

MASTER

Towards solution-centric business a research into business model innovation

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Abstract

During the past two decades, more and more manufacturers are trying to provide solutions to their customers. Despite their efforts, the transformation often results in lower profits and higher costs. According to main stream solution business literature this is because product-centric companies are unable to successfully develop and align services with their product-offerings. Using a business model innovation perspective, this research claims that these companies fail because they are unable to fully adopt their business model to provide solutions. By studying a manufacturer that successfully transformed towards a solution-centric business, this paper contributes to existing solution business literature by developing a model that shows how to manage the transformation from a product-centric business towards a solution-centric business model. The model is based on two core-categories: (1) triggers of transformation, and (2) business model innovation. The model shows how the different elements of the business model innovation are highly interdependent with each other. Therefore, this study shows that the transformation to a solution-centric business is very complex and requires great holistic and systemic thinking of top-managers. Finally, the research finds support for eight propositions related to the transformation to a solution-centric business.

Key words: Solution business, business model innovation, transformation

Executive Summary

Introduction

Traditional manufacturing businesses are placing more and more emphasis on offering solutions to their customers. Despite the many advantages of a solution business models, a lot of manufacturers struggle with or fail in the transformation. The aim of this paper is to see how manufacturers can manage to transform from a product-centric business to a solution business. This is done by focusing on how the business model of a manufacturer should be innovated to go from offering products to successfully offering solutions. Moreover, the aim is to see why manufacturers want to transform to a solution business model and, by combining different solution business literature, how a solution-centric business should be organized. These research aims are translated in the following research question:

How to manage the transformation from a product-centric business to a solution-centric business?

In order to systematically answer the research question, it is divided in the following four sub-questions:

1. Why do manufacturers want to transform to a solution-centric business models?
2. How to organize a solution-centric business?
3. How is a manufacturer mastering the transformation process from a product-centric business to a solution-centric business?

Theory

The theory chapter is divided into four parts. The first part is giving a background of solution business literature and showing its development over the last decades. In the second part, the first sub-research question is answered. There are four main reasons why manufacturers want to become a solution provider, because in theory it drives: (1) top-line growth, (2) bottom-line growth, (3) a more stable cash-flow, (4) and a sustainable competitive advantage. However, empirical data shows that the transformation often does more damage than good to manufacturers. In the third part of the theory chapter, business model innovation literature is applied to solution business literature. Combining these literature streams with each other gives a more complex perspective on the transformation towards a solution-centric business. As a result, the major propositions of this research is: *“Manufacturers that want to successfully transform, from being a product provider to a solution provider, must simultaneously innovate their business model on all three design levels, namely: content, structure, and governance.”* Finally, the fourth part answers the section sub-research question of this research, by combining several insights from different literature stream regarding the organization of a solution business model.

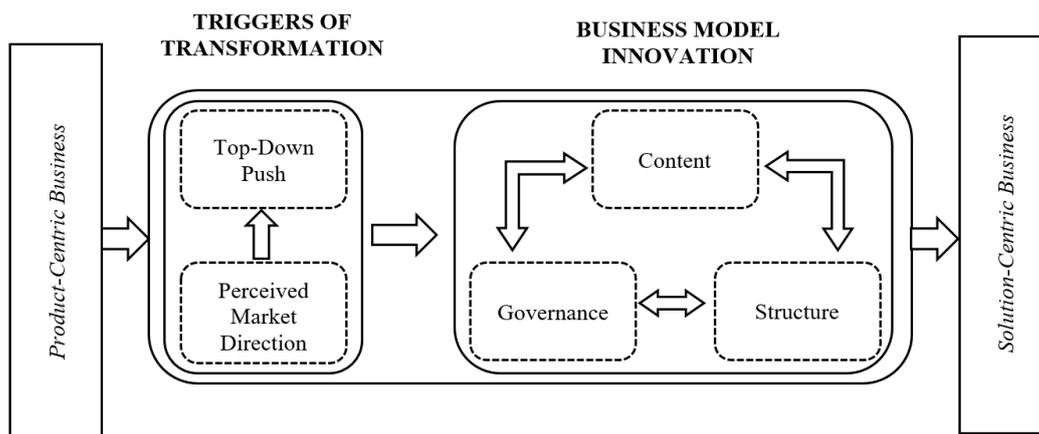
Methodology

In order to answer the research question, a qualitative single-case study is performed. The case-study is a Swiss Multinational high-tech machine manufacturer that recently transformed from a product-centric business towards a solution-centric business. The manufacturer is therefore a critical case for solution business theory and, subsequently, to the related theoretical propositions of this research. This research used “grounded theory” as a general strategy for the collection and analysis of the qualitative data. The data collection for this research took place from March 2016 until July 2016 and is based on the following sources of evidence: documentation, archival records, semi-structured interviews, direct observations, and physical artefacts. The most important source of data collection for this research are interviews. In total 12 semi-structured interviews were carried out with both people from top- and middle- management. Each interview lasted between 1.5 to 2 hours.

Based on both Strauss and Corbin (1990) and Charmaz (2014), the coding of the collected data was done in three phases, namely: “open coding”, “axial coding”, and “selective coding”. The outcome of the coding process were numerous concepts, categories, and core-categories. These formed the building-blocks for the model and theory development of this research. The research applies several tactics to improve the reliability and validity of this research.

Findings

In exploring the research question there are two main themes to the model of solution business transformation, as illustrated in the figure below, that emerged from the case-study, namely: (1) triggers of transformation, and (2) the business model innovation process towards the solution-centric business.



First, two specific categories relating to the triggers of the transformation are identified: (1) perceived market direction by top-managers, and (2) the related top-down push from top-managers to go into a solution business. Indeed, the transformation towards a solution business is clearly initiated by top management. The managerial cognition capabilities play a central role in triggering the transformation towards a solution business.

Second, the model shows that companies that want to transform from a product-centric business to a solution-centric business must simultaneously innovate their business on three levels, namely on content, structure and governance. The different elements of the business model innovation are highly interdependent with each other. Besides the development of this model, the finding chapter highlight all how the case-company was mastering the transformation towards its solution-centric business model. Thus, the third sub-research question is answered in this chapter. Also, some unexpected findings are outlined at the end of the result section.

Discussion

The discussion chapter reflect the implications of the research findings with the main research question. Thus, it goes more into depth how to manage the transformation from a product-centric business to a solution-centric business. The chapter outlines the importance of experimenting with the business model. More importantly, it discussed the interdependencies between the different elements of the business model, and how managers should deal with these interdependencies. In addition, the findings of this study are related to the propositions that were proposed in the theory chapter. All the developed propositions are supported by the findings of this research.

Conclusion

The primary objective of the conclusion is to conclude with the major findings and implications of this research. Several theoretical and managerial implication are identified. Finally, also the limitations of this research and further research avenues are discussed.

Overall, this study gives a more