services that can be delivered. The scope of the services, i.e. the horizontal integration, describes how advanced the services offerings are in a particular life-cycle stage. MTB aims at developing vertically integrated service propositions, supporting the customer throughout the whole life-cycle. The widest scope of services can be found in the maintenance stages of the vehicle's life-cycle. The value that is delivered through all the propositions can be described as maximum deployability of the vehicles at a minimum of total costs. The offered services can range from basic delivery of spare parts up to a full service maintenance contract depending on the customer's demands. R&M services can be provided to the trucks, but in some cases also to the vehicle's superstructure, the trailers, or other systems. One-stop-shopping is referred to these R&M services. This can be included in a service contract, as well as ad-hoc R&M service intervention. Only recently during the internship, MTB has started offering operational services, such as fleet management services; ***"We sell our telematics solution in combination with service contracts … the information of telematics is used to make an adequate R&M planning, and it allows fuel savings to be identified. That is new, we offer some fleet management."*** Appendix I provides a detailed description of MTB's possible service offerings as shown in figure 3.1.

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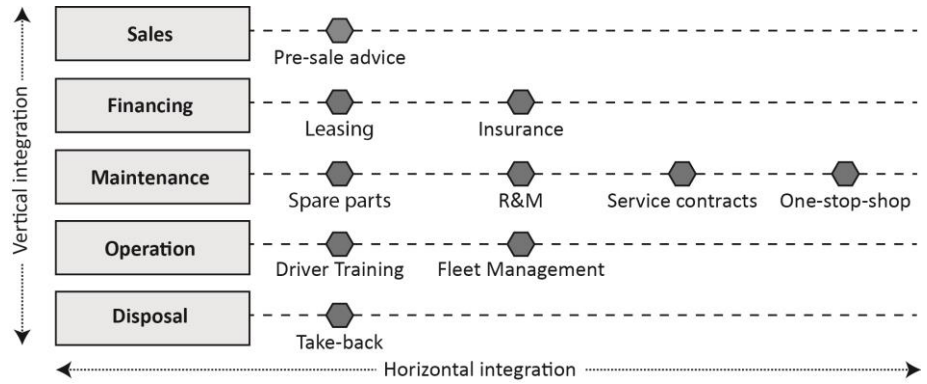


Figure 3.1 - MTB's service offerings during various stages of a vehicle's life-cycle.

3.2.3 Channels

Osterwalder & Pigneur (2010) described that a business model can have direct or indirect channels. MTB has applied either a direct, or an indirect channel, depending on the type of customer. An International Key Account (IKA) is a customer with a large fleet (>100 trucks) and a decentralized internationally oriented organization. IKAs are in general approached through direct channels. Non-IKAs; customers with a more centralized organization and a smaller fleet (<100 trucks), are generally approached by indirect channels, the network of dealers. This especially holds for the sales channels. Vehicles are sold to non-IKAs by the dealer organization, while MTB provides sales support where necessary. Sales to IKAs is handled directly by MTB's sales department without any intervention of the dealers. However, the distinction is a little more complex for the service channels and some nuances should be made, as will be explained next.

According to Nordin (2005), the three key processes of a service channel are; 1) the contracting process, 2) the ordering process, and 3) the expediting process. The first process relates to the agreement on the delivery of services, such as signing a service contract. Second, the ordering process describes the process when a customer calls for service when a product needs support or maintenance. Finally, the expediting process describes the actual service intervention. Each of these

three processes can either be conducted by the supplier directly or by an indirect channel partner (Nordin, 2005). This classification of the service channel will be used to describe MTB's service channels. Table 3.2 describes if a direct or an indirect channel is being used in which of these processes. For both contracting and ordering processes, this depends on two factors; the type of customer and whether services are controlled by a service contract. Two types of service contracts exist; 'central' and 'local' service contracts. The first is a contract directly between MTB and the IKA customers, while the second is a contract between the dealer and non-IKA customers. Under a central contract, contracting and ordering processes are both handled directly with MTB, while a local contract is always indirectly dealt with by the dealers. A contracting process does not occur when no service contract is included. In this situation, both IKA and non-IKA approach the dealer for services. Regardless of the type of customer, the expediting processes such as performing R&M activities and statutory inspections, are always carried out by the dealers.

Table 3.2 - The use of direct and indirect channels related to different service channel processes.

Situational context	Contracting process	Ordering process	Expediting process
Central service contract (IKA)	Direct	Direct	Indirect
Local service contract (non-IKA)	Indirect	Indirect	Indirect
No service contract (IKA and non-IKA)	N/A	Indirect	Indirect

3.2.4 Customer Relationships

MTB applies a customer intimacy strategy (Treacy & Wiersema, 1993), establishing long-term relationships with the customers based on trust and cooperation. The service propositions that have been developed are all aimed at binding the customer to the organization for longer periods and increasing the loyalty of the customers. MTB organizes quarterly meetings with their IKA customers to manage and control the delivery of services. However, as explained in table 3.2, many (non-IKA) customers are approached by the dealer organization. Therefore, MTB must also manage the relationship with the dealers to make sure the developed service propositions are actually delivered by the dealers as desired. A close relationship that includes training and facilitates learning from each other is required.

3.2.5 Revenue Mechanism

Revenues can be related to the sales of the product and to the delivery of services. In all cases, these revenues are separated. MTB receives one-time transactional revenues on the sales of new vehicles from either the customer, or a leasing company in case the customer opts for financial or operational leasing. In the latter case, the lessor charges the customer a monthly fee for interest and amortization. During the use-phase, service revenues can be either transactional or monthly recurring. R&M service interventions, statutory inspections, and spare parts generate transactional revenues based on the cost of materials and labour used for providing service. In case these services are controlled by a service contract, a monthly fee is calculated based on the estimated mileage and the type of deployment. Both service contract and leasing contracts include a post-calculation at the end of the contract period for potential over- or under-mileage. Over-mileage is charged at the end of the period and under-mileage is refunded up to a certain limit.

3.2.6 Key Activities

MTB's core business is sales of commercial vehicles, spare parts, and additional services during the use-phase of the vehicles. Most of the profits are generated on the sales of spare parts. Thus, in order to increase the turnover of spare parts, MTB aims to increase the installed base through sales of new vehicles and by generating customer loyalty. Since most of the customers are served by the dealer network, two important activities are providing sales support to and training the dealer organization. Dealers are supported with additional information and sales tools, and central marketing campaigns are applied to boost sales. In addition, MTB provides training to improve the soft sales skills of the dealer's sales employees. This also assures that the dealers offer propositions to the customer as developed by MTB. These activities should promote new truck sales and improve customer loyalty. Furthermore, MTB frequently provides technical 'hard' trainings. The content of this training program is provided by the OEM and is aimed at increasing the technical knowledge of mechanics to improve the delivered R&M service quality. Another important activity of MTB is risk management. Under a service contract, MTB takes over the financial risks of possible product break-downs. An accurate contract fee must cover these financial risks. MTB has developed a fee calculator, which takes into account many deployment-related factors to estimate the risk of excessive costs during the vehicle's life-cycle and set a cost-neutral fee. Cost-neutral implies that over the full contract period, no profits or losses are made. MTB continuously optimizes the calculator to manage risks.

3.2.7 Key Resources

Since all expediting processes are outsourced to the dealer organization, MTB does not need any resources such as a network of workshops and maintenance equipment. However, a central inventory for spare parts is required. From here, spare parts are distributed to the dealer's local inventory based on a forecasting IT-system. This forecasting system reduces costs related to the stock of spare parts by managing it more efficiently. Another important IT-system is the TeleMatics system which combines performance-, condition-, and usage monitoring. This information is used to manage the maintenance of vehicles, to prevent product break-downs, and to provide operational services, such as fleet management and driving style analysis. It can also be used to optimize the service contract calculator, which itself is also an important resource to manage risks. On top of this, extensive technical knowledge and expertise of the vehicles allows MTB to manage risks efficiently.

3.2.8 Key Partners

As MTB is positioned between the OEM and the dealers on the value chain, these stakeholders are the most important partners. The OEM is responsible for developing and improving products and MTB provides feedback about the customer's demands of the Dutch market and discusses potential product improvements. Furthermore, the OEM is actively involved in solving guarantee issues during the product's life-cycle. MTB has established a strategic partnership with the dealers based on extensive sharing of information, knowledge, capabilities, and risks. Risk-sharing models have been applied with the dealers so that they become cost efficient in conducting R&M services under a service contract. About half of the dealers are part of MAN Nederland Dealer (MND), a subsidiary company of Pon. These dealers are equity-based partners which makes strategy alignment easier. The other dealers are private entrepreneurs operating under the MAN brand. Another important equity-based partner is MAN Lease, the main partner providing financial services included in the offering.

3.2.9 Cost Structure

MTB's cost structure is relatively basic; costs are related to provision of commercial leniency, logistical costs, inventory costs, human resources for sales and service of the vehicles, and marketing costs. Cost reductions come from better purchasing conditions, more efficient logistics and inventory management, and reclamation at the OEM for guarantee and leniency issues. However, with the provision of service contracts the cost structure is changed. In this case, revenues are fixed and the costs become variable, depending on product reliability and maintenance efficiency. The service contracts department must find an optimum in providing enough maintenance to prevent break-downs, but not exceed the calculated fee for the contract; cost management becomes very important.

3.3 Comparison with the Theoretical Framework

This section will compare MTB's business model with the theoretical framework to determine the current position of MTB on the product-service continuum. Literature mainly distinguishes PSS based on the contents of the offering and the used revenue mechanism (Baines *et al.,* 2007; Beuren *et al.,* 2013). These elements will therefore be used as a basis in determining the current position on the product-service continuum. The other elements will be compared with the theoretical framework to assess the alignment of the business model with the position on the continuum. The customer segments element is not included as that element will be discussed in the next chapter.

Value proposition

R&M services, delivery of spare parts, statutory inspections, financing services, and take-back arrangements, etc., can all be compared to the basic installed base services of Oliva & Kallenberg's (2003) framework. MAN FleetCare, providing assistance to customers with an own workshop, can be grouped under professional services since it aims at improving the customer's maintenance processes. The same applies for MAN ProfiDrive trainings, as it improves the efficiency of the vehicles during usage. Tukker (2004) described these types of services as 'advice and consultancy services'. Through the provisioning of service contracts, MTB has already transitioned into the second PSS business model (Oliva & Kallenberg, 2003; Windahl & Lakemond, 2010). The full service maintenance contracts are described by Oliva & Kallenberg (2003) as maintenance services that ensure a functioning product. However, MTB has also recently started offering some fleet management services through monitoring and providing advice on the driving style of truck drivers. Fleet management is normally taken care of by the customer and can thus be classified under the operational services (Oliva & Kallenberg, 2003, Windahl & Lakemond, 2010). In addition, the one-stop-shop principle can also be seen as an operational offering as described by Helander & Möller (2008), since it aims at optimizing the customer's processes related to maintenance. The customer has an increased availability of the vehicles as maintenance for the complete vehicle is performed at once. Thus, based on the value proposition it seems that MTB has positioned itself firmly on the first two business models. Table 3.3 provides an overview of the positioning according to the value proposition.

With the provisioning of operational lease, it seems that MTB has also positioned itself in the use-oriented PSS business model, since Tukker (2004) described leasing as the most basic form of use-oriented PSS. However, as was found in the interviews, operational lease is not considered as a highly servitized offering in the automotive industry. ***"Leasing is very normal business. That already exists for years and we don't distinguish ourselves from the competition with that."*** Leasing is a commonly accepted

and diffused concept among this industry, since it requires very little changes in the behaviour of the user and the supplier, which was also confirmed by additional literature (Vezzoli & Ceschin, 2010; Herrmann & Kuntzky, 2013). ***"Usually a net operational lease is provided by the financing company, consisting only of interest and amortization ... Parallel to that we sign a maintenance contract with the customer."*** However, it is also possible that no service contract or any other contributing services are included. In this case, the customer is still responsible for proper operation of the vehicles. Thus, although this type of leasing does change the ownership structure from a financial perspective, it can be better explained as a financing construction than as a different business model where the customer only procures the use of the product as is the case with use-oriented PSS. In addition, operational services such as fleet management, are considered to be a more servitized offering and can also be delivered when the customer is still the owner of the product, i.e. without any (operational) lease constructions. From this can be concluded that ownership structure alone cannot distinguish between product-oriented and use-oriented PSS. Similarly, Van Ostaeyen *et al.* (2013) also indicated that the use of ownership structure to describe differences in types of PSS often fails to accurately capture the PSS businesses found in practice. Because of this, it is chosen to change the first two business models in regard to ownership structure. According to Oliva & Kallenberg (2003) ownership is always transferred to the customer in the first two business models. However, the framework is modified so that financial ownership can also remain at a leasing company or financial investor in these business models, making the structure of financial ownership irrelevant for these business models. Therefore, the lease offerings as currently delivered by MTB in corporation with financing partners are not considered as use-oriented value propositions, but as financial services belonging to the product-related services.

A true use-oriented offering where the customer is only interested in the usage of the product, would consist of a complete service package that the customer purchases at a use-based fee, including the vehicle and all contributing services to make the usage of the vehicle possible such as R&M for the complete vehicle, tires, full fleet management, insurance, fuel management, fuel, etc. This type of offering is now referred to as a Pay-As-You-Drive (PAYD) lease or rental offering, and can be compared with use-oriented PSS business models. With a PAYD offering, the supplier has full responsibility for the product, while the customer has unlimited or limited access to the product depending on the type of contract. In case the customer requires unlimited access they use a long-term lease/rental agreement, and a short-term rental agreement is used for unlimited and temporarily access to the product. The latter is similar to the product-sharing as described by Tukker (2004). The modified PSS business models are shown in table 3.3. However, the interviews showed that any form of Pay-As-You-Drive rental agreements is currently not being offered by MTB and therefore the position of MTB in use-oriented business models is removed.

Table 3.3 - MTB's positioning on the modified value propositions of the theoretical framework.

	Transactional Business		**Product-Oriented PSS**		**Use-oriented PSS**	**Result-oriented PSS**
Type of services:	Basic IB	Professional	Maintenance	Operational	Pay-As-You-Drive Rental Solutions	Functional performance
MTB's Positioning	**X**	**X**	**X**	**X**		

Channels

As shown in the theoretical framework, an indirect customer interface is sufficient for the transactional business model. A more direct and intense interaction with the customer is only desired when starting to deliver product-oriented PSS. This is especially true when operational services are delivered under this business model (Helander & Möller, 2008). MTB applies the transactional business model to the non-IKAs and the product-oriented PSS to the IKA customers. Since, the non-IKAs are always approached by the dealers and IKAs by MTB, it can be concluded that the right channels are in place for the two applied business models.

Customer Relationships

When a provider takes over management of maintenance and operations under the product-oriented PSS, a long-term close relationship with the customer based on cooperation and trust is necessary (Oliva & Kallenberg, 2003; Helander & Möller, 2008). As described in the previous section, MTB has strong relationships and direct contact with the IKA customers, confirming the type of relationship compared to the theoretical framework. The wider the scope of services included in the service contract, the more interdependency is found in the relationship. The dealers maintain the relationship with the non-IKA customers. No direct relationship is found between MTB and these customers, which is aligned with the theoretical framework.

Revenue Mechanism

As was explained in the previous section, MTB receives one-time revenues on the sales of new vehicles. Revenues on services can be either transactional, or monthly recurring. Oliva & Kallenberg (2003) described the same distinction in revenue mechanisms for the type of services under the installed base service space. The transactional business model is applied to non-IKA customers, and MTB incurs transactional revenues from the spare parts that are being used by the dealer organization for conducting service interventions. In the product-oriented PSS business model MTB receives monthly revenues from the IKA customers through central service contracts. Pricing for a service contract should be expressed in terms of operational availability to make the value of such a contract tangible (Oliva & Kallenberg, 2003; Hypko *et al.*, 2010). An SLA on equipment availability would make it a performance-based contract. However, such SLA's are not implemented by MTB in service contracts for trucks. These performance-based contracts are only found in the public transport sector.

Key Activities

As MTB is the importer of the MAN vehicles and not the OEM, they are not responsible for product & process development as identified in the framework. Therefore, product & process development is not confirmed as a key activity. Under the product-oriented PSS it becomes important to measure and asses risks carefully. This was confirmed by the interviews; risk and cost management is one of MTB's most important activities in the management of service contracts.

Key Resources

MTB's service department has its own profit & loss responsibility, acting as an independent service organization. Oliva & Kallenberg (2003) consider this as the first step to manage after sales processes efficiently. ***"With our recent product, TeleMatics, we can easily track and control the risks on service contracts."*** The telematics solution provides the remote monitoring capabilities and can predict failures, confirming the alignment with the framework, as well as the additional human resources from the service contracts department that manages the contracts

Key Partners

In the transactional business model it was found that non-core business services are indeed outsourced to external partners as Helander & Möller (2008) described. But the relationship with the dealer cannot be described as basic information exchange, but as a strategic partnership. The literature describes that this becomes important for more advanced PSS business models. It makes sense that MTB has applied this strategic partnership, since MTB also applies a product-oriented PSS under which they also outsource the expediting processes to the dealer organization.

Cost Structure

For a service provider, capacity utilization is the key to reduce the fixed costs of the service organization (Oliva & Kallenberg, 2003). This does not hold for MTB, as they do not own any workshops, confirmation with the theory was not directly found. However, the interviews with the dealer organization did indirectly provide confirmation; the offering of a service contract provides them a guarantee on a certain amount of work and the ability to plan the utilization of the workshop more efficiently. Furthermore, as mentioned before, management of the contracts requires additional human resources which bring additional costs for the service department. MTB's cost structure is aligned with the positioning on the product-service continuum.

3.4 Conclusion

Overall, it can be concluded that MTB has currently positioned itself on the first two business models of the product-service continuum (figure 3.2). For the customers that have a relationship with the dealers, MTB applies a basic transactional business model. In this case, the dealer can be considered as a customer as well. MTB sells the spare parts to the dealer and supports the dealer in approaching the end customer. MTB has applied a product-oriented PSS business model for the international key accounts by providing R&M service contracts, taking over risk of equipment failures and optimizing equipment availability by preventing and predicting possible failures. At the moment they are including operational services under this business model by offering fleet management services, mainly related to optimizing the usage of the vehicle through ensuring a better driving style. The business model applied by MTB seems to have a good fit with the theoretical framework, except for the ownership structure that created some issues. Ownership does not necessarily have to be transferred to the customer in the first two business models. It is possible to include (operational) leasing constructions as financial services, where the vehicles are activated at the balance sheet of a lessor or financial investor. The financial ownership structure is therefore removed from the framework and not used as a differentiator between product- and use-oriented business models. However, in the use- and result-oriented PSS business models physical ownership still has to remain with the provider, as the provider is fully responsible for the product in those business models.

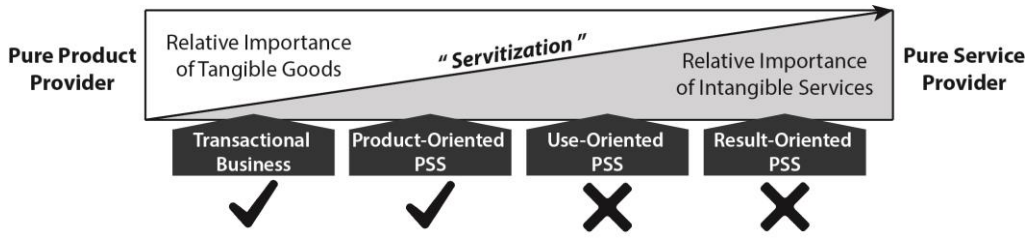


Figure 3.2 - The current position of MTB on the product-service continuum.

4 Customer Perspective

The previous chapter described the current business model applied by MTB and determined the position on the product-service continuum. This chapter will analyse the customer's demands and their perspective on PSS in this market. Based on the customer's perspective it can be determined what the desired position of MTB should be on the continuum. This chapter will provide an answer to the third research question:

> ***RQ 3:*** *How can customers in the truck industry be described in terms of their demands and their perspective towards PSS?*

4.1 Methodology

The purpose of this chapter is to get an understanding of the customer's business, what is important for them and which difficulties they face in doing their business. The most important value aspects that a PSS should deliver are discussed. It also examines the customer's expectations towards a supplier of heavy commercial vehicles and their preferences towards the PSS offerings. Kindström (2010) has introduced the concept of customer maturity, which describes the customer's willingness to adopt advanced PSS. The more mature a customer is, the more he is willing to apply for a supplier using a PSS business model. According to theory, the maturity level depends on the following factors; the customer's core business, the preferred dependency on the supplier, their own capabilities, ownership preference, financial resources, and the perceived technological complexity (Helander & Möller, 2008; Windahl & Lakemond, 2010). These factors are compared to this industry to find similarities or differences.

4.1.1 Data Collection

The main data collection method was semi-structured interviews including open-ended questions that have been held with representatives of customer organizations. Selection of the respondents for the interviews with customer organizations has been done together with the respondents from the internal analysis. The objective was to obtain a sample that showed a variety of different customer characteristics. This way, it allowed for comparison of the different types of customers in relation to the preferences towards advanced PSS offerings. The differences in characteristics were related to; fleet size, type of branche or industry they were operating in, and differences in own capabilities. The interviewed respondents from table 3.1 were asked to provide names of customer organizations that are interesting to be included in the interviews. Table 4.1 shows an overview of the interviewed respondents and some customer characteristics. In total, 11 interviews have been held.

An interview guideline was used to maintain some level of structure in the interviews (Appendix J). The guideline consisted of open-ended questions and was used as a flexible checklist to make sure the important aspects were discussed. However, the respondents were allowed to diverge from the questions and discuss aspects they considered relevant. The questions in the guideline were based on three general topics; 1) general characteristics of the customer, their core business and what is important in that business, 2) the customer maturity factors as described above, and 3) the 'customer journey', i.e. all the activities a customer engages in from purchasing, using, up to disposal of vehicles. These questions show the most important value for a customer and their preferences towards a supplier and PSS business models. In order to enhance the further analysis of the data, all interviews were tape recorded with permission of the respondent.

Additional sources of data have been included to triangulate the data, such as information from the

customer's website, or company brochures and annual reports. Since the interviewed customers have a direct relationship with either MTB or the dealer, the data from the internal analysis also provided much relevant information about the customer's preferences and the market in general which could be compared with the data from the customer interviews. The same applies for the informal observation and conversations at the case company.

Table 4.1 - The interviewed respondents from customer organizations.

Customer	*Core business*	*# Trucks*	*Sector*	*Customer*	*Core business*	*# Trucks*	*Sector*
A: ITC Holland Transport	Transport	± 65	Liquid foods	G: SITA	Other	> 200	Waste
B: Nabuurs	Transport	± 400	Liquid foods/ Retail/Distribution	H: Bode Scholten	Transport	± 50	Retail/ Distribution
C: Vos Logistics	Transport	± 1.000	Cargo/Bulk	I: John v/d Kroon	Other	1	Food (Potatoes)
D: DHL Express	Transport	± 500	Post & Parcel	J: Post-Kogeko	Transport	> 100	Food/ Distribution
E: Lekkerland	Other/Transport	> 150	Food products	K: J. Den Breejen	Other	± 50	Construction
F: Mebin	Other	± 220	Construction				

4.1.2 Data Analysis

All interviews were audio recorded so that they could be fully transcribed after conducting the interviews. The transcription process resulted in a large set of unstructured data. Summarising and categorising data as described by Saunders *et al.* (2009) are the two main analysis processes that are being used to support the interpretation of the data in this study. First, each individual interview transcript was carefully reviewed and summarized on its most important findings. This way a thorough understanding was achieved of the customer's core business, their preferences and demands, and finally, their view towards a supplier delivering advanced PSS. This also allowed for easy comparison of the key findings of interview transcripts from the other interviewed respondents.

Next, the large amount of unstructured data from the interview transcripts has been categorised using a combination of a deductive and an inductive approach. More specifically, a template analysis has been performed. A template analysis combines both inductive and deductive approaches on analysis in the sense that specific codes or categories can be predetermined and then adapted or added to the template as data is collected and analysed iteratively (Saunders *et al.,* 2009). The initial coding scheme of table H.1 in Appendix H has also been used for coding the customer interviews. Here, the customer segment category represented the template for the analysis. The template consisted of the customer maturity factors as described above based on theory and of the customer value factors that were derived from the initial interviews within MTB and the dealer organization as part of the case analysis. These interviews showed that total cost of ownership (TCO) and the utilization levels of vehicles are the two most important value aspects for the offering of a vehicle supplier, as one respondent mentioned: ***"Our propositions are aimed at generating customer loyalty, which we achieve by aiming at maximum deployability at a minimum of total costs."*** The template analysis was performed as a continuous process of collecting and analysing data, while continuously revising the structure of the template. The template analysis allows key themes to be examined and new themes or concepts to be identified that may not have been focussed on at the beginning of the data collection process. The software Dedoose has also been used for the coding process of the template analysis. As a result of this process, the customer segment category has been updated as shown in table H.2 in Appendix H.

4.2 Results

This section will describe the results of the analysis and represent the final structure of the template including the customer maturity and customer value factors. Based on these two concepts the overall preference of customers towards PSS can be determined and what type of PSS business model could provide the customer with optimal value. The results are supported with some representative quotes from the interview respondents.

4.2.1 Customer Maturity

After analysis it turned out that all customer maturity factors derived from theory were confirmed in the data, except the ownership structure and the availability of financial resources. As can be seen in table H.2 (Appendix H), these two factors have been removed under the 'customer maturity' sub-category. In addition, risk aversion, the scope on performance, and the preferred degree of control were other factors that emerged from the data analysis. These have been added to the template for customer maturity. Table 4.2 provides an overview of the customer maturity factors in relation to the PSS business models. Next, a description of how these factors affect customer maturity will be provided.

Core business

In terms of core business, the customers can roughly be divided in two groups. First, those that offer professional transportation or logistical services; these are the logistical service providers (LSP) or haulage companies. Second, those that use the trucks for transport of their own products, hereafter referred to as own transporters. Literature claims that the customer's core business is an important aspect for the maturity level. If the customer views the product, its management, and operation as a part of the core business, then the customer is less willing to outsource these activities to a third party (Windahl & Lakemond, 2010). The findings from the interviews confirm this. Own transporters seem to have a higher customer maturity level, since they view the trucks and the operation of the trucks not as their core business. As customer F said; ***"Our core business is the delivery of concrete, not transport. Although transport is necessary, we want it to require as little effort and as less worries as possible."*** Or similarly; ***"The core business is processing waste, but to process waste you still have to collect it … Transport is just a necessary activity. If I could couple all waste containers to one single truck, I would do it!" - customer G.*** However, from the interviewed sample of customer organizations, it seemed that haulage companies or LSPs often view trucks as a part of their core business and are not looking for outsourcing of truck-related activities.

Preferred dependency on supplier

Helander & Möller (2008) described that the service strategy should be aligned with the customer's preferred dependency on the supplier. They defined three degrees of supplier dependency; fully independent, sharing expertise with the supplier, and fully relying on the supplier's expertise. The customer's sourcing strategy is related to this; it determines which activities, if any at all, are outsourced to an external service supplier. The interviews confirmed that there are differences in the preferred dependency among customers, and as a result, also in the preferred type of PSS. This preference in dependency is found to be governed by several aspects. First, not mentioned in literature; the degree of **control** the customer requires. Control can be related to the **specification of the vehicle and the services**, but also to the **maintenance & operational activities** during the use-phase. Delivering more advanced PSS implies that the customer has less control on both aspects. For instance a result-oriented PSS; no product or services are predetermined in the contract, and the

supplier has full responsibility for delivering the result or output which both parties agreed upon. The customer needs to trust on the fact that the supplier has the right knowledge on how to deliver this result or output. Customers often use specific vehicles that are required for their type of deployment, and the following quote confirms that control over the product's specifications is important: ***"We know what we need … I trust your ability to unburden me, but I do not trust you in delivering the right vehicle for the job … that knowledge definitely lies at our company."*** Similarly, the customers can also prefer control over use-phase activities, such as maintenance and fleet management activities. Some customers prefer to perform and manage these activities themselves, while others would outsource the control over this to a service supplier. This outsourcing aspect also determines whether the customer invests in **in-house R&M and/or operational capabilities,** just as described by literature (Helander & Möller, 2008). A customer with an own R&M workshop said: ***"One could place everything under a R&M contract, including maintenance management, so you can focus entirely on providing transportation services, but I prefer to be in control and do it myself … not being too dependent on others and remaining flexibility."*** Finally, whether the customer desires to maintain some level of control and prefers to be relatively independent also depends on the **performance scope** of the customer. When comparing the interviews between the various respondents, it appeared that some customers operate from an emotional viewpoint, while others make truly rational decisions and act on performance indicators. ***"I have my own list of what I want. The specs of the vehicle, the appearance, the colour … I have my personal preferences about that … There is a lot of emotion involved." – Customer H.*** This customer indicated not being focused on KPI's as fuel consumption, or CO2 emissions: ***"I know a lot of savings can be made … But I do not give that much priority."*** In contrast, customer G mentioned that he would definitely prefer a supplier relationship that is governed by KPI's: ***"The possibility to fully outsource maintenance, that would make us very happy … But you need to set KPI's for that. Then you also have to pay according to performance."*** From this can be concluded that more performance oriented companies are more willing to outsource services to another party, resulting in a higher customer maturity level.

Ownership preference

The literature mentioned that a transition towards PSS business models includes a change in the transfer of ownership (Baines *et al.*, 2007; Tukker, 2004; Windahl & Lakemond, 2010). Barquet *et al.* (2011) states specifically that for use- and result-oriented PSS, the customer prefers to have no assets on their balance sheet. However, based on the results of the interviews, it cannot be related to a higher level of customer maturity. As customer G described; ***"We prefer to have the trucks on our balance sheet, but outsource the full maintenance on all trucks and superstructures completely to one service partner … and then we pay a kilometre-based fee which is coupled to performance indicators ... that is our ultimate goal."*** In contrary, customer B often procures vehicles with operational lease (off-balance), while performing all R&M themselves. This indicates that the preferred ownership structure cannot be considered as a factor that describes the maturity level of the customer. Furthermore, the customer's financial resources were also of importance in determining the maturity level according to Helander & Möller (2008). This is closely related to the customer's preferred type of ownership; an accountancy issue describing on-balance vs. off-balance. Thus, in line with the above, it can be concluded that the customer's financial resources is not related to customer maturity.

Risk aversion

When the supplier starts shifting to the right side of the continuum, risks are transferred to the supplier. This starts with the delivery of R&M service contracts, where risks of product failures remain with the supplier. ***"A service contract is in my opinion an insurance against excessive R&M costs, which means it includes a premium on spreading the risks … I prefer to take the risk myself and keep that money in my own pocket"*** is what customer E said. However, customer H had a different opinion; ***"All vehicles have a service contract, so I know my costs in advance. It is always possible something breaks down … For comparison, I tried a few without service contract, but I was shocked of the high bills for maintenance."*** From this can be concluded that the customer maturity level is also affected by how risk averse the customer is.

Table 4.2 - An overview of the variables that define the level of customer maturity in this market.

	Low customer maturity →			**High customer maturity**
Customer maturity factors	*Transactional business*	*Product oriented PSS*	*Use oriented PSS*	*Result oriented PSS*
Trucks/transport part of core business	*High*	*Medium*	*Medium-Low*	*Low*
Type of supplier dependency	*Independent*	*Shared Expertise*	*Shared Expertise*	*Full Reliance*
▪ **Control over product specification**	▪ *High*	▪ *High*	▪ *Medium*	▪ *Low*
▪ **Control over activities**	▪ *High*	▪ *Medium-Low*	▪ *Medium*	▪ *Low*
▪ **R&M capabilities**	▪ *High*	▪ *Medium-Low*	▪ *Medium-Low*	▪ *Low*
▪ **Operational capabilities**	▪ *High*	▪ *Medium*	▪ *Medium-Low*	▪ *Low*
▪ **Performance Scope**	▪ *Low*	▪ *Medium*	▪ *High*	▪ *Very High*
Risk aversion	*Low*	*Medium*	*Medium*	*High*

In the conclusion of this chapter, the characteristics of customers will be compared with these maturity factors to determine how different types of customers score in terms of maturity, and it will position the interviewed customers on the continuum based on these factors.

4.2.2 Customer Value

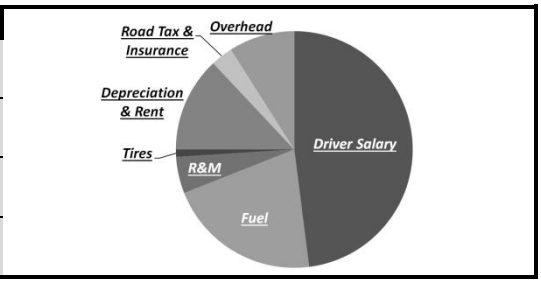
This subsection describes the most important value aspects that a PSS should deliver. The interviews with customers confirmed that the TCO and the utilization levels are the most important value elements. However, as will be described next, from the analysis it also turned out that flexibility and sustainability were also of importance. These are therefore added to the template.

Total Cost of Ownership

Reducing costs is actually the most important value for all customers. ***"Everything is all about costs; the total cost of ownership"- Customer E. "It is most important that one cubic metre of concrete is delivered to the customer at minimal costs and at 100% service" – Customer F. "Cost management is very important, everything we do is weighed against the TCO" – Customer D.*** Thus, all decisions that are made regarding the purchase of new vehicles, additional services, or outsourcing to a supplier are based on the total cost of ownership (TCO). The TCO of a vehicle is the sum of all costs that are incurred during the whole life cycle of the vehicle, or at least during the customer's period of ownership. Thus, any proposition that a supplier delivers should be aimed at ensuring the lowest possible TCO. The average cost structure for a haulage company is shown in table 4.3, based on a report of 'Transport & Logistiek Nederland (TLN)' (Doppert, 2014). The main costs originate from fuel consumption and pay checks for their truck drivers. Thus, improvements on both of these categories have the highest savings potential. To which degree the supplier is required to be involved in reducing costs depends on the customer maturity level as described before. The important aspects and the expectations of the vehicle supplier will now be discussed.

Table 4.3 - The TCO-model of haulage companies (Doppert, 2014).

Cost Structure of a Haulage Company			
Driver Salary	*48%*	*R&M*	*5%*
Fuel	*21%*	*Road Tax & Insurance*	*3%*
Depreciation & Interest	*13%*	*Tires*	*1%*
Overhead	*9%*		



Fuel costs can be optimized in two ways; the first is related to the technical fuel consumption of the vehicle, this is considered as a performance indicator of the vehicle. Improvements can be made through for instance, more efficient engines, start-stop systems, or better aerodynamics. Second, fuel consumption can also be reduced by improving the driving style, and choosing the right vehicle for the right job. A supplier can deliver a system that can analyse the driving style, such as TeleMatics, and provide recommendations for improvement. However, these deployment-related fuel savings are considered to be a part of the customer's core business. ***"Fuel consumption is so strongly related to costs and thus also to savings, that fuel is part of our core business." – Customer C.*** Most of the customers prefer to manage the drivers themselves, while they expect a supplier to focus on the technical fuel consumption. How engaged a customer is in managing the fuel consumption is also strongly related to its performance scope. While all of them realize that the potential savings in terms of fuel consumption, some customers indicated that they do not actively monitor and control this. These customers only compare the vehicle's technical fuel consumption to that of competing brands during the sales process.

The expectations from the supplier regarding R&M depends on the insourcing or outsourcing decision as described in the previous section. Some customers stated that, given the size of their fleet or because they already have a workshop for R&M on other equipment, it pays off to have an own workshop for performing R&M. Other customers clearly indicated that R&M is not their core business, but that of the vehicle supplier, and they are of opinion that preventive and possibly even predictive maintenance should be performed by the supplier to reduce and control costs. Therefore, performance oriented customers often apply for a service contract; ***"Our policy is to always use service contracts … One fixed price; this way you can calculate in advance and truly determine your TCO" – Customer G.***

Utilization levels

Next to TCO, another very important KPI related to the customer's fleet is the utilization level of their vehicles. ***"Our core business is transport, so the utilization levels are very important for us … so we can get the maximum out of the truck." – Customer C.*** This actually holds for all customers, but especially for the LSP's or haulage companies as they earn revenues on deploying the vehicles. The utilization level of a vehicle is influenced by many factors. First, the customer's fleet capacity should be aligned with the amount of available work. In some branches, the demand for transportation services or the demand for an own transporter's products fluctuates heavily and frequently. It is important for a customer to adapt his fleet capacity to these demand fluctuations: ***"We used to get a forecast on transport volumes, but the world has changed … We no longer get forecast, and we are struggling with what capacity we need." – Customer C.*** Or as customer F mentioned: ***"Our biggest challenge is the capacity, the flexibility in capacity. Sometimes you need a truck there, then there. Sometimes you need less trucks, and then you need more … it could be that one factory needs 1 truck in the morning, and 14 in the afternoon."*** A flexible

capacity is needed to follow these fluctuations in demand. Customers have currently found a solution to this problem mainly by making use of charter companies. These are smaller transportation organizations that perform transportation services for the larger organizations. However, most of the interviewed customers would be interested when the vehicle supplier found a solution to provide them this flexibility, for instance through a use-based PSS; ***"Purchasing kilometres would be the ideal future for me; that I can only buy what I need and be very flexible in that." – Customer D.*** This flexibility is not only related to the capacity, but also to the functionality of the vehicles. This means that the requirements for the vehicle's specifications can change over time. Customer D: ***"We need flexibility in capacity, but also in functionality … most important is environmental legislation; Euro 4, 5, and 6. Which type of vehicles are allowed to drive in city centres, and which not … that changes a lot and fast, which makes it hard for us, because you purchase a vehicle for about 8 years."***

Second, the utilization levels are also reduced because of vehicle downtime due to planned or unplanned R&M. Thus, reducing the number of times a vehicle has to go to a workshop during a given period will have a positive effect on the utilization levels. ***"Long R&M intervals, so that we have to visit the workshop only once a year, that would help us immensely."*** This requires careful maintenance management to determine which maintenance activities can best be performed at the maintenance intervals. In addition, the maintenance intervals should be adapted to the customer's deployment planning, preferably after or before their regular shifts. Reducing downtime because of maintenance intervals is also one of the main reasons why many of the customers are interested in one-stop-shopping, as long as the service supplier can deliver the right service quality. ***"It would be very interesting for me if I could go to one supplier for all my maintenance activities. One point-of-contact and one workshop where everything is taken care of." – Customer F.*** All interviewed customers mentioned that outsourcing full maintenance requires a partner that has the right expertise and know-how of performing maintenance on the whole vehicle and all related subsystems.
Furthermore, the number of break-downs and the response to these break-downs also affect the total downtime of the vehicles. The number of break-downs should be reduced by performing preventive and predictive maintenance efficiently and effective. ***"I don't want to experience down-time because of a break-down … I prefer preventive maintenance, the vehicles go to the workshop at least 2 times a year." – Customer H.*** In case a break-down does occur, it is important that the supplier has the correct procedures in place for dealing with these break-downs quickly. Thus, fast break-down services are required that are ideally coupled to condition monitoring systems (telematics) to automate and speed up this process.

Sustainability

Nowadays, the environmental performance of organizations is becoming more important. Especially for organizations that deploy vehicles which use fossil fuels. More environmental friendly solutions to transportation are required. This is mostly translated to the CO2-emissions, or also known as the 'Carbon Footprint'. It depends on the performance scope of the customer how focussed they are on sustainability. Most of the customers do not actively measure their environmental performance, but experience a corporate social responsibility which is reflected in their decision-making processes. In addition, sustainable improvements are mainly related to fuel savings which represents a win-win situation; fewer costs and less CO2-emission. Customers try to reduce the amounts of driven kilometres, or by reducing the fuel consumption as described above.

4.3 Conclusion

The first section described the factors that determine a customer's maturity level. The second section described the most important value elements that customers are looking for in a possible PSS offering. This final section of the chapter will conclude which type of customers is most likely interested in an advanced PSS offering. The used customer characteristics are fleet size, the type of transportation activities, and the sector or industry they are operating in. It will describe a few groups of customers that could each be targeted with a different PSS business model, representing the desired position of MTB on the product-service continuum based on the customer interviews.

Customer characteristics

The sample of customers that have been interviewed represented a variety of different types of customers. Customers with only one vehicle up to multiple hundreds of vehicles in the fleet, both own transporters and haulage companies active in different sectors, and some customers performed all R&M in-house, while others outsourced the R&M completely. This way, insights were provided on the preferences towards PSS from multiple customer perspectives. Appendix K shows a positioning of the interviewed customers on the continuum based on their preferences. These are derived from the customer maturity aspects as described above and from the preferred type of relationship, contents of the offering, and the pricing mechanism. Appendix K also provides an overview of the characteristics of the interviewed customers.

Overall, based on the interviews it can be concluded that larger organizations and own transporters are transitioned more to the right of the continuum as compared to the smaller organizations and the LSPs or haulage companies. Large organizations are generally more focussed on actual KPI's and recognise the benefits of a strong partnership that is based on performance. In addition, the larger organizations are narrowing their focus on their core business, outsourcing any activities not related to their core business through a partnership with a supplier. Although this is generally the case, every customer can take different perspectives on these aspects, because of cultural differences in top management. Thus, the overview of the factors in table 4.2 function as a reference for estimating which customer might be interested in which concept based on these customer maturity aspects.

Another customer characteristic that has an effect on the customer's maturity is the sector or industry the customer is operating in, because this is related to the degree of risk aversion. For instance, customers that operate in the construction sector are more frequently exposed to higher repair & maintenance (R&M) costs due to the heavy duty character of the operational deployment of the vehicles. The vehicles plough through the soft dirt and sand, resulting in more vibrations and shocks due to bumpy road conditions, and the sand increases wear & tear on rotating parts etc. In contrast, customers in the distribution sector perceive lower risks, since these trucks usually drive at a constant speed for long distances on flat dirt-free roads.

Customer value

In terms of value that an offering should provide, it can be concluded that TCO reduction and flexibility are the most important customer values that can be delivered by a vehicle supplier. The utilization level of the vehicles is a very important KPI for all the customers, but its optimization depends a lot on the customer's logistic processes. To improve these logistic processes, the customer needs flexibility in the fleet capacity and in functionality. Although the respondents of the interviews stated that flexibility is very important, it must not harm their performance in terms of TCO. Finally,

for the very mature customers, additional customer value is perceived through unburdening when the supplier takes total care of their fleet. A vehicle supplier that is developing new PSS business models should aim to fulfil these customer demands.

Desired position

Three different groups of customers can be identified that share similar preferences and expectations towards the supplier delivering a PSS. Each group could be targeted with a different PSS business model. Now, these groups of customers and the corresponding PSS business models will be discussed, resulting in the desired position of MTB on the continuum.

First, there is a group of customers that prefer to remain relatively independent of the supplier and perform all fleet management activities themselves. They either decide to perform maintenance activities in-house and purchase spare parts, or they outsource R&M to the dealer organization on an ad-hoc basis. Some customers demand proactive support of the supplier about how to preform R&M optimally in their specific situation. This holds for both customers that perform R&M in-house, as well as customers that outsource R&M to the dealers. This group of customers can be addressed with the first PSS business model; ***'transactional business'***.

The second group of customers recognizes the benefits of engaging a contractual relationship with the service supplier, either a dealer or MTB. These customers apply for a service contract. The customer's preferred dependency on the supplier determines what they want to include in the contract; this can be only basic R&M up to full one-stop-shop maintenance and fleet management activities. However, the latter has received only little attention so far. Customers are mainly interested in technical management, some in fuel management as well, but most of the customers perceive that they become too dependent on the supplier if many fleet management activities are included in the service contract. This group of customers can be addressed with the ***'product-oriented PSS'***.

Finally, there seems to be a small group of customers that consists mainly of the large own transport companies. Although a necessary part of their business, trucks and transportation is not seen as their core business, and it needs to require as little effort as possible from them. They are looking for a partner that can unburden them as much as possible. It could even be possible that they wish to outsource the complete fleet to this partner so that quality and low costs are guaranteed at minimal effort from the customer. These customers are merely interested in the functional usage of the trucks; transportation of their products or equipment. These customers could be targeted with a ***'use-oriented PSS'*** that delivers total care at a guaranteed TCO, while the customer's payment is based on the actual usage. This pay-per-use principle could also be applied to customers that are looking for flexibility in their fleet capacity. They can use vehicles temporarily and pay according to usage. This business model can therefore be delivered to both type of customers as a long-term or a short-term rental solution.

Overall, it can be concluded that most of the customers are interested in either a 'transactional business' or a 'product-oriented PSS'. However, these customers often also need a certain level of flexibility in their capacity which could be delivered by a 'use-oriented PSS' that facilitates product sharing or similar flexible rental solutions. This business model can also provide total care to the customers that are only interested carefree usage at the lowest TCO.

5 Conjoint Analysis

From the previous chapter could be concluded that mainly the first two business models are of interest to most of the customers. However, the third business model of the framework also seems to be an interesting business model to apply for MTB. The purpose of this chapter is to measure the preferences of the customers in the Dutch market of heavy commercial vehicles towards the adoption of any of these PSS business models by means of a quantitative study. Comparing this to the results from the customer interviews could validate the conclusions on MTB's desired position on the product-service continuum.

According to Hair *et al.* (2010), a conjoint analysis is a suitable multivariate technique for understanding a customer's evaluations and preferences of predetermined combinations of features that represent a potential product or service. This methodology has been widely used in many different domains, such as product positioning, market segmentation, and product pricing, but it has also been used for designing services (Shih *et al*., 2009). A conjoint analysis assumes that customers evaluate the total value of a product as the combined value of each separate feature that is part of the product. This way, the customer's preferences towards specific characteristics of the PSS business models can be examined.

The steps involved in conducting a conjoint analysis are described by Shih *et al.* (2009) as; 1) selecting important attributes and levels that comprise the products; 2) constructing the preference model; 3) building the PSS profiles; 4) performing data collection; 5) conducting an analysis of the results. The remainder of this chapter will address these steps.

5.1 Experimental Design

Various types of conjoint analysis methods exist to evaluate customer's preferences, such as trade-off, full-profile rating or ranking, choice-based, etc. However, choice-based conjoint (CBC) is the most used conjoint technique at the moment (Johnson & Orme, 2007). Asking respondents to choose among hypothetical products or services seems to better represent actual buying behaviour than ranking or rating product concepts as is done with the conventional conjoint analysis. Which conjoint method should be used in which specific situation depends on multiple aspects, such as the number of attributes, the interviewing mode, the net sample size, available interview time, and whether pricing is included (Orme, 2009a). The most important criteria in this research are the number of attributes and the sample size. Adaptive Choice-Based Conjoint (ACBC) is a more favourable method as compared to traditional CBC for smaller sample sizes and when more than three attributes are required (Orme, 2009a). A CBC study design should be used for sample sizes of at least 100, but ideally in the multiple hundreds. However, obtaining a net sample size of at least 100 respondents seemed to be an issue in this research project. In addition, the complexity of the possible PSS offerings could not be represented with only three attributes. Thus, to maximize the amount of information per respondent and increase the efficiency of the study design, it is chosen to use an ACBC study design.

Attributes & Levels

The interviews with both managers from MTB as well as with the customers have provided much insight on what could be important attributes and corresponding levels for the experimental design. Based on this information an initial experimental design has been developed which was discussed at the case company and at the dealer organizations to validate the efficiency of the design. The initial

design has been modified to a final experimental design, which is shown in table 5.1. A more detailed description of the initial and the final version of the experimental design, and of the results from the discussion session is provided in Appendix L.1.

Table 5.1 - Final version of the attributes & levels for the experimental design.

Attributes	Levels	Attributes (cont'd)	Levels (cont'd)
Relationship with the Supplier	- *Reactive & Incidental* - *Proactive & Informative* - *Strategic partner (including KPI's)*	*Product-Service Integration*	- *Products & Services not integrated as total solution* - *Products & Services are integrated as total solution*
Technical Services	- *Supply of spare parts* - *R&M at the dealer* - *One-stop-shopping*	*Pricing Mechanism*	- *Cost-based billing* - *Fixed periodical fee* - *Pay per usage (per km/hour)* - *Pay for function (e.g. tonne-kilometres)*
Fleet Management	- *Not included* - *Technical management* - *Full fleet management*		

5.2 Data collection

The interface of SSI Web enables the easy setup of a questionnaire including ACBC questions. Also some basic questions were included to gather demographic information about the customers which could later on be used for segmentation. An example of a conjoint question that explains the used experimental design of the conjoint analysis is shown in Appendix M.1, and the additional information that described the attributes & levels is shown in Appendix M.2. The respondents were approached with an email, inviting them to take part in the conjoint study. Email addresses were obtained from the CRM software package "Salesforce". Written permission of the dealer organization was required to approach customers with the questionnaire. Unfortunately, only three dealers gave permission to approach their customers, which resulted in a total of about 500 potential respondents. After about one and a half week a reminder was sent to customers that did not yet fill in the questionnaire.

5.3 Data Analysis

The analysis of ACBC studies is performed by making use of multinomial logit regression models to estimate the part-worth utilities. CBC has frequently been analysed by methods that combined data across individuals. However, the use of such aggregate analysis is perceived to obscure important aspects of the data and it requires a substantial amount of response to get reliable results. It is therefore preferred to estimate individual-level part-worth utilities, especially for conjoint studies consisting of smaller sample sizes. Nowadays, Hierarchical Bayes (HB) models are used frequently in determining robust individual part-worth utilities from choice-based conjoint studies (Orme, 2009b). Therefore, Sawtooth Software recommends using a HB method for analysing ACBC data and has included a HB analysis tool in their conjoint software 'SSI Web'. This analysis tool is used to obtain part-worth estimates of the conjoint study. A more detailed description of the HB estimation procedure is provided in Appendix L.2. During the computation, it is possible to monitor the progress on a screen as shown in appendix N. The grey area in the graph represents the iterations step to achieve convergence, while the white area represents the iterations for parameter estimation. Convergence is achieved when the estimates for the betas are oscillating around a certain mean value. In addition, this screen shows us some statistics that are relevant for assessing the "goodness of fit" of the model, these are; percent certainty, root likelihood (RLH), average variance, and parameter root mean square (RMS). These statistics are provided in two columns; the left column describes the statistics for the current iteration, while the right column averages the statistics values of all iterations (Orme, 2009b).

The ***'percent certainty'*** indicates how much better the solution is than basic chance, and how it compares to a solution that has a perfect fit. The value of this statistic ranges from zero to one; where a value of zero implies that the model resembles a basic chance model and a value of one implies a perfect fit. The ***'root likelihood'*** represents the geometric mean value of the probabilities predicted in the model. With n number of possible concepts in each choice task, each concept has a probability of 1/n to be chosen in a basic chance model. The RLH in this case would also be 1/n. A RLH of for instance 2*1/n would implicate that the model is two times better at estimating utilities than a basic chance model (Orme, 2009b). The perfect model would have a RLH of 1.

5.4 Results

In total, 24 of the 521 potential respondents that were approached with an invitation actually completed the questionnaire. This resulted in a response rate of 24/521 = 4.6%. This section will present the results from the HB analyses that have been performed on the dataset.

5.4.1 Assuming homogeneity

Given the low sample size, a base model has been estimated which assumes a homogeneous dataset. Later in this section, heterogeneous models will be estimated to see if this is an improvement to the basic homogeneous model. The results of this first model are shown in table 5.2.

The percent certainty and the RLH are 0.492 and 0.660 respectively, indicating an acceptable 'goodness of fit'. Thus, the resulting part-worth estimates that are used in the model can be considered as quite robust estimates.

Table 5.2 - Results of the HB analysis on the complete dataset.

Attribute Importance	***Level Utilities***	***Attribute Importance***	***Level Utilities***
Relationship with the Supplier (17.03 %)	Reactive & Incidental (-7.76) ***Proactive & Informative (20.40)*** Strategic partner (-12.64)	Product-Service Integration (12.92 %)	***P&S not integrated (19.63)*** P&S are integrated (-19.63)
Technical Services (17.24 %)	Supply of spare parts (-2.14) ***R&M at the dealer (21.12)*** One-stop-shopping (-18.98)	Pricing Mechanism (28.13 %)	***Cost-based billing (52.04)*** Fixed periodical fee (-72.16) Pay per usage (16.92) Pay for function (3.20)
Fleet Management (24.67 %)	***Not included (40.98)*** Technical management (22.53) Full fleet management (-63.51)		
# respondents: **24**	Percent Certainty: **0.492**	Root Likelihood (RLH): **0.660**	

'Fleet management' and ***'pricing mechanism'*** appear to be more than average important factors in making decisions given the fact that in an 'all-equal' situation, the importance scores for each one of the five attributes would be 20%. Especially, ***'pricing mechanism'*** is the most important factor for choosing a PSS offering. Comparing the differences in the part-worth estimates of the levels, it can be concluded that customers prefer a ***'proactive'*** relationship with the supplier, which performs ***'R&M at the dealer'***s workshop. Full one-stop-shop technical services have gained the least interest. The same applies for fleet management services, since most of the customers clearly prefer a PSS that ***'not includes fleet management'***. The trucks and related services should ***'not be fully integrated'*** as a total solution, and the customer prefers to ***'pay per service intervention'*** for the costs incurred.

From these results can be concluded that the customers in general prefer the first PSS business model; the transactional business. This conclusion is based on the assumption of a homogeneous dataset. However, due to the large diversity in the type of customers, the next section will run some additional HB analyses considering heterogeneity.

5.4.2 Assuming heterogeneity

The dataset is split through the use of the demographic variables. In total, three cross-sections are made based on three variables; 1) whether customer has own R&M capabilities or not, 2) a fleet size of less or more than 50 vehicles, 3) the customer's core business, i.e. a haulage company or an own transporter. The results from the separate analyses are shown in tables O.1-O.6 in appendix O. All models had a similar 'goodness of fit' as compared to the homogeneous base model, with percent certainties of around 0.500 and RLHs of around 0.650. Only a few models showed a slight improvement in terms of model fit. One would expect a better model fit for these heterogeneous models, since the studied market is not homogeneous, but this is probably related do to the low sample size. The sample size for each model becomes even smaller because it uses split data.

In-house R&M vs. Dealer R&M

The differences between these two models can obviously be found in the technical services; they prefer either the delivery of spare parts or R&M at the dealer. No significant differences are found in the type of relationship; in both models a proactive supplier is preferred. In terms of fleet management services, customers that outsource R&M to the dealer would also like to outsource the technical management of the maintenance, while customers with an own workshop are only interested in PSS offerings without fleet management. An interesting and not so obvious result was that cost-based billing and pay-per-usage are about equally preferred for customers with own R&M capabilities. Overall, the results are quite similar to those of the full dataset model.

Small (<50) vs. large (>50) fleet

The differences between smaller and larger fleets are quite similar to the differences in the customer's R&M capabilities. Large fleets show similar results as customers with own R&M capabilities and smaller fleets show similar results as customers without R&M capabilities. Large fleets are generally more interested in performing R&M and fleet management themselves. However, direct results showed that most of the respondents in this segment have own R&M capabilities. This would explain the similarity between the two separate analyses based on the a priori segmentation. The only significant difference is found in the increased preference for a strategic partner for large customers. This could be related to the fact that larger organizations are generally more focussed on actual KPI's as was explained in chapter four.

Transportation as core vs. non-core business

The biggest difference found in this segmentation is related to the pricing mechanism. Aside from traditional cost-based billing, own transporters would be interested in paying for function as well. This is the first model that showed a clearly more than neutral preference for pay-for-function. The other utilities show similar results as found in all other models.

5.5 Conclusion

The fact that decent models with an appropriate model fit could be created with HB analysis indicates that the experimental design of the conjoint study appears to be quite successful. The respondents were able to accurately provide their preferences over the generated concepts. However, given the small sample size of the conjoint study, it should be noted that these results should be used only as an indication of the preferences in the market. It might not be a representative view on the complete Dutch market of heavy commercial vehicles. This is especially true for the analyses that are made on the cross-sections of the dataset; in these cases the dataset for each cross-section analysis consisted of approximately 10 respondents. For instance, all but one of the customers in the dataset with more than 50 vehicles has an own workshop. This has biased the results for technical services towards a preference for spare parts. However, as was found during the interviews, there are also many customers with more than 50 vehicles that do not have their own workshop.

As mentioned in the fourth chapter, the customer interviews showed that the first two business models are most interesting for the biggest majority of the customers. A similar conclusion was drawn from the results of the conjoint analysis; especially the 'transactional business' stands out from the analysis. The customers prefer a proactive supplier that provides the customer with advice and that provides repair & maintenance services to the vehicles, but not for the vehicle's superstructures or subsystems, while the customer is charged for every service intervention. Preferably, no fleet management activities are performed by the vehicle supplier. The customer would like to remain independent and in control over the fleet. This confirms that the customers are mainly interested in a supplier that applies a conventional business model that is positioned on the left side of the product-service continuum.

Overall, the results are quite well aligned with the findings from the qualitative interviews and validation was found. It is therefore assumed that apart from the low sample size, the given dataset still provides a quite representative sample of the complete market. However, a large scale conjoint study might provide additional insights on the true preferences of customers in this market, and allow for more cross-sectional analyses to improve the segmentation for PSS business models.

6 Recommendations for Business Model Innovation

The purpose of this research project was to develop a new or improved business model for MTB that enables them to move further on the product-service continuum. The previous chapters determined the current and the desired position of MTB on the product-service continuum. This chapter will describe the required changes for the business model of MTB that need to be made in order to take in the desired position on the continuum, and thus provides an answer to the final research question:

RQ 4: *What changes are required in MTB's business model to support the desired PSS service strategy?*

6.1 Methodology

The recommendations regarding the new or improved business model will be based on the answers of the first three research questions that investigated the possible PSS business models according to theory, the current position, and the desired position of MTB on the continuum based on the demands and perspectives of the customers towards the theoretical PSS business models. The theoretical framework as is developed in answering the first research question is a useful tool for following a PSS innovation cycle as shown in figure 6.1. The first step in this cycle; determining the current position has been answered by the second research question. The desired position has been described in the previous two chapters answering the third research question. This chapter will discuss the business model development step.

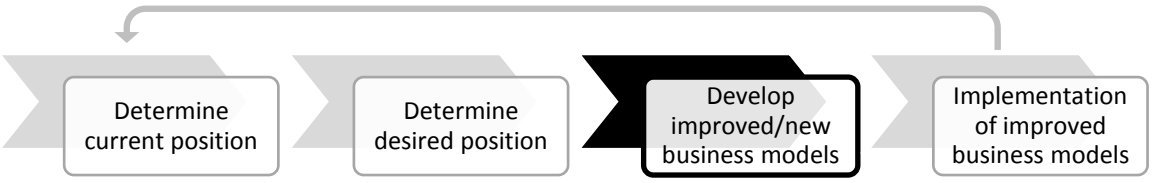


Figure 6.1 - The innovation cycle for using the PSS business model framework.

6.2 Recap on the current and the desired position

First, a short recap on the current and the desired position. As explained in chapter 3, the business model of MTB is currently geared to a position on the first two stages of the product-service continuum; 'transactional business' and 'product-oriented PSS'. The first business model is applied to the majority of the customers; ad-hoc delivery of basic after sales services. The second business model is applied to customers that prefer a contractual relationship through the delivery of a service contract against a monthly fee.

Based on both the customer interviews and the conjoint analysis, it seems that the majority of the customers is interested in either one of these two business models, concluding that MTB has currently taken a position from which most of the market can be served. Therefore, the two business models currently applied should definitely remain to exist in MTB's business. But the customer interviews also showed the possibilities for an interesting third business model that could be developed parallel to the current business models, providing flexibility and total care as a use-based rental solution. The two following sections will shortly describe some improvements for the current business model, and it will describe the 'use-oriented PSS'.

6.3 Improve Current Position

Chapter three already showed that MTB's current business model is quite well aligned with that of the theoretical framework. However, some improvements could be identified. An important area of improvement is the proactive attitude of MTB towards their customers. The customers indicated that they desire more proactive support and that MTB should apply more process-centred thinking instead of vehicle-centred. For instance, providing R&M at the optimal moment for the vehicle does not automatically imply that this moment is optimal from the customer's perspective as it can interfere with critical transport planning, thus leading to unwanted down-time. The customer's processes and efficiency must become more central in the way services are provided to the customers. Another area of improvement is to make the added value of a service contract more tangible, by including an SLA on operational availability of the vehicles (Oliva & Kallenberg, 2003). This is already done in the public transport sector, but the same principle should be applied to service contracts for trucks. TeleMatics creates many possibilities to start managing, measuring and offering operational availability instead of mere risk reduction. Furthermore, MTB has to develop more fleet management services and skills, and further build on the one-stop-shopping concept, so that they can become the full maintenance partner for their customers. Many customers indicated that one-stop-shopping would be a very interesting concept, but the general perception is that the knowledge & expertise for delivering high quality one-stop-shop services is currently not sufficiently present in MTB's R&M network.

6.4 Pay-As-You-Drive Rental Solutions

This business model is the next step on the continuum; a use-oriented PSS business model, or more specifically, the Pay-As-You-Drive (PAYD) Rental Solutions. This section will describe what this business model should look like and identify which specific aspects need further investigation to test its feasibility. At the end of this section, table 6.1 shows the business model canvas of the PAYD Rental Solutions with concise descriptions on the business model elements.

Figure 6.2 outlines the main differences between the current business model and the new Pay-As-You-Drive business model. In the current business model, the customer purchases a truck and manages their fleet themselves. MTB and the dealer organization provide services to the customer once the vehicle is in use by the customer. These services can range from delivery of spare parts up to a service contract. The services are being paid for per intervention or a monthly fee in case a service contract is applied. The customer uses other suppliers for spare parts or services for the vehicle's superstructure, IT-systems, mechanical installations, tires, fuel, etc. The customer can make use of any leasing or financing constructions as is shown in grey in the figure. However, as described before, leasing is considered as a financing service, not as a use-oriented PSS.
The lower figure represents the actual use-oriented PSS; the Pay-As-You-Drive Rental concept. Now, the customer truly purchases the all-inclusive usage rights to a vehicle. The basic idea is to deliver the use of a transportation solution which the customers need in doing their business, providing total care and flexibility in both their fleet capacity and in functionality. The rental fee is based on the actual usage of the transportation solution, for instance per kilometre, or per hour. The supplier is the owner of the vehicles and has full responsibility of ownership, vehicle management, and for the vehicle's performance. Thus, MTB is in control and decides which vehicles of their fleet are deployed at a particular customer for the agreed upon rental period. MTB functions as a strategic partner that is the customer's only central contact point when it comes to their transportation solution. A strong network of stakeholders is required that MTB uses to outsource specific activities in maintaining a

functioning fleet. The role of the dealer under this business model changes from being both a sales and service organization, to being a pure service organization that MTB uses to outsource R&M activities. Under this business model MTB has a direct relationship with the customer, only expediting processes are handled by the dealers.

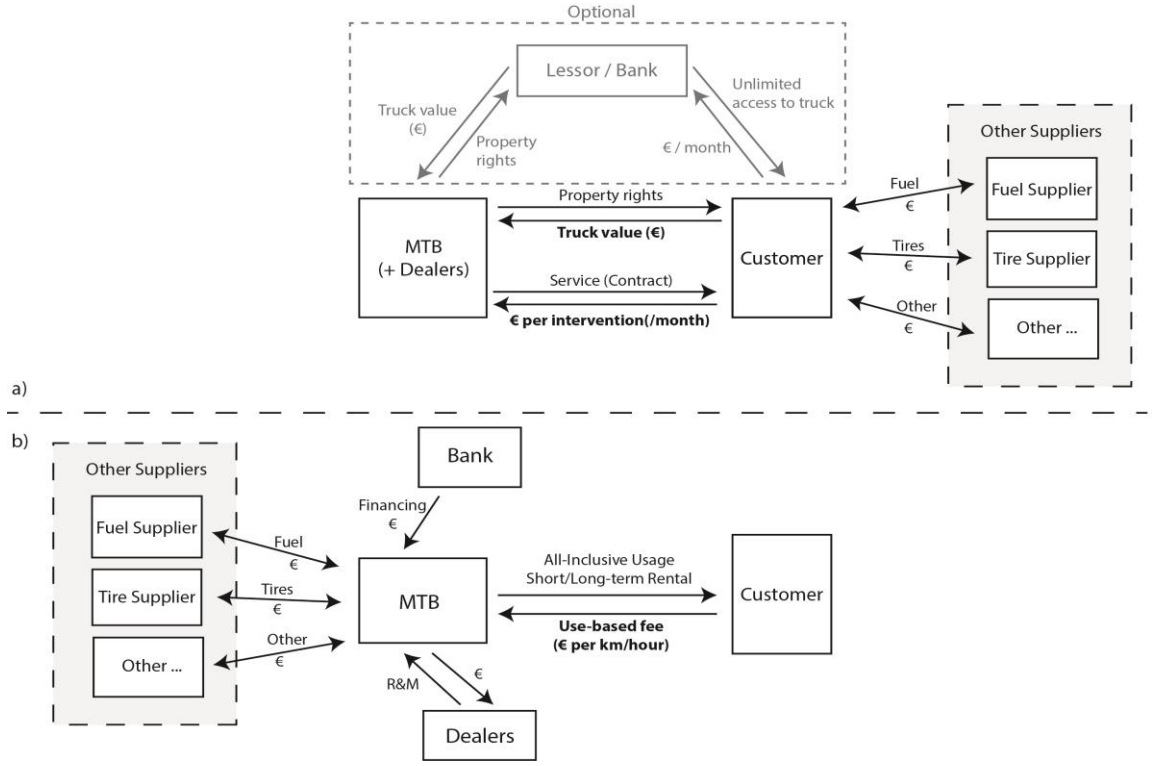


Figure 6.2 - A graphical representation of the current business model (a) and the PAYD business model (b)

Each of the business model elements will now be discussed shortly to provide a basic understanding of what the business model should look like. In addition, the differences as compared to the current business model will also shortly be described.

Value Proposition

The customer and MTB will together determine what type of vehicle is needed for the type of deployment, and what type of rental agreement suits the customer's demands. A vehicle is then deployed from MTB's fleet. Different type of rentals could be offered; one that specifically aims at providing flexibility through short-term rentals, and one that aims at providing total care including many supporting services for long-term rental of the core fleet. These are now referred to as 'PAYD Flex Rental' and 'PAYD Core Rental'. Another type could be that the customer's existing fleet is taken over and rented back as a PAYD rental concept; 'PAYD Buyback'. This way, the rental agreements can vary from a few days, up to about 8 years or even more. The rental offering consists of an all-inclusive usage right to a vehicle, including all accompanying services, such as insurance, full R&M to the complete vehicle, tires, accident management, fuel management, fuel, fleet management, monitoring systems, training, consulting, etc.. The rental agreement includes many SLAs and KPIs to control the quality of the delivered transportation solution, such as SLAs on downtime, response time in case of failures, vehicle availability, etc. The value in the offering comes from unburdening by being the customer's only point of contact when it comes to their fleet-related issues. The customer's costs move along with their revenues and they achieve full cost transparency through a guaranteed TCO, because of the pay-per-drive principle. Compared to the current business model,

differences can mainly be found in the integration of the offered products and services, and who is in control and bears responsibilities for the vehicles. In the current business model, the products and services are not integrated; the vehicle is sold, and the delivered services are either bundled in a service contract or unbundled. The customer is in control and has most of the responsibilities. However, under this PAYD business model, all delivered products and services are fully integrated into one service offering; a real transportation solution. Now, MTB is in control and fully responsible for a functioning transport solution.

Customer Segment

The current business model targets the whole market. However, this PAYD concept should only be targeted at specific customer segments. A combination of the type of PAYD rentals can be used to take care of the whole fleet for customers that are looking for a carefree transportation solution. Comparing these customers to the factors of table 4.2, these customers can be associated with a high focus on their core business, view trucks not as a part of this, and wish to maintain only little control over the specifications of the vehicle and the operational deployment of the vehicles. Customers that are only interested in temporarily additional fleet capacity to cover their peaks in demand might only be interested in 'Flex Rental'. MTB has to develop clusters of customers that could share the same type of vehicles and whose peaks can complement each other to achieve high utilization levels for these truck-sharing vehicles.

Channels

Under this business model, MTB needs to establish a direct relationship with its customers. This especially holds for the non-IKA customers. For the IKA customers, not much is changed in the used channels when transferring to this PAYD business model. As described before, the current business model must remain to exist. Thus, the current sales process must include the option for a PAYD business model. The dealer's account managers should assess the customer's maturity level based on the maturity characteristics as described in table 4.2. Once it becomes clear that these customers could benefit from either one of the PAYD modules, the account managers are responsible for selling a PAYD subscription. If the customer does not seem to be interested in PAYD, the current business model will be applied. However, once a customer chooses to subscribe for PAYD, a direct relationship with MTB will be established. The customer is incorporated in the PAYD customer database and coupled to an IT system that connects the planning departments of the PAYD customers to MTB's fleet management department. Then, MTB will determine together with the customer what their ideal rental solution would be. Compared to table 3.2, the customer has initial contact through the dealer organization, but the contracting and ordering processes are performed directly by MTB. The dealer is still responsible for expediting the R&M services.

Customer Relationship

MTB has a direct relationship with the customer once subscribed for the PAYD rental concept. Frequent interactions occur for continuously adapting the rental program to provide the customer with full flexibility and an optimal fleet capacity that meets their demands. However, such a relationship requires the customer and MTB to share a lot of information and knowledge related to the deployment of the vehicles. This requires a strategic partnership based on trust, cooperation, and learning from each other. Comparing this to the current business model, MTB not always has a direct relationship with its customers. In addition, the current supplier-customer relationships are more of a proactive nature; without the inclusion of actual KPI's that govern the relationship.

Revenue Mechanism

The main revenue mechanism is the use-based fee that a customer pays per vehicle. It depends on the customer's type of deployment which type of use-based fee is applied. It can be either one or a combination of a price per driven kilometre, or per hours used. The construction of the use-based fee must be interesting for both parties. On top of that the customers pay a monthly fee for every vehicle and for the PAYD subscription. The subscription fee can be considered as a general management fee. The lower the fixed monthly fee for the vehicles, the more interesting it becomes for the customer. Thus, MTB must find new ways to separate fixed and variable costs related to vehicle ownership and deployment and they must aim to minimize the fixed monthly fee as much as possible. A 100% use-based revenue mechanism might not be feasible as this includes too much risk for MTB when a customer does not use the vehicle, while it is still being deployed at their location. Compared to their current business model, the differences lie with the inclusion of a use-based fee and the integration of the revenue mechanism for both products and accompanying services. An integrated use-based mechanism has not been applied in the current business model.

Key Activities

Johnson & Herrmann (1998) investigated the implications of product-sharing services and developed an assessment framework for potential product-sharing services. The key to success of this business model depends on MTB's ability to map the peaks and troughs in the demand of the customers, so that efficient utilization levels and cost-related benefits can be achieved. The predictability and the frequency of usage by the customer must be examined. Information from TeleMatics could be of use in developing models that estimate and manage the utilization levels. Another challenge is related to the fact that most of the times the trucks cannot be considered as a standardized product that can be used by multiple customers; another requirement for a product-sharing service (Johnson & Herrmann, 1998). Customers can have a wide range of personal preferences or specific functional requirements for the truck. This requires MTB to engage vehicle remanufacturing, modifying, and upgrading activities. This way, the vehicles can easily be customized to the demands of each specific customer before being deployed at their location.

Currently, activities are mainly related to selling and servicing vehicles and parts. However, this business model aims at increasing the tenure of the vehicles in MTB's fleet and continuous modification of the vehicles to maximize the deployability and utilization of the vehicles. MTB can decide whether new vehicles should be added to or removed from their fleet. As MTB becomes a fleet owner, the most important activity becomes fleet management.

Key Resources

The most important resource that should be acquired for this business model is the PAYD vehicle fleet. A portfolio of different types of vehicles is needed to address the various customer segments. This automatically implies the increased need for financial resources. Furthermore, a fleet management department that continuously manages the fleet's capacity and deployment is required. This leads to additional human resources. As described, an IT-system is needed to connect the fleet management department to the customer's planning department. An open source system is needed that can communicate with any other IT system of the customers and with information databases such as TeleMatics, or diagnostics systems from other brands. Ideally, these integrated IT systems should be coupled to a service card. With this service card, the customer can get access to all related services and products that are included in the rental agreement. A self-billing mechanism can be incorporated in the integration of the management systems, so that the customer is automatically charged for the monthly usage.

Key Partnerships

MAN Lease and MAN TopUsed should be involved in this concept to support the development of the PAYD fleet, but possibly other financial investors should be acquired for additional financial resources. The partnerships with the OEM and the dealer organization also need some alterations. The OEM is traditionally mostly involved when it comes to solving guarantee issues. But now, the OEM must also be involved with respect to the remanufacturing process; for products to be truly remanufacturable or modifiable this has to be taken into account during the design process. This is called 'design for remanufacturing'. The dealer organizations should also develop capabilities in modifying vehicles. MTB can decide to insource the additional R&M capabilities that are required for performing all equipment related R&M (at the dealer organization), or to outsource these activities to third party strategic suppliers. In the latter case, MTB should establish a network of strategic partnerships with service suppliers of other equipment. In the current business model, the customer manages these relationships themselves.

Cost Structure

The cost structure under this business model can be characterized by increased costs that are mainly related to providing maintenance to the fleet and additional human resources for managing the fleet. Furthermore, the integration and development of IT systems requires significant investments. Other investments that have to be made are related to the development of the partnerships and supporting the dealer in acquiring the capabilities necessary for maintaining the whole fleet. Currently, the 'parts' department at MTB sells the spare parts to either the dealer organization or the customer for performing R&M services, generating revenues and profits. However, under this PAYD business model, the 'spare parts' department gets a whole different perspective as it changes from being a profit-generating department to being a pure cost-based department; using spare parts for maintenance of the PAYD fleet leads to additional costs.

Table 6.1 - The business model canvas for the Pay-As-You-Drive Rental Solution

Key Activities

- Remanufacturing, modifying and upgrading the vehicles, extending the vehicle's life-cycle and increasing deployability
- Maximizing utilization of the vehicle fleet
- Fleet management activities
- Matching the transport planning and the peaks and troughs in customer's fleet capacity
- Integrating and automating open source IT-systems, coupled to the customer's IT- and management systems

Key Partnerships

- Establish network of strategic partnerships with:
  - Financing partners
  - Third-party suppliers of; tires, fuel, additional equipment, etc.
- Supporting the dealer organization
  - Function as hubs of the fleet
  - Developing remanufacturing capabilities
- Leverage OEM to 'design for remanufacturing'

Key Resources

- Pay-As-You-Drive vehicle fleet
- Performance monitoring systems, such as MAN TeleMatics, and IT-systems
- Financial resources
- Knowledge & Expertise
- Human Resources
  - Fleet Management

Value Proposition

- Pay-As-You-Drive Rental Solutions
  - Core Fleet
  - Fleet Buy Back
  - Flexible Fleet
- Customized and flexible rental programs, both short-term and long-term
- All-inclusive access rights to a transport solution, including full service:
  - Full R&M
  - Tires
  - Insurance
  - Fuel
  - Fleet Management
  - Process Advice & Consultancy
  - Driver Training
  - Service Card
- Customer value:
  - Flexibility
  - Guaranteed TCO
  - Total Care

Customer Relationship

- Strategic Partnerships, based on;
  - Collaboration
  - Trust
  - Knowledge, information & resource sharing
- Frequent interactions
- Continuous cooperation to improve processes
- Integrated and coupled management systems

Channels

- Train Sales, Retail, and Account managers to sell Pay-As-You-Drive Rental Solutions
- More direct relationship with the non-IKA customers as compared to conventional business

Customer Segment

- Customers looking for carefree use of a vehicle to do their business
  - Like to be unburdened as much as possible
  - Most likely customers that do not view trucks and transport as core business; large own transporters
- Customers that need temporarily additional fleet capacity
  - Can be any type of customer

Cost Structure

- Additional costs related to fleet ownership
- Additional costs for human resources related to fleet management
- Investment in IT-systems and integration capabilities

Revenue Mechanism

Pay-As-You-Drive Vehicle Fees
- Low fixed monthly fee per vehicle
- Use-based fee (€ per km/hour) for the actual usage of a vehicle

Pay-As-You-Drive Subscription Fee
- Low yearly subscription fee per customer

6.5 Conclusion

This chapter of the report served as the recommendations towards MTB in developing their future business models and provided an answer to the final research question. Figure 6.3 provides an overview of the short-, mid-, and the long-term recommendations. Given the preferences of most the customers and the readiness of the market for PSS, it seems that the current business model of MTB is able to satisfy the needs and demands of many customers. The first recommendation is to continue with their current business practice to serve this biggest share of the market. As described in the beginning of this chapter, MTB could improve the value in service contracts by including SLA's on operational availability. In addition, the customer's processes must be the central focus when delivering services and more proact0ivity is desired towards the customer. Second, for the customers that demand a strong outsourcing partner that manages their fleet from a technical perspective, MTB should expand their capabilities related to one-stop-shopping and technical fleet management. In the future, a business model selling all-inclusive usage of the vehicles as described above will become important. Some customers already showed preference towards such a model, but as a final recommendation, the above business model needs further investigation on its feasibility and its implementation. In addition, the mid-term recommendation, expanding the capabilities to become an outsourcing partner, needs to be in place before applying a PAYD business model.

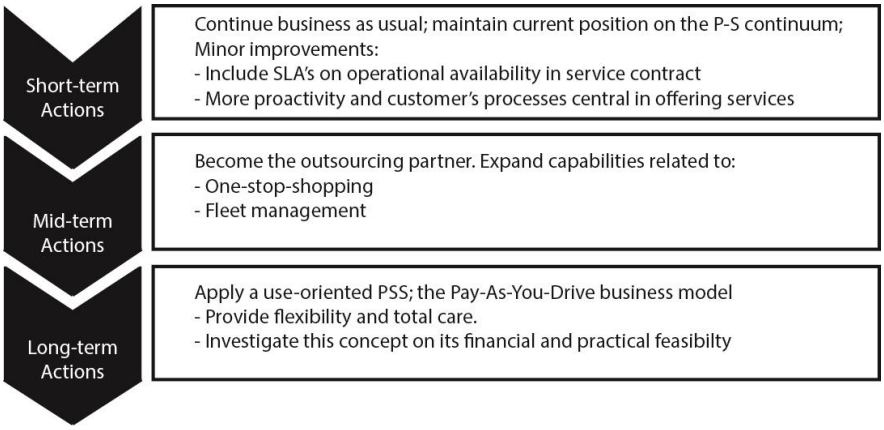


Figure 6.3 - The recommendations towards MTB; from short- to long-term recommendations.

Evaluation of PAYD

One of the biggest challenges to make this model feasible is the ability to provide a vehicle to customers that matches their specific requirements, while this vehicle must also be deployable at other customers to maximize utilization. This especially holds when the PAYD is offered as a short-term truck-sharing model through 'PAYD Flex Rental'. Therefore, MTB has to investigate whether they can develop particular customer segments that can use the same vehicle and whether the customers in these segments have peaks and troughs in their required capacity that complement each other. It seems that this model has most feasibility when offered to customers that use basic tractors as these are quite universal vehicles. In addition, efficient utilization and maximum deployability also depends on whether MTB is able to develop the capabilities to remanufacture and modify the vehicles so that they can be deployed at various customers.

Once the above mentioned challenges could be overcome, the feasibility all comes down to whether competitive prices can be established while maintaining acceptable profit margins for MTB. This business model must therefore be thoroughly investigated from a financial perspective. New calculators should be developed that include new use-based pricing models and that can forecast the costs incurred during the vehicle's complete life-cycle.

Selling Transport Mobility

An even more advanced PSS concept would be a result-oriented PSS business model. As the literature described, in a result-oriented PSS business model only a result, functionality, or performance is determined in the agreement, not a product (Tukker, 2004; Baines *et al.*; 2007). The supplier is free on how this result is delivered. However, when one translates this to the transport sector; the function of a truck would be to perform transportation services; i.e. transport mobility. Thus, when the truck's function is determined in the contract and MTB provides the transportation service, then MTB would become a LSP or haulage company themselves. This involves taking over entrepreneurial risk related to the customer's core business when this is offered to professional transport organizations. It might be an interesting concept, when offered to an own transporter, but then MTB would have to compete with any other LSP or haulage company. From this can be concluded that a true result-oriented PSS would change MTB's core business more than is desired. In addition, all interviewed customers reported that the knowledge on which vehicle is necessary to perform their transport activities, i.e. the logistical knowledge, is always stronger present at the customer than at the vehicle suppliers. Customers would not allow a supplier to have full control over specifying the vehicles, and customers in general have a lack of confidence that the supplier can perform these transport activities well and efficiently. As a final recommendation, MTB should not focus on establishing a position on the product-service continuum by delivering a result-oriented PSS business model that sells transport mobility.

7 Discussion

This master's thesis studied the implications of product-service systems for the business model of a supplier of heavy commercial vehicles. The thesis started with an introduction of the topic, the context in which the research is performed, and a description of the problem statement that formed the objective of this research project. The main objective was to identify a new or improved business model that allows the investigated case company, MAN Truck & Bus b.v., to move along the product-service continuum. This first section of this chapter evaluates the answers to the research questions as were provided in the previous chapters.

Four theoretical business models

The first stage of the research project was aimed at providing an answer to the first research question, and consisted of a literature review on business models for product-service systems. The review resulted in a theoretical framework which describes a typology of business models for product-services systems that can be positioned on the product-service continuum. Four types of PSS business models were found; 'Transactional Business', 'Product-Oriented PSS', 'Use-Oriented PSS', and 'Result-Oriented PSS'. The organizational aspects of these PSS business models have been described according to nine business model elements; the customer segment, the value proposition, the channels, the customer relationship, the revenue mechanism, the key activities, key resources, key partnerships, and the cost structure. Literature on servitization, including both integrated solutions and product-service systems, has been analysed to get an understanding of the business model elements for the different types of PSS business models and to complete the framework.

Current business model

The framework was tested for its applicability in this context through a single-case analysis at the case company. The current business model of the case company was analysed and compared to the theoretical framework in order to position the case company under one of the theoretical PSS business models. This provided an answer to the second research question. While the theoretical framework makes a distinction between the types of business models largely based on the ownership structure, it seems that the ownership structure is not a useful distinguishing feature in this business context. Retaining ownership of the products by the provider does not necessarily imply a use-oriented or result-oriented PSS. After the framework has been altered based on this conclusion, it was found that one of the first two business models can be applied by the case company, depending on the demands of the customer. The business model aspects as identified in the theoretical framework were confirmed by the analysis of the case company's business model.

Customer perspective

The purpose of the third research question was to get an understanding of the customer's perspective towards the PSS offerings. This was carried out in two separates studies; one consisted of qualitative semi-structured interviews with customers, and the other was a quantitative study called conjoint analysis. Both studies focused on the characteristics of the various PSS business models that are visible for the customer, such as the relationship with the supplier, the contents and value of the offering, the revenue mechanism, etc. The analysis of the customer interviews revealed a set of variables which determines the customer's demand for advanced product-service systems. These variables are able to describe which customers could be targeted with which one of the PSS business models. In addition, the analysis identified the most important value factors that a supplier should deliver through its offerings. It was found that the total cost of ownership and the utilization level are

the two most important value factors. Based on this information a conclusion was drawn about the desired position on the product-service continuum. This desired position was then examined from a quantitative perspective through the conjoint analysis. The customer interviews were held prior to performing the conjoint analysis. This was done to set up an efficient experimental design for the conjoint analysis which is understandable for customers, and so that the results from the conjoint analysis could provide additional validation. Although the response to the conjoint questionnaire was very limited, it showed similar results as compared to the interviews and validation was found.

Business model innovation

Finally, the last research question was aimed at the development of a new or improved business model for the case company. The desired position can be compared to the current position on the framework to identify the required changes in the business model of the case company. The customer's perspective showed that most of the customers are interested in either one of the first two business models which are already applied by the case company. This means that the company's strategy is already aligned with the customer's sourcing strategy. However, some possibilities for a use-oriented PSS business model were found. Customers need flexibility in their capacity and in functionality in order to improve utilization levels. This flexibility is therefore very important for many customers. There also seems to be a small group of customers whose maturity level is higher than the majority of the customers. These customers are large (inter)nationally operating organizations in which transportation services are not viewed as their core business. They prefer a supplier who takes total care of their fleet-related issues at a minimum of total costs during the use-phase of the vehicles. This stresses the importance to develop a use-oriented PSS, where the customer procures all-inclusive usage of a vehicle. The fleet of vehicles delivered under this business model are owned by the case company and provided to the customer as a short- or long-term use-based rental solution including full service. This form of rental solutions provides the customer with flexibility and total care at guaranteed low total cost of ownership. This business model has been described by using the nine business model elements of Osterwalder & Pigneur (2010). However, an extensive business case must still be performed to investigate its feasibility, in terms of practical implementation as well as its financial feasibility.

7.1 Academic Implications

The business model concept has proven to be a useful framework to describe a typology of PSS. The current literature was vague on what is an accurate representation for the different types of PSS. More specifically, although Tukker's classification is widely acknowledged, there are some misunderstandings about the actual differences between these types of PSS. Some mainly described that the differences between these PSS are related to the structure of ownership, such as Tukker (2004) himself. However, others mainly describe the type of revenue mechanism and the level of integration as a distinguishing feature (Van Ostaeyen *et al.,* 2013), or the orientation of the services provided under these types of PSS (Beuren *et al.,* 2013). Using the business model canvas as a more structured template, it allows the actual features of a PSS to be broken down in more manageable and understandable separate elements. This makes it easier to describe the actual differences between these types of PSS and categorize a company's business models under either one of these types of PSS. Additional contribution was found by including the perspective of the customer towards various types of PSS business models. Although Kindström (2010) defined customer maturity as the willingness of customer's to adopt more advanced service offerings, it was not clear which aspects determine the customer's maturity level. The interviews with customers in the Dutch market of

heavy commercial vehicles identified a set of variables that seem to affect the customer's maturity level. These variables can be used by assessing which customers are most likely interested in which type of PSS. Finally, although servitization literature traditionally focussed on manufacturing organizations, this research has investigated the implications of PSS as a special case of servitization for an organization further downstream the supply chain. Since the role of an importer is to act as a representative of the OEM in a specific country, their main purpose is similar to that of the OEM, which in this case is selling vehicles and parts. However, their distinctive power comes from adding value through advanced services, which makes analysing advanced service business models, such as PSS, still an interesting topic for these organizations. Given the fact that MTB is part of Pon, instead of the OEM, they have the power to approach the Dutch market in their own preferred way. However, the success of a PSS business model, such as PAYD, is very likely to depend on the willingness of the OEM to cooperate and align with this strategy. Future studies could specifically focus on these supply chain relationships as a success factor for the delivery of integrated products and services by organizations further downstream the supply chain, i.e. non-manufacturing organizations.

7.2 Managerial Implications

As mentioned earlier, MTB's current business model is under pressure; they earn revenues and profits mainly on the sales of spare parts. MTB's profit centre is dependent on the size of the installed base, the maintenance activities that needs to be performed on the installed base, and loyalty from the dealers and customers to purchase spare parts through MTB. Given the current circumstances in the market of heavy commercial vehicles, the installed base is decreasing and vehicles require less maintenance due to increasing product quality. MTB recognizes the need to develop new business models that enable the creation of additional value for their customers and to find alternative revenue streams. This study contributed to this by analysing the possibilities for an altered business model in the context of PSS. The theoretical framework as developed in the literature review describes the possible types of PSS business models a company can implement. A suggestion to implement a use-oriented PSS business model that provides flexibility and total care at guaranteed costs was made based on analysis of the customer's preferences and demands. At the same time, it was confirmed that their current business model matches the sourcing strategy of most of the customers in the market.

In general, the developed theoretical framework can be used by companies that wish to transition towards being an advanced service provider. The framework acts as a tool to follow a business model innovation cycle as depicted in figure 7.1. It allows the company to determine the current position on the continuum, and by analysing the demands and preferences of customers in the market, comparing these to the customer maturity factors as described in table 4.2, the desired position of the company can be determined. After that, comparison of the desired position with the current position highlights necessary changes in an organization's business model for delivering the desired type of PSS.

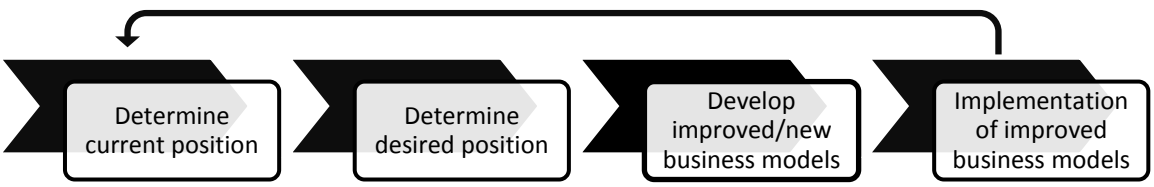


Figure 7.1 – The business model innovation cycle.

7.3 Limitations & Future Research

A drawback of this research study is that it consisted of a single-case study at only one company. The developed theoretical framework could only be assessed on its applicability for the PSS business models which were currently applied by the case company. A distribution of cases on the complete product-service continuum that could truly validate the framework's practical applicability was not present in this study. In addition, the findings of the study cannot be generalized across other industries or markets as this study only investigated the commercial automotive industry.

Another limitation was that, given the qualitative nature, this study only explored the factors that seem to be of importance for a customer's maturity level. It cannot be said which one of these factors is more important over the others, and whether these factors hold for other industries as well. Future research could proceed with the identified factors and empirically validate and test the causal relationships between the factors and the customer's maturity level. Favourably, this should be performed across multiple industries to see whether these factors hold for other industries as well.

Furthermore, the response to the conjoint analysis was very low. A sample size of only 24 respondents was realized, while a typical conjoint analysis sample size normally consists of multiple hundreds of respondents. The results were still similar to the results found in the interviews; however, it is hard to form conclusions about the significance of the results from the conjoint analysis. Future research could conduct a large-scale conjoint study and provide additional information and insights. A larger sample allows for more cross-sections of the data to be made, so that differences between various types of customers could be identified.

Given the exploratory nature of this study, which was aimed at identifying possibly interesting PSS business models based on the market and customer analysis, the suggestions for the new use-oriented business model remain fairly superficial. It was outside the scope of this study to write an extensive and detailed business case on the practical implementation and financial feasibility of this business model. MTB needs to perform further research on this matter.

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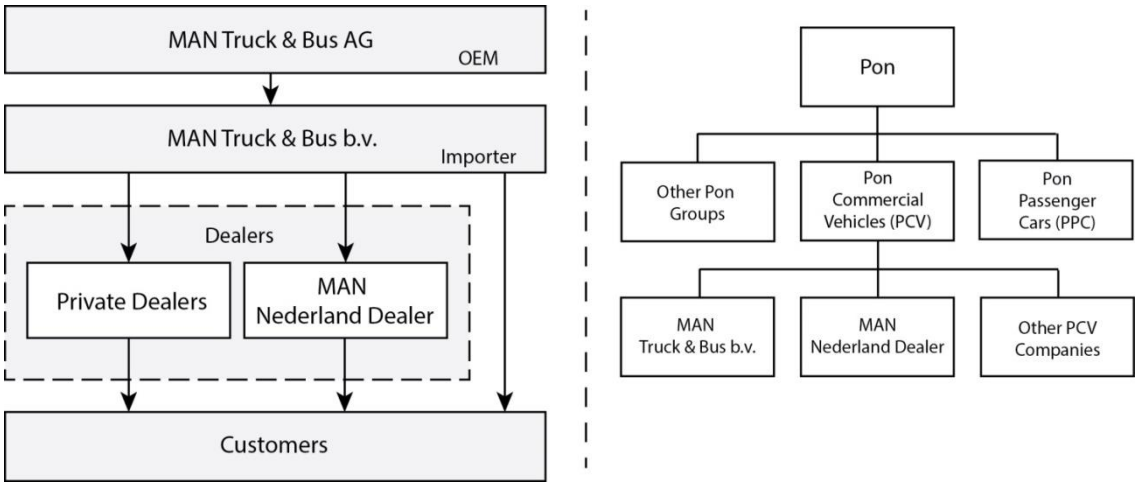
Appendices

Appendix A - List of Tables and Figures

Appendix B - List of Abbreviations

ACBC	Adaptive Choice-Based Conjoint
B2B	Business-to-Business
B2C	Business-to-Consumer
BYO	Build-Your-Own
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CBC	Choice-Based Conjoint
CRM	Customer Relationship Management
EDS	Express Delivery Service
IKA	International Key Account
IS	Integrated Solutions
HB	Hierarchical Bayes
KPI	Key Performance Indicator
LSP	Logistics Service Provider
MND	MAN Nederland Dealer
MTB	MAN Truck & Bus b.v.
OEM	Original Equipment Manufacturer
P&L	Profit & Loss Statement
PAYD	Pay-As-You-Drive
PCV	Pon Commercial Vehicles
PSS	Product-Service System
R&M	Repair & Maintenance
SLA	Service Level Agreement
TCO	Total Cost of Ownership
TLN	Transport & Logistiek Nederland
VWPFS	Volkswagen Pon Financial Services

Appendix C – MTB's position on the value chain



Appendix D – Comparison of Literature on Business Model Elements

Osterwalder & Pigneur (2010)	Johnson et al. (2008)	Giesen et al. (2011)	Hedman & Kalling (2003)	Chesbrough (2007)	Teece (2010)
Value Proposition	Customer Value Proposition	Value Proposition	Offering	-	Customer Value, Technology & Features in Offering
Customer Segments	Customer Value Proposition	Customer Segments	Customers	Target Market	Target Market Segments
Customer Relationships	-	Value Chain Relationships	-	-	-
Channels	Key Resources	-	-	-	Value Capture Mechanism
Revenue Mechanism	Profit Formula	Pricing Models	Offering (price)	Revenue Mechanism	Revenue Stream
Cost Structure	Profit Formula	-	Offering (cost)	-	-
Key resources	Key Resources	Internal Resources	Resources	-	Value Capture Mechanism
Key partners	-	External Partners, Value Chain Relationships	Suppliers	Value Network	Value Capture Mechanism
Key activities	Key Processes	Internal Processes	Activities & Organization, Management Scope	-	Value Capture Mechanism
Competition	-	-	Competitors	Competitive Strategy	-

Appendix E – Service strategies identified in literature on the product-service continuum

Transactional Business	Product-oriented PSS	Use-oriented PSS	Result-oriented PSS
After-sales service [1]; After-sales service provider [2]; Product-related services [3]; Advice & consultancy [3]; Equipment Supplier [4]; Basic Components [7]; Basic IB services [8]; Development Partner [2]; Solution provider [6]; Advice & consultancy [3]; Professional services [8]	Service partner [1]; Customer support provider [2]; Product-related services [3]; Maintenance offering [5]; Integrated Components [7]; Maintenance services [8]; Outsourcing Partner [2]; Activity management & outsourcing [3]; Operational offering [5]; Solution Provider [6]; Basic Solution [7]; Operational services [8]	Lease, Renting, Sharing, or Pooling [3]; Rental Offering [5]	Value Partner [1]; Pay-per-service [3]; Functional result [3]; Integrated Solutions [4,7]; Performance Offering [5]; Performance provider [6]; Full-service [9]; Outcome-based contracting [10]; Performance-based contracting [11]; Functional products [12]

[1] Matthyssens & Vandenbempt (2010); [2] Gebauer (2008); [3] Tukker (2004); [4] Windahl (2007); Davies (2004); [5] Windahl & Lakemond (2010); [6] Helander & Möller (2008); [7] Penttinen & Palmer (2007); [8] Oliva & Kallenberg (2003); [9] Stremersch et al. (2001); [10] Ng et al. (2013); [11] Hypko et al. (2010); [12] Markesat & Kumar (2005)

Appendix F – The 4 theoretical PSS business models

Appendix F.1 - The completed theoretical framework including the four PSS business models.

	Transactional Business	Product-Oriented PSS	Use-oriented PSS	Result-oriented PSS
Customer Segment	Customers that want ownership of the product and have many in-house capabilities to ensure a properly functioning product themselves. In addition, they prefer to remain independent of the supplier. Customer maturity: Low Perceived product complexity: Low	Customers that want ownership of the product and have medium to no capabilities to ensure a properly functioning product themselves. They would like to share expertise with the supplier. Customer maturity: Medium Perceived product complexity: Medium	Customer is interested only in the use of the product and wants to make low initial investments, ownership is not important. Customer relies fully on the supplier's expertise. Customer maturity: High Perceived product complexity: High	Customer is interested only in usage and the functional performance/result of the product, ownership is not important. Customer relies fully on the supplier's expertise. Customer maturity: Very high Perceived product complexity: High
Value Proposition	The physical product is delivered to the customer. Assistance, delivery of spare parts, and corrective maintenance/repairs to ensure a proper function product. Furthermore, increasing the efficiency of the product in the customer's processes by providing consulting services, and product & process training.	The physical product is delivered to the customer. Ensure a proper functioning product by preventing failures and a guarantee on equipment availability/performance through full maintenance contracts. Optimizing customer's processes, reducing risks and operating costs by taking over the operational management of the customer.	The use of, or access to a product is provided, while the ownership remains with the provider. Different forms of usage, such as leasing/renting/sharing, provide the customer with more flexibility. Customers need less capital for the availability of a product.	The output, or the functional result, is delivered that fulfils the customer's specific needs by an integrated combination of products and services. A certain output performance is guaranteed to meet the customer's demands. The customer can focus on their core business, while the supplier makes sure the output is delivered. The provider remains the owner of the product.
Channels	An indirect customer interface is sufficient for the transactional approach. Engaging in professional consulting requires a new service channel.	A more relational approach to sales and services requires a direct & intense interface with the customer. Occurs usually at higher management levels.	Lease & rental contracts are easier to manage than sales of complex products.	A direct & intense interface with the customer is required. The use of relationship marketing should develop perceived trustworthiness, reliability, and experience in delivering results or performance. This should pull PSS adoption.
Customer Relationships	Transactional & reactive relationship, low supplier-customer interdependency.	Long-term customer relationships based on trust and cooperation through sharing expertise and resources. Medium to High supplier-customer interdependency.	Enables a long-term customer relationship. Medium supplier-customer interdependency.	Long-term customer relationships based on trust and cooperation, including risk-, knowledge- & revenue-sharing models. The customer is involved early in the development of the integrated product-service offering. High supplier-customer interdependency.

	Transactional Business	Product-Oriented PSS	Use-oriented PSS	Result-oriented PSS
Revenue Mechanism	Transactional revenue of selling the product. Additional transactional revenues from services. Prices are unbundled and based on the input of required material & human resources.	Transactional revenue of selling the product. Additional recurring revenues for the services component. Pricing for services is bundled and can be based on the input of required material & human resources, or on the operational availability of the product. When taking over operational management, pricing can also be based on performance.	Recurring relational revenues based on availability or usage of the product. Both product and services are integrated into one revenue model.	Recurring relational revenues which can be based on availability, usage or performance/output of the product. The used revenue mechanism depends on the level of abstraction for defining functionality. Products and services integrated into one revenue model and coupled to performance.
Key Activities	Outstanding product & process development to deliver the best product. Furthermore, business consulting to optimize the use of the product in the customer's process.	Assessing risks, costs, and possible failures. Monitoring the performance of the product. Continuous development of product and services and integrate them as systems to deliver and improve performance.	Assessing risks, costs, and possible failures. Monitoring the performance of the product. Continuous development of product and services and integrate them as systems to deliver and improve performance, taking care of the complete life-cycle and disposal. Design for function/usage. Training retail & sales personnel. Activities related to financing.	
Key Resources	An independent service organization to manage after sales process efficiently. Knowledge on customer's processes for professional services.	Remote monitoring capabilities for gathering management information and assessment of product quality and risks. Intimate knowledge on customer's processes. Additional human resources for managing operations.	Remote monitoring capabilities for gathering management information and assessment of product quality and risks. Intimate knowledge on customer's processes. Additional human resources for managing operations. High need for additional financial resources.	
Key Partners	Outsourcing of non-core business services to an external partner. Basic information exchange between partners.	Long-term relationships with service suppliers. Intense information exchange between partners.	Strategic integration with partners and stakeholders. Intensive information exchange, including training, sharing knowledge, and sharing capabilities.	
Cost Structure	Mainly production and R&D costs, additional material and human resources costs for providing basic services.	More efficient utilization of service capacity which reduces costs. Additional costs for human resources needed for managing operations.	Increased cost for financing activities, since return on the invested capital is extended over a period of time.	Increased cost for financing activities, since return on the invested capital is extended over a period of time. There is a need for life-cycle cost management.

Appendix F.2 – A detailed description of the 4 theoretical PSS business models

Business Model 1 – Transactional Business

The first business model that is positioned on the product-service continuum includes the transactional services as defined by Oliva & Kallenberg (2003); basic installed base services and professional services. As with all the installed base services, the product is sold in a traditional manner and services are provided during the use phase of the product. The types of customers that can be targeted with this type of business model are customers with a low level of customer maturity. Customer maturity can be described as the customer's willingness to adopt advanced services, or in this case more advanced PSS (Kindström, 2010). The more mature a customer is, the more he is willing to adopt a PSS approach. Preference of ownership is one of the factors determining the level of customer maturity. Other factors are the core business of the customer, the customer's own capabilities in servicing the tangible assets, its financial resources, and the perceived technological complexity of the offering (Helander & Möller, 2008). Customers in this business model like to remain independent of the supplier since they have already acquired many in-house capabilities to keep the product functioning properly themselves. The product's complexity is perceived to be low, further reducing the need to outsource activities during the use phase to the supplier. In addition, they have sufficient financial resources and like to keep the ownership of the product. To keep the product's proper functionality, basic services are provided, such as repair & maintenance services, a help-desk, delivery of spare parts, break-down services. The customer can also be provided with professional consulting services about how the product could best be used to increase the efficiency of their processes. These are advice, consultancy, product- & process training, but it could also include process-engineering services or process-R&D (Oliva & Kallenberg, 2003; Gebauer, 2008; Tukker, 2004). All services offered to the customer occur on an ad-hoc transactional basis, the services are delivered on request of the customer. The relationship with the customer can thus be described as transactional and reactive. Just as the relationship, the revenue model is also of a transactional nature. The product is sold and services are provided and invoiced case by case (Oliva & Kallenberg, 2003; Helander & Möller, 2008). An input-based revenue mechanism is used where the customer is charged a mark-up for the materials, equipment, and labour that have been used for the service intervention (Van Ostaeyen *et al.*, 2013; Helander & Möller, 2008). The most important resources in this business model are a separate service organization and the human resources to provide the services to the customer (Oliva & Kallenberg, 2003). For delivering professional services an additional key resource is the knowledge & expertise of the employees about the customer's business processes (Markesat & Kumar, 2005; Oliva & Kallenberg, 2003). The core business of the supplier is still oriented on the product instead of services, thus product development is a core activity of the supplier (Oliva & Kallenberg, 2003). This also results in outsourcing of the service activities by many suppliers. These subcontractors are the key partners within this business model. Cost structures are relatively the same as compared with a pure manufacturing organization, although some extra costs are incurred for additional material and human resources necessary for the service interventions (Barquet *et al.*, 2011).

Business Model 2 – Product-Oriented PSS

The second business model captures the relational type of services of the installed base service space (Oliva & Kallenberg, 2003); maintenance services and operational services. The product is still sold in a traditional manner and services are provided throughout the use-phase of the product. However, as compared to the first business model, these services are provided to the customer on a relational basis. The customers that can be best addressed with this business model have a medium customer maturity level (Kindström, 2010). They have sufficient financial resources, thus ownership is still transferred to the customer. However, in contrast to the first business model, these customers do not have the capabilities to maintain the product functioning properly and therefore rely on the expertise of the supplier for this (Helander & Möller, 2008). Furthermore, they perceive the product's complexity as medium. Because of this, they are not developing their own in-house capabilities, but they prefer to outsource the maintenance to the supplier. The value proposition in this business model still represents a functioning product through provision of maintenance services, particularly

(full) maintenance contracts that include all necessary services to ensure optimal equipment availability. Through the provision of a contract, the offering now also includes a guarantee on equipment availability and/or equipment performance, and the risks of product breakdown are incurred by the supplier (Gebauer, 2008). The value proposition can also include operational services that offer the customer improved efficiency and reduced costs of their operations. The supplier takes full responsibility and assumes risks for the customer's operations by taking over the management of the operational processes (Oliva & Kallenberg, 2003). These type of contracts that offer management of maintenance and/or operations need to be performed in coordination with the customer, since the supplier becomes part of the customer's processes (Helander & Möller, 2008). Therefore, a long-term close relationship with the customer based on cooperation and trust is necessary (Oliva & Kallenberg, 2003; Helander & Möller, 2008). For efficient cooperation, both supplier and customer should share expertise and resources in this relationship (Helander & Möller, 2008). As a channel, the provider must establish a direct and intensive interface with the customer in order to facilitate this close relationship (Barquet *et al.*, 2011). Furthermore, the sales of these types of offerings occur usually at higher management levels (Helander & Möller, 2008). The revenue model includes the transactional product sales and a relational component for the revenues on the services (Tukker, 2004; Van Ostaeyen *et al.*, 2013). The revenue mechanism for the services can be based on the required input of resources or on the operational availability of the product (Van Ostaeyen *et al.*, 2013). This means that the provider can charge a fixed fee per time period based on the average costs incurred for the contract or the provider charges a fee for the time the product is available to the customer. The latter includes a bonus/malus on performance in terms of equipment availability (Oliva & Kallenberg, 2003). In case operational services are offered, the revenue model could also be coupled to other performance metrics related to operational management (Gebauer, 2008). The key activities of a supplier are assessing risks, costs, and possible failures in the first place (Oliva & Kallenberg, 2003). A poor functioning product leads to increased costs for the supplier, thus monitoring the condition and the performance of the product is an important key activity (Oliva & Kallenberg, 2003). In addition, to increase the reliability of the product and the efficiency of the provided services, the supplier must continuously develop improved products and services. This automatically leads to the required resources, which are monitoring capabilities (Oliva & Kallenberg, 2003), knowledge on the customer's processes, and additional human resources for managing operations (Helander & Möller, 2008). The increased complexity of the delivered services requires a network of partners that support the supplier in the delivery of the complete offering. The partners should exchange information intensively in a long-term relationship (Barquet *et al.*, 2011). The provisioning of maintenance contracts and taking over the customer's operations allows the supplier to make more efficient use of the service capacity reducing costs (Oliva & Kallenberg, 2003).

Business Model 3 – Use-Oriented PSS

In this third business model, the customer is interested only in the use of the product, not ownership of the product (Barquet *et al.*, 2011). The customer wants to make low initial investments and pay only for the usage of the product. They have no capabilities to maintain the product themselves and they perceive the product as very complex (Helander & Möller, 2008). Thus, the maturity of the customer can be labelled as high (Kindström, 2010). The value proposition in this business model is the carefree use of, or access to a product without the risks of ownership. The supplier retains the ownership of the product and the product is not transferred to the customer, and the supplier is also often responsible for maintenance, repair, and control (Tukker, 2004; Baines *et al.*, 2007). The availability or the use of a product is then often provided through product lease, product renting or sharing, or product pooling. According to Barquet *et al.* (2011), lease and rental contracts are easier to manage than the sales of complex products which reduce the efforts needed in the channels element. However, companies applying use-oriented business models could experience customers that are not enthusiastic about ownerless consumption and need to use new sales channels to pull PSS adoption (Baines *et al.*, 2007). Offering leasing, renting, or sharing concepts enables the development of long-term business relationships (Barquet *et al.*, 2011), instead of the short-term transactional relationship with the traditional sales of products. However, the value in the proposition is still related to the product instead of the performance delivered by the product, i.e. the supplier does not become such a big part of the

customer's processes as with the provision of operational services under the second business model. Therefore, the customer-supplier interdependency is low to medium (Windahl & Lakemond, 2010), depending on whether maintenance and additional services are included in the proposition. The revenues are now completely based on relational mechanisms and both product and services are integrated in this revenue model. Since the offering consists of the use of or access to a product, the possible revenue mechanisms can be availability- or use-based (Baines *et al.*, 2007; Van Ostaeyen *et al.*, 2013). The first consists of a fixed fee for a given period regardless of the intensity of usage in that period, whereas the latter does consist of a fee based on the use intensity. With the use-based revenue mechanism, a customer pays only for the actual usage during a given time period (Van Ostaeyen *et al.*, 2013). The most important resources of this business model are the products of which they provide the usage and the financial resources of retaining the ownership (Tukker, 2004). In addition, for controlling the functionality and quality of the product and reducing the ownership risks of the product, the supplier must be active in monitoring the product. Thus they need to develop or acquire remote monitoring capabilities (Oliva & Kallenberg, 2003). The other key activities and key resources are quite similar to the second business model; continuous optimization of products & services, and additional human resources. The relationship with external partners has risen to a strategically level in this business model as compared to the second business model; partners should share information, knowledge, risks, and capabilities, and they should train each other for optimal service provision towards the customer (Barquet *et al.*, 2011). The cost structure of this business model has an increasing presence of costs related to the required additional capital for retaining the product ownership (Tukker, 2004).

Business Model 4 – Result-Oriented PSS

The most advanced business model is all about the functional aspects of the product. Literature has also referred to this as a functional product business model (Markesat & Kumar, 2005). Customers are only interested in the result, functionality, or the benefits a product can deliver. However, the product itself is considered as irrelevant for the customers, thus ownership is not important (Tukker, 2004; Baines *et al.*, 2007). The customer therefore relies fully on the expertise of the supplier to deliver the integrated solution that is able to deliver the expected results (Helander & Möller, 2008). The customer's maturity level is considered to be very high (Kindström, 2010). The value proposition consists of an agreed upon result, or output performance, that is delivered by the supplier, without any specification of a predetermined product that is involved in the delivery of the results. In principle, the supplier is totally free on how to deliver the agreed upon results (Tukker, 2004; Baines *et al.*, 2007). The value for the customer is the increased ability to focus on the core business by outsourcing all non-core business processes related to management and operations of the product to the supplier. The supplier takes total care and responsibility for the product and the efficiency of the product; this could lead to a benefit for the customer through more customization and a higher quality or performance (Baines *et al.*, 2007). Given the flexible nature of the product being delivered as a service, it could provide the customer with additional flexibility and functionality (Baines *et al.*, 2007). For many customers it is hard to realise the potential benefits a result-oriented PSS can deliver, and to define their demands on an abstract level. Therefore, the supplier must clarify customers of the potential benefits and pull PSS adoption (Baines *et al.*, 2007; Tukker, 2004). This requires relationship marketing to establish a direct and intense interface with the customer, and to create perceived trustworthiness, reliability, and ability in delivering the required results (Gebauer, 2005; Barquet *et al.*, 2011). The goal is to establish a long-term intensive customer relationship based on trust and cooperation, which includes sharing risks, knowledge, and revenues with the customer (Windahl & Lakemond, 2010; Penttinen & Palmer, 2007; Barquet *et al.*, 2011). Revenues in this business model are usually based on the functional aspects of the delivered combination of products and services. However, use-based revenue mechanisms can also be used. Van Ostaeyen *et al.* (2013) described three types of performance based revenue mechanisms that are used in a result-oriented business model; solution-, effect- or demand fulfilment-oriented. Which revenue mechanism will be chosen to charge the customer for providing the service is related to the level of abstraction used to define the functional performance (Van Ostaeyen *et al.*, 2013). In addition, Helander & Möller (2008) described that sharing revenues is important under this business model as that allows for the provider and the customer to have

shared interest in achieving improved performance. In terms of key activities, this improvement on performance requires continuous development of products and services from a functional or performance perspective (Beuren *et al.*, 2013). Just as in the previous business model, product and performance monitoring is also very important under this business model (Barquet *et al.*, 2013). Furthermore, the infrastructural organization of this business model has many similarities with the use-oriented PSS business model, meaning the key activities, resources, and partnerships are much alike. However, as the provider becomes more involved in the customer's processes under this business model, it is of utmost importance that the provider has an in-depth understanding of the customer's processes (Baines et al. 2007; Helander Möller 2007). Furthermore, as the contents of the offering are described in more abstract terms trough functional performance, it requires a different approach from retail and sales personnel to convince the customers of the added value in this offering. Retail and sales personnel need additional training (Barquet *et al.*, 2013). Finally, as the provider is now responsible for the complete product and its operations during the whole life-cycle, it requires new methods of managing the life-cycle costs (Barquet *et al.*, 2011).

Appendix G – Interview Guideline Case Interviews

Interview Guideline

Name respondent:
Department:
Function:
Date:

Introduction

Provide a short description of the research project.
Explain the purpose of the interview; analysis of MTB's current business model and market/customer analysis.
Explain the type of interview; open and semi-structured, question guideline acts as a flexible checklist.
Approximately 1-1,5 hours needed for the interview.
Ask permission of respondent for audio recording.

General

- What is the core business of MTB ? What are MTB's core activities ?
- How would you describe the current business model of MTB ?
- What is the strategy of MTB ?

Value Proposition

- Can you give a description of the products and services that MTB or your department can deliver ?
- What value proposition does MTB deliver ? What is the value for the customer ?
- Are services integrated in the offering ?
- Are the offerings standardized or customized for each customer ?
- Are the offerings oriented towards the product or towards the customer's processes ?

Customers

- Can you give a description of the type of customers in the market ?
    - What customer segments can be identified ?
    - What differences can be identified within these segments ?
- What are the core activities of the customers ?
    - Do many customers perform their own maintenance and service ?
- What are the customer's demands and needs ? What value are they looking for ?
- What is the customer's revenue model ?

Customer Relationships

- Can you describe the relationship with your customers ?
- What contact points occur during the relationship with the customer ?

Sales Process

- How is the sales process organized ?
- What are MTB's sales channels ? How are customers approached ?
    - Is the use of tenders common in the market ?
- Are services integrated in the sales of new products ?

Service Organization

- What after-sales and services are offered to the customers by MTB ?
    - Are the services and after-sales delivered to the customer included in a contract ?
- How is the delivery of after-sales and services organized ?
- What are MTB's service channels ? Through which channels are services being delivered ?
- What role does the dealer organization play in delivery of after-sales/services ?
- Are there any SLA's or KPI's used for delivering after-sales/services ?

Revenue Model & Cost Structure

- Can you describe the revenue model of MTB ?
- What pricing mechanism is employed ? What pricing mechanism does the customer prefer?
    - How price sensitive is the customer ?
- Are the revenues of a transactional or relational nature ?
- Can you describe the cost structure of MTB, and of your department ?
- Does the department have its own profit & loss responsibility ?

Partners

- What stakeholders are involved in delivering the value proposition to the customers ?
    - What logistic partners?
    - What financial partners?
- What relationship does MTB have with the dealer?
- What relationship does MTB have with the OEM?
- Are there any other partnerships that MTB has?

Ending

- Do you have any additions to the discussed topics ?
- Do you have any further remarks regarding this interview ?

Appendix H – Coding Scheme

Table H.1 – The initial coding scheme

Customer Segment	• Customer maturity	• Supplier independency • Perceived product complexity • Preferred type of ownership • Financial resources • In-house capabilities • Core business
	• Customer characteristics	
	• Customer value	• TCO • Utilization levels
	• Supplier expectations	
Value proposition	• Services	• Basic IB services • Professional services • Maintenance services • Operational services • Lease / Rental • Functional result
	• Product-service integration	
	• Values	• Cost reduction • Flexibility • Unburdening
Channels	• Sales	• Direct • Indirect
	• Service	• Direct • Indirect
Customer relationship	• Transactional interactions • Long-term relationship • Trust • Sharing knowledge, risks, and revenues	
Key partners	• Basic information exchange • Strategic integration	
Key resources	• Human resources • Financial resources • Remote monitoring capabilities • Customer knowledge	
Key activities	• Relationship marketing • Risk & cost management • Maximizing customer loyalty	• Condition monitoring
Revenue mechanism	• Transactional revenues	• Product • Services
	• Relational revenues	• Pay per month • Pay per use • Pay per function • Pay per performance • Integrated revenues (product & service)
Cost structure	• Additional costs for human resources • Efficient utilization of service capacity • Product and R&D costs • Cost of financing activities • Life-cycle cost management	

Table H.1 – The final coding scheme

Customer Segment	• Customer maturity	• Supplier independency
		• Risk aversion
		• Trucks/transport as core business
			• Performance scope
			  ○ KPI
			  ○ Emotion vs. rational
			  ○ TCO vs. Price comparison
			• In-house capabilities
			  ○ R&M
			  ○ Operational
			• Control
			  ○ Product specs
			  ○ Activities
			• Multi-supplier strategy
			• Trust in supplier
			  ○ Previous experiences

	• Customer characteristics	• Fleet size
		• Type of deployment
		• Sector/Industry
		• Truck tenure
		• Preferred ownership
		• Core business
			• Financing/Leasing
			  ○ Residual value guarantee
			  ○ Bad fit with truck tenure
			• Transport / LSP
			• Own transport

	• Customer value	• TCO
		• Sustainability
		• Utilization levels
			• R&M, tires
			• Personnel
			• Fuel
			• Depreciation, insurance, interest
			• Win-win with fuel savings
			• Carbon footprint
			• Flexibility
			  ○ Fleet Capacity
			  ○ Functionality
			• R&M down-time
			  ○ Break-down response
			  ○ Service intervals
			• Logistic planning
			  ○ Loading factor
			  ○ Delivery success
			  ○ Vehicle weight

	• Supplier expectations	• Flexibility
		  ○ Fleet capacity & functionality
		  ○ R&M planning
		• One-stop-shop
		• Proactive support
		  ○ Knowledge & expertise
		  ○ IT-support/integration
		• Total Care / Unburdening
		• Product improvements	

	• Fleet Management	• Fleet Capacity • R&M	• Demand fluctuations • In-house capabilities • Dealer R&M • Service contracts

			• Down-time • Service intervals
		• Tire management • Performance monitoring • Risk management • Logistics planning • Fuel management	• Telematics ○ Not open source/universal • Driving style analysis
Value proposition	• Products	• Truck • Touring car • Bus • Used vehicles • Vehicle suitability (specs) • Parts	

	• Services	• Pre-sale advice
		• Financial services
		• Spare Parts
		• Product Advice & Consultancy
		• R&M
		• Operational Services
		• Disposal
			• Lease
			  ○ Operational
			  ○ Financial
			• Insurance
			• Express Delivery Service
			• Driver training
			• Fleet Care
			• Ad-hoc
			• Service contract
			  ○ SLA
			  ○ No SLA
			• One-stop-shopping
			• Fleet Management
			• Telematics
			• One-stop-shopping
			• Take-back

	• Customization		
	• Values	• Flexibility • Unburdening • Low TCO • Uncertainty reduction	• Risk reduction • Equipment availability
Channels	• Sales	• Direct sales • Dealer sales • Tenders	
	• Service	• Contracting • Ordering • Expediting	
	• IKA • Non-IKA		
Customer relationship	• Long-term relationship • Trust • Close collaboration • Transactional interactions • Dealer		
Key partners	• OEM • 3rd party suppliers		

	• Logistics • Dealers • Financing partners		
Key resources	• Human resources • Financial resources • Telematics • Inventory forecasting system		
	• Knowledge & Expertise	• Customer knowledge • Product knowledge • Maintenance knowledge	
Key activities	• Selling vehicles • Selling parts		
	• Marketing • Inventory management • Performance monitoring	• Lead generation	
	• Risk management	• Risk-sharing models • Condition monitoring	
	• Dealer support	• Maximizing dealer loyalty • Dealer training • Dealer network strategy	
	• Maximizing customer loyalty		
Revenue mechanism	• Transactional revenue on vehicle sales		
	• Revenue on services	• Sales of spare parts • Monthly fees	• Service contract • Fleet Care • Telematics
Cost structure	• Logistics • Inventory • Human resources • Commercial leniency • Marketing • Cost price spare parts		

Appendix I – The service offerings of MTB

Pre-sale advice & financing

At the beginning of a vehicle's life-cycle, a customer must determine what would be the best solution for their specific situation. Depending on the existing pre-knowledge a customer has about the specifications needed for his type of vehicle application, MTB can function as a consulting partner providing the customer with advice on what would be the best solution for their situation. During the sales process, in corporation with financing partners, MTB also offers a wide variety of financial services, which includes financing, leasing and/or insurances. The two main types of financing are financial and operational lease. The difference between financial and operational leasing is that with financial leasing a customer becomes the owner of the vehicle after the lease term and the vehicle is therefore activated on the customer's balance sheet. Whereas with operational lease, the vehicle is not activated on the customer's balance sheet and the customer is not the owner of the product. The costs for leasing the vehicle become a running expense that is shown on the customer's profit & loss statement (P&L).

Maintenance

Once a vehicle is operational at the customer's location, it needs to be provided with maintenance to ensure a proper functioning and performance of the vehicle. MTB provides many possibilities to customers so that their vehicles are properly maintained. The main differentiation can be found in the service segmentation approach; the self-repairing customers are provided with spare parts and knowledge to maintain the vehicles themselves. These customers can use MAN's express delivery service (EDS), where spare parts are delivered directly at their workshops overnight. In addition, these customers can apply for MAN FleetCare, where they receive technical documentation, mechanic training, diagnostics equipment, and technical support. This proposition is meant to provide the self-repairing customers with a similar platform as the dealers, so that these customers can perform maintenance themselves as efficient as possible. For customers with older vehicles in their fleet, there is also a possibility to purchase MAN Ecoline parts. These parts have been refurbished and are delivered with full factory guarantee at a lower price.

The other group of customers come to the dealers for maintenance services. The possible types of maintenance services are; corrective, preventive maintenance, and predictive maintenance. Corrective maintenance aims at solving product break-downs or malfunctions as fast as possible; this includes corrective repairs, statutory inspections, a break-down service, etc. Preventive maintenance aims at preventing break-downs and failures by following periodic maintenance schedules and replacement of wear & tear parts. While predictive maintenance is aimed at optimizing the maintenance schedules and interventions for optimal equipment availability by monitoring the product's condition and predicting possible break-downs. Corrective and preventive maintenance can occur on an ad-hoc basis when the customer approaches a dealer and asks for maintenance. In this case, MTB is not involved in providing maintenance; this is completely taken care of by the dealers and MTB only sells the spare parts necessary for providing maintenance to the dealers. However, maintenance can also be offered on a relational basis through a service contract. MTB offers different types of service contracts, depending on the scope of maintenance services that are included. In the full-service maintenance contract, all three types of maintenance are included; corrective, preventive, and predictive, at a fixed monthly fee. The customer knows exactly what it can expect in terms of maintenance costs during the years of the contract, while MTB carries the risk

of excessive costs. Furthermore, a service contract unburdens the customer by managing the maintenance of the vehicles and providing them with concise management reports. In some cases, a service contract also includes SLA's on equipment availability, making it a performance-based contract. This is common in the bus market, where public transport organizations demand a certain capacity to be available at all times. Only a few cases exist in the truck market, for instance the crash tenders at Schiphol. However, in general there are no availability guarantees provided to the customers in the truck market.

In some cases, MTB has taken over the customer's workshop and offers a service contract including the availability guarantees as described above. For the public transport organizations, these are the BusPartners establishments. Other examples are, AirportPartners for the crash tenders at Schiphol, and WastePartners for the garbage trucks of SITA. These workshops are organized as such that they are specialized in R&M for these types of trucks and function as a one-stop-shopping centre. These one-stop-shops act as a single contact point for the customer that can organize maintenance of the complete system. Another one-stop-shopping concept of MTB is TrailerPartners. This form of maintenance involves not just the trucks delivered by MTB, but also the accommodated superstructures, subsystems, special installations, and trailers. This one-stop-shopping principle can be provided on an ad-hoc basis, but it can also be incorporated in a service contract. By providing one-stop-shopping, MTB is becoming a solution provider as described by Helander & Möller (2008), since they ensure proper functionality of not only their own components, but also that of third party suppliers.

Operation

In order to reduce costs related to fuel usage and excessive wear & tear during operation of the vehicles, MTB can deliver a driver training in corporation with the OEM and the ANWB; MAN ProfiDrive. This driver training aims at driving economically and responsibly and it complies with the Code 95 training that drivers need to follow every once in a while. The training is usually offered to the customer during the sales process and is provided as a one-time transaction.

Only recently, during the internship at the case company, MTB has started to proactively offer operational services, such as fleet management. Fleet management activities can be divided in three different categories; technical management, financial management, and logistics management. First, technical management can also be described as maintenance management as it relates to maintenance planning, tire management, managing break-down services, pick-up and return services, and arranging substituting vehicles. Financial management can be anything from basic administration, managing the service or leasing contracts, up to managing insurances. Finally, logistics management has everything to do with the deployment of vehicles and drivers. This includes managing the fleet capacity, purchasing and disposal of vehicles, planning of vehicle deployment, driver management, and fuel management. These three types of fleet management activities go hand in hand as they are strongly related, but it is possible for the customer to outsource these activities to a service supplier. As such, MTB's trucks can now be equipped with a telematics solution that combines performance monitoring, usage monitoring, communication, and track & tracing. MTB uses the information of MAN TeleMatics basically for two purposes; first, they use the information for managing the maintenance activities for vehicles under a service contract. In case maintenance is provided on ad-hoc basis, without service contract, the dealers can also use the TeleMatics information for managing the maintenance if that is demanded by the customer. This way, maintenance can be organized more efficiently in terms of both equipment availability and

maintenance costs. Second, MTB uses the information for offering operational services. This includes mostly analysis of the driving behaviour of the customer's truck drivers. The customer is given advice on how their truck drivers can drive more economically in terms of both fuel consumption, as well as maintenance cost related to wear & tear. Clear and concise performance reports can show the economic savings potential. At the time of this study, MTB is setting up a specific program for offering driving training to a particular customer based on the information obtained from TeleMatics.

Disposal

When a customer decides to no longer use the vehicles, he can take care of the vehicle disposal himself, but MTB also provides the ability to take-back vehicles through MAN TopUsed. MAN TopUsed is the occasion trading organization of MTB. During the sales process, MTB can provide a guarantee on the residual value as an option for the customer to sell the vehicle at the end of its use to MTB for the guaranteed sales price. In case leasing is included in the offering and the customer decides not to take over the vehicle after the leasing period, then the vehicles are also transferred to TopUsed. MAN TopUsed then organizes the remarketing of the vehicles. Occasionally, these vehicles are also used for short-term rentals; mostly serving as replacement vehicles during maintenance activities.

Appendix J – Interview Guideline Customer Analysis

Interview Guideline

Name respondent:
Department:
Function:
Date:

Introduction

Provide a short description of the research project.
Explain the purpose of the interview; market/customer analysis, identifying customer value and preferences.
Explain the type of interview; open and semi-structured, question guideline acts as a flexible checklist.
Approximately 1-1,5 hours needed for the interview.
Ask permission of respondent for audio recording.

Business Model of X

- What is the core business of X ? What are the key activities?
    - Which parts of the logistical process does X perform?
    - What sector/industry are you operating in?
    - Are trucks/transport perceived as a part of X's core business?
- What type of customers does X have?
- What are X's revenue mechanism and cost structure?
    - Do you focus on Total Cost of Ownership?
    - How is this optimized?
- What are the challenges/problems that X faces in doing business?
- What is most important for X?
    - TCO / flexibility / fuel consumption / availability / loading factors / sustainability / quality
- What is the strategy of X?
    - Which role does the supplier of commercial vehicles need to take for this strategy?

Fleet

- Can you give a description of the fleet of X? What type of vehicles/equipment?
    - Do the vehicles have any customized specifications, or are they quite standard?
    - What is the average truck tenure? How long are the vehicles in use?
- Which fleet management activities are currently done at X?
    - Are any fleet management activities outsourced?
        - Technical / Logistic / Financial
- How does X determine the required capacity of the fleet? And trailers/drivers?
- Do you experience many peaks and troughs in the demand for capacity?
    - If so, how frequently and how strong are these peaks?
- What solutions does X use to capture these capacity fluctuations?
    - Rental / Flexible Leasing / Charters?
- What is the distribution of fixed vs. flexible capacity?

Supplier Relationship

- Can you describe the current products and services that are used from MTB?
- Can you describe the current relationship with MTB?
    - What should be changed in this relationship?
- What are the expectations of the vehicle supplier?
    - To what extent is X looking for complete solutions, instead of trucks and basic service?
    - To what extent is X looking for a proactive and strategic partner focusing on performance of X's processes?
    - Total care / fleet outsourcing / purchasing kilometres

Performance

- What are important KPI's for the business of X?
    - TCO / fuel / availability / loading factors / flexibility / sustainability / logistic-related
- What are important KPI's for the customers of X?
    - Does X provide any guarantees to its customers?
- How actively is X engaged in managing and monitoring performance metrics?
    - Does X make use of any telematics software?
    - What performance metrics are measured?
- How important is sustainability for X?
    - What is done to become more sustainable?
    - Where lies the biggest potential in becoming more sustainable?

Procurement

- How is the purchase of new equipment organized? Through dealer, importer, tenders?
- What is important when purchasing new vehicles? What does X look for?
    - Residual values / financing / R&M / TCO / brand / supplier partnership / vehicle specs
- How does X evaluate multiple types of trucks, or different brands?

R&M, Tires, and after sales during use-phase

- How is R&M to the vehicles/trailers currently organized?
    - Service contract / ad-hoc at the dealer / universal workshop
- Does X have own R&M capabilities? If so, what is the reason of having own R&M capabilities?
- What is important for X in terms of R&M?
- Is there a need for one-stop-shopping; all after sales services organized at one supplier?
- What after sales and/or services are you expecting from a supplier?

Ending

- Do you have any additions to the discussed topics ?
- Do you have any further remarks regarding this interview ?

Appendix K – Positioning of the Interviewed Customers

	Transactional Business	*Product Oriented PSS*	*Use Oriented PSS*	*Result Oriented PSS*
Customer Positions	**A B E I K** **B E J K**	**C D G H** **C D G**	**(A) (D) F (G)**	**(G)**

Customers:	*Respondent:*	*Fleet Size:*	*Own workshop(s) for trucks/other equipment:*	*Core business:*	*Sector:*
A: ICT Holland Transport	Owner	± 65	Yes / Yes	LSP/Haulage	Tank & Silo
B: Nabuurs	Fleet Manager	± 400	Yes / Yes	LSP/Haulage	Retail / Distribution, Tank & Silo
C: Vos Logistics	Fleet Manager	± 1.000	No / Yes	LSP/Haulage	Tank & Silo, Cargo/Long Haul
D: DHL Express	Fleet Manager / Procurement Manager	± 500	No / No	LSP/Haulage	Distribution
E: Lekkerland	Fleet Manager	> 150	No / No	Own transport / LSP	Retail / Distribution
F: Mebin	Fleet Manager & Procurement Manager	± 220	No / No	Own transport	Construction
G: SITA	Fleet Manager	> 200	No / Yes	Own transport	Waste
H: Bode Scholten	Owner	± 50	No / No	LSP/Haulage	Retail / Distribution
I: John v/d Kroon	Owner	1	No / No	Own transport	Other
J: Post-Kogeko	Director	> 100	Yes / Yes	LSP/Haulage	Retail / Distribution
K: J. Den Breejen	Fleet Manager	± 50	Yes / Yes	Own transport	Construction

Appendix L – Background information on conjoint analysis

Appendix L.1 - The experimental design

As described in the theoretical framework, the differences for the customer between the various types of PSS are mainly related to the contents of the offering, the corresponding ownership structure, the relationship with the supplier, and the payment structure for the customer.

In terms of contents of the offering; the scope of maintenance services is important, whether the customer wishes to outsource all maintenance to the supplier, i.e. one-stop-shopping. Other important factors are additional services not related to maintenance, such as financial services, insurance services, analysing driving behaviour to reduce fuel consumption, or even full fleet management. As discussed in the previous chapters, these activities or services can all be describes as fleet management services; either technical fleet management, or financial management, or logistic management. When the supplier takes care of all these types of fleet management they offer full fleet management to the customer. The table below provides an overview of the initial design of the attributes & levels.

Attributes	*Levels*	*Attributes (cont'd)*	*Levels (cont'd)*
Relationship with the Supplier	- *Reactive & Incidental* - *Proactive & Informative* - *Strategic partner (including KPI's)*	*Technical Services*	- *Supply of spare parts* - *R&M at the dealer* - *One-stop-shopping*
Ownership Structure	- *On-balance* - *Off-balance*	*Fleet Management*	- *Not included* - *Technical management* - *Financial management* - *Logistic management* - *Full fleet management*
Control over Product & Services	- *Full control* - *Shared control* - *Little control*	*Pricing Mechanism*	- *Cost-based billing* - *Fixed periodical fee* - *Pay per usage (per km/hour)* - *Pay for function (e.g. tonne-kilometres)*

From this discussion could be concluded that the initial design was too large and too complex for respondents to evaluate properly. In one of Sawtooth's technical papers it was also mentioned that one must be careful in using too much attributes & levels, because it will enact information overload and customers will start using simplification strategies and focus only on the most important attributes (Orme, 2002). In general, for a full-profile study one must not include more than six attributes.

In addition, the current design created confusion between some of the attributes and corresponding levels. Some combinations of attributes & levels would not represent a logical product concept, thus being hard to evaluate by respondents. In the current design there is too much correlation between the attributes & levels, a common problem among conjoint studies (Hair *et al.,* 2010). Sawtooth described in one of their research papers (Orme, 2002) the possibility of describing prohibited pairs, or combinations of features, that cannot be displayed at the same time to solve this issue. However, they discourage the excessive use of prohibitions as this reduces design efficiency. Therefore, it was necessary to rearrange some of the attributes & levels, so that minimal prohibitions were required and design efficiency was improved.

The final version of the experimental design is shown in the table below. The attribute related to *'ownership structure*' and '*control over the product*' have been removed from the design to reduce the correlation between the attributes. Instead, these are now summarized by the type of relationship with the supplier and a new attribute that describes the integration of the product and services as a total solution. These two attributes can be considered as 'superattributes' as defined by Hair *et al.* (2010), that combine aspects of correlated attributes. The type of relationship defines the degree of control of the supplier and the product-service integration defines whether the customer purchases the vehicles as a service, or whether the vehicles are sold separately from the services. This is considered to be a better approach, because an off-balance ownership structure does not necessarily imply an advanced service model in this business context, as described earlier.

Attributes	***Levels***	***Attributes (cont'd)***	***Levels (cont'd)***
Relationship with the Supplier	- *Reactive & Incidental* - *Proactive & Informative* - *Strategic partner (including KPI's)*	*Product-Service Integration*	- *Products & Services <u>not</u> integrated as total solution* - *Products & Services <u>are</u> integrated as total solution*
Technical Services	- *Supply of spare parts* - *R&M at the dealer* - *One-stop-shopping*	*Pricing Mechanism*	- *Cost-based billing* - *Fixed periodical fee* - *Pay per usage (per km/hour)* - *Pay for function (e.g. tonne-kilometres)*
Fleet Management	- *Not included* - *Technical management* - *Full fleet management*		

An ACBC questionnaire consists of three sections; the Build-Your-Own (BYO) question, the screener section, and the choice task tournament. In the BYO-question, a respondent can choose their ideal combination of features for their product concept. The screener section uses this information to generate near optimal concepts, which deviate on a few attributes compared to the BYO concept. The respondent must evaluate each of these screening concepts and mark it as "a possibility" or "not a possibility". Based on this, the model comes up with suggestions on which specific features might be totally unacceptable or an absolutely must have for that particular respondent. Based on this, an X amount of possible product concepts are generated that are shown in the choice task tournament. In this final section, the respondent sees a set of choice tasks that consists of three possible screening concepts and has to choose the best option. This section can be treated as a fallout tournament, because each product concept that is not chosen will be removed from the set and the process continues until the best product concept has been identified.

Appendix L.2 – Hierarchical Bayes estimation procedure

The information from the ACBC questionnaire is coded for parameter estimation during the HB analysis. Since, an ACBC consists of three different sections as compared to a traditional CBC, these sections are treated and coded differently in the HB analysis. The BYO questions can be treated as X choice tasks for an X number of attributes where the respondent chooses one of the levels. In the screener section, a T number of product concepts are generated where the customer marks these concepts as "a possibility" or "not a possibility". These marks are treated as binary choices, where it is assumed that the respondent compares the utility of these concepts to a certain threshold. This threshold is included in the HB analysis. The final section in the ACBC, the choice task tournament, is treated similarly as in traditional CBC analysis. The built-in HB analysis tool of SSI Web takes care of this information coding automatically and estimates the part-worth utilities based on this reasoning.

The HB model assumes that individual part worths have a multivariate normal distribution that can be represented by the following equation. In this equation, $\boldsymbol{\beta}_i$ represents a vector of part-worths for the *i*th individual, $\boldsymbol{\alpha}$ represents a vector of means of the distribution of individual's part worths, and **D** represents a matrix of variances and covariances of the distribution of part worths across individuals.

$$\boldsymbol{\beta_i} \sim Normal(\,\boldsymbol{\alpha}, \boldsymbol{D}\,)$$

Choices for each individual can be described by a multinomial logit model, i.e. the preference model, where the probability of the ith individual that chooses the kth alternative in a specific task can be described as follows, with $\mathbf{p_k}$ the probability and $\mathbf{x_j}$ a vector of values that describes the jth alternative in that choice task:

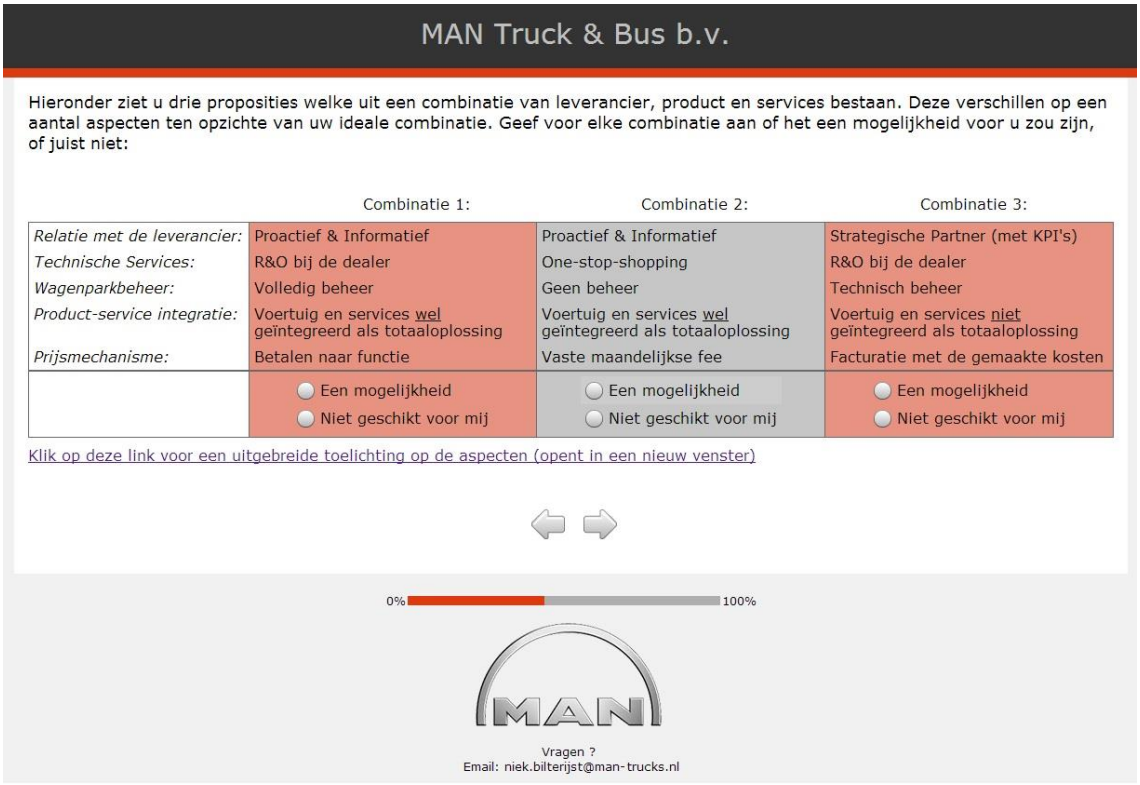
$$\boldsymbol{p_k} = \frac{e^{\boldsymbol{x_k'\beta_i}}}{\sum_j e^{\boldsymbol{x_j'\beta_i}}}$$

The parameters that are estimated in the HB analysis are the vectors $\boldsymbol{\beta}_i$, the vector $\boldsymbol{\alpha}$, and the matrix **D**. This is done through an iterative process which is quite robust, and the chosen start values do not appear to affect the results of the iteration process (Orme, 2009b). Each iteration consist of a few steps, in which each step re-estimates one set of parameters based on the values for the other two sets. This iteration process continues until convergence is achieved. This technique is known as 'Gibbs sampling' (Orme, 2009b).

Once convergence is assumed after an x number of iterations, the process continues for many further iteration steps and the values found for the three parameters in each of these iteration steps are saved in a log file. The final results that are found from the analysis are the average values of the three parameters found during the iteration steps that occurred after convergence. The betas are particularly interesting as they represent the part-worth utilities of each individual. SSI Web's built-in analysis tool automatically performs these iteration steps. However, it is possible to change the number of iteration steps that are performed before convergence is assumed and the number of steps after convergence is assumed in the 'estimation settings' tab of the analysis tool.

Appendix M – Experimental Design Conjoint Analysis

Appendix M.1 – An example of a screener question showing the experimental design.

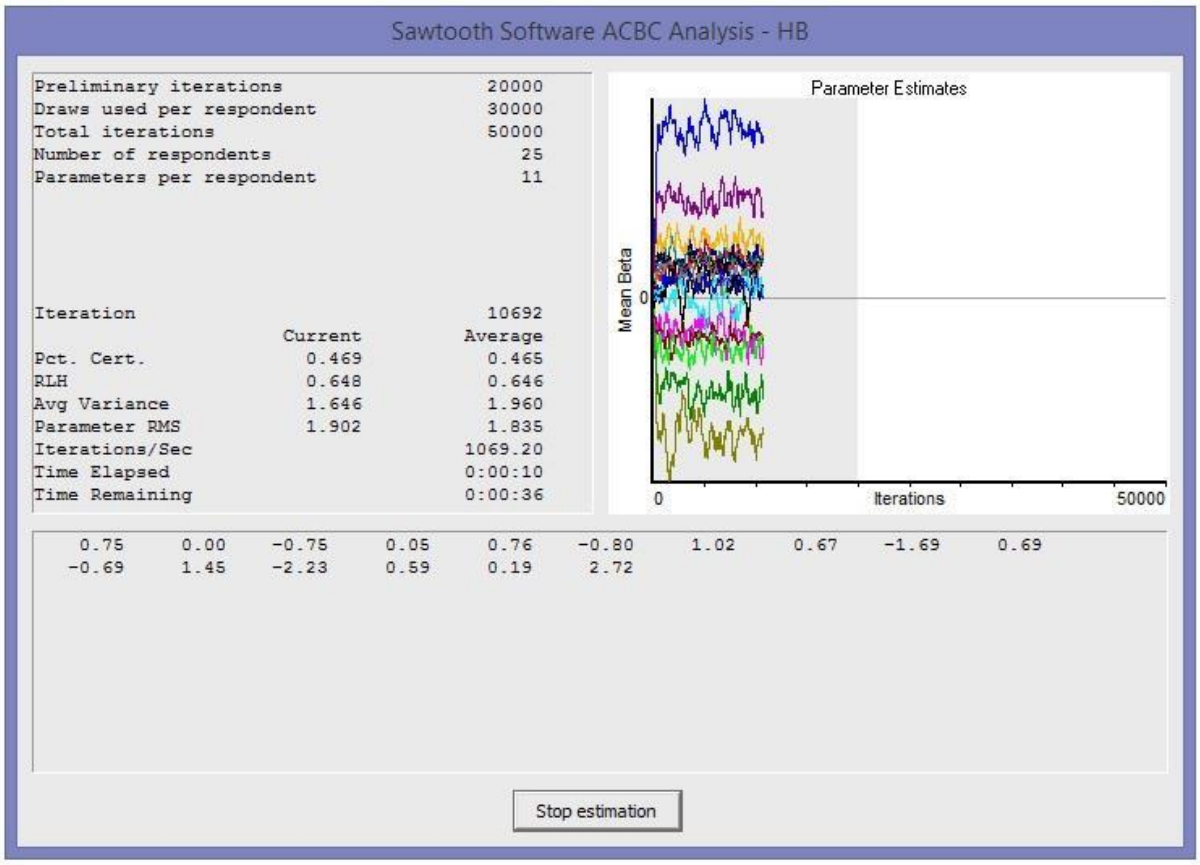


Appendix M.2 – The additional information that describes the attributes & levels.

Relatie met de leverancier:	
- Reactief & Incidenteel:	U geeft aan wanneer u de leverancier nodig heeft. Verder wordt er geen support of meedenken verwacht vanuit de leverancier. U heeft zelf veel controle.
- Proactief & Informatief:	De leverancier komt proactief met extra informatie en support en denkt mee over verbeteringen op het product en de processen.
- Strategische Partner:	Intensieve samenwerking op de lange termijn waarbij beide partijen gecommitteerd zijn aan performance-doelstellingen (KPI's). De leverancier heeft veel controle over de voertuigen en geleverde diensten om de gestelde KPI's te behalen.
Technische services:	
- Levering van onderdelen:	Enkel levering van onderdelen indien nodig, R&O wordt in uw eigen of universele werkplaats uitgevoerd.
- R&O bij de dealer:	R&O aan enkel het voertuig wordt uitgevoerd bij de dealer.
- One-stop-shop:	R&O aan zowel voertuig als opbouw, opleggers, en sub-systemen bij de dealer.
Wagenparkbeheer:	
- Geen beheer:	Naast eventuele technische services (R&O/Onderdelen/One-stop-shop) biedt de leverancier geen aanvullende services (alleen bij een reactieve leverancier).
- Technisch beheer:	Pakket met wagenpark-services op technisch vlak, zoals planning voor R&O/APK, schade afhandeling, haal- en brengservice, vervangend vervoer, pechhulp.
- Volledig beheer:	Deze vorm van wagenparkbeheer omvat een totaalpakket en geeft u als klant totale ontzorging. Dit pakket bevat alle componenten van wagenparkbeheer; financieel, technisch en logistiek wagenparkbeheer en is volledig gericht op het verbeteren van uw processen en het verlagen van uw Total Cost of Ownership. Dit omvat o.a. contractbeheer, administratie, brandstofadministratie en -monitoring, aansturen van chauffeurs, verzekeringen, beheren van de capaciteit, inzetten van extra voertuigen, etc.
Product-service integratie:	
Bij het prijsmechanisme zijn er twee mogelijkheden met betrekking tot het voertuig; wel of niet geïntegreerd:	
- Niet geïntegreerd:	Het voertuig en de aanvullende services worden gescheiden verrekend; het voertuig wordt separaat aangeschaft, en de services worden in één prijspakket opgenomen. Onderstaand prijsmechanisme geldt enkel voor alle geleverde services.
- Wel geïntegreerd:	Het voertuig wordt opgenomen in de totaaloplossing, onderstaand prijsmechanisme geldt voor zowel voertuig als alle geleverde services. Het voertuig blijft in dit geval in eigendom van de leverancier en het gebruik wordt aangeboden als service.
Prijsmechanisme:	
- Betalen naar verbruik:	Vaste prijs voor elke kilometer/uur dat het voertuig wordt ingezet.
- Betalen naar functie:	De functie van de totaaloplossing wordt ingekocht in plaats van de voertuigen en services zelf (bv. een X aantal ton goederen dat getransporteerd kan worden per maand). Dit is alleen mogelijk indien de voertuigen in eigendom blijven van de leverancier; waarbij de voertuigen en services dus wel geïntegreerd zijn.

Appendix N – HB Analysis Monitoring

An example of monitoring the iteration process in SSI Web's HB analysis tool.



Appendix O – HB Analysis results

*Table O.1 – Results from the HB analysis on customers with **own R&M capabilities**.*

Attribute Importance	*Level Utilities*	*Attribute Importance*	*Level Utilities*
Relationship with the Supplier **(19.14 %)**	Reactive & Incidental **(1.46)** Proactive & Informative **(19.02)** Strategic partner (including KPI's) **(-20.49)**	Product-Service Integration **(14.79 %)**	Products & Services not integrated as total solution **(28.27)** Products & Services are integrated as total solution **(-28.27)**
Technical Services **(18.16 %)**	Supply of spare parts **(51.78)** R&M at the dealer **(-32.93)** One-stop-shopping **(-18.84)**	Pricing Mechanism **(18.86 %)**	Cost-based billing **(26.05)** Fixed periodical fee **(-50.79)** Pay per usage (per km/hour) **(23.28)** Pay for function (e.g. tonne-kilometres) **(1.46)**
Fleet Management **(29.05 %)**	Not included **(70.42)** Technical management **(0.16)** Full fleet management **(-70.58)**		
Nr. of respondents **7**	Percent Certainty **0.557**	Root Likelihood (RLH) **0.700**	

*Table O.2 – Results from the HB analysis on customers that go to the **dealer for technical services**.*

Attribute Importance	*Level Utilities*	*Attribute Importance*	*Level Utilities*
Relationship with the Supplier **(16.29 %)**	Reactive & Incidental **(-6.474)** Proactive & Informative **(16.91)** Strategic partner (including KPI's) **(-10.44)**	Product-Service Integration **(11.67 %)**	Products & Services not integrated as total solution **(14.67)** Products & Services are integrated as total solution **(-14.67)**
Technical Services **(17.76 %)**	Supply of spare parts **(-24.88)** R&M at the dealer **(37.76)** One-stop-shopping **(-12.88)**	Pricing Mechanism **(32.96 %)**	Cost-based billing **(65.92)** Fixed periodical fee **(-78.76)** Pay per usage (per km/hour) **(10.16)** Pay for function (e.g. tonne-kilometres) **(2.69)**
Fleet Management **(21.31 %)**	Not included **(25.61)** Technical management **(30.14)** Full fleet management **(-55.75)**		
Nr. of respondents **17**	Percent Certainty **0.500**	Root Likelihood (RLH) **0.663**	

*Table O.3 – Results from the HB analysis for customers with a fleet of **less than 50** vehicles.*

Attribute Importance	*Level Utilities*	*Attribute Importance*	*Level Utilities*
Relationship with the Supplier **(15.18 %)**	Reactive & Incidental **(0.25)** Proactive & Informative **(15.33)** Strategic partner (including KPI's) **(-15.58)**	Product-Service Integration **(14.32 %)**	Products & Services not integrated as total solution **(21.52)** Products & Services are integrated as total solution **(-21.52)**
Technical Services **(16.02 %)**	Supply of spare parts **(-10.81)** R&M at the dealer **(25.99)** One-stop-shopping **(-15.18)**	Pricing Mechanism **(31.72 %)**	Cost-based billing **(54.62)** Fixed periodical fee **(-78.50)** Pay per usage (per km/hour) **(17.45)** Pay for function (e.g. tonne-kilometres) **(6.42)**
Fleet Management **(22.76 %)**	Not included **(33.11)** Technical management **(24.83)** Full fleet management **(-57.94)**		
Nr. of respondents **17**	Percent Certainty **0.481**	Root Likelihood (RLH) **0.652**	

*Table O.4 – Results from the HB analysis for customers with a fleet of **more than 50** vehicles.*

Attribute Importance	*Level Utilities*	*Attribute Importance*	*Level Utilities*
Relationship with the Supplier **(24.42 %)**	Reactive & Incidental **(-25.47)** Proactive & Informative **(31.80)** Strategic partner (including KPI's) **(-6.33)**	Product-Service Integration **(10.43 %)**	Products & Services not integrated as total solution **(17.55)** Products & Services are integrated as total solution **(-17.55)**
Technical Services **(18.27 %)**	Supply of spare parts **(25.63)** R&M at the dealer **(-4.37)** One-stop-shopping **(-21.25)**	Pricing Mechanism **(20.61 %)**	Cost-based billing **(45.83)** Fixed periodical fee **(-53.53)** Pay per usage (per km/hour) **(12.73)** Pay for function (e.g. tonne-kilometres) **(-5.03)**
Fleet Management **(26.27 %)**	Not included **(55.61)** Technical management **(10.47)** Full fleet management **(-66.08)**		
Nr. of respondents **7**	Percent Certainty **0.546**	Root Likelihood (RLH) **0.694**	

*Table O.5 – Results from the HB analysis on customers as **professional transporters.***

Attribute Importance	*Level Utilities*	*Attribute Importance*	*Level Utilities*
Relationship with the Supplier **(15.97 %)**	Reactive & Incidental **(-7.77)** Proactive & Informative **(21.09)** Strategic partner (including KPI's) **(-13.32)**	Product-Service Integration **(13.60 %)**	Products & Services not integrated as total solution **(24.72)** Products & Services are integrated as total solution **(-24.72)**
Technical Services **(16.03 %)**	Supply of spare parts **(-6.88)** R&M at the dealer **(16.23)** One-stop-shopping **(-9.35)**	Pricing Mechanism **(27.32 %)**	Cost-based billing **(56.02)** Fixed periodical fee **(-67.31)** Pay per usage (per km/hour) **(25.58)** Pay for function (e.g. tonne-kilometres) **(-14.29)**
Fleet Management **(27.07 %)**	Not included **(34.61)** Technical management **(37.58)** Full fleet management **(-72.19)**		
Nr. of respondents **14**	Percent Certainty **0.457**	Root Likelihood (RLH) **0.640**	

*Table O.6 – Results from the HB analysis on customers as **own transporters.***

Attribute Importance	*Level Utilities*	*Attribute Importance*	*Level Utilities*
Relationship with the Supplier **(17.79 %)**	Reactive & Incidental **(-3.41)** Proactive & Informative **(9.73)** Strategic partner (including KPI's) **(-6.32)**	Product-Service Integration **(12.91 %)**	Products & Services not integrated as total solution **(12.72)** Products & Services are integrated as total solution **(-12.72)**
Technical Services **(16.19 %)**	Supply of spare parts **(10.55)** R&M at the dealer **(20.76)** One-stop-shopping **(-31.32)**	Pricing Mechanism **(32.27 %)**	Cost-based billing **(49.53)** Fixed periodical fee **(-82.60)** Pay per usage (per km/hour) **(9.68)** Pay for function (e.g. tonne-kilometres) **(23.39)**
Fleet Management **(20.84 %)**	Not included **(48.27)** Technical management **(0.99)** Full fleet management **(-49.26)**		
Nr. of respondents **10**	Percent Certainty **0.585**	Root Likelihood (RLH) **0.714**	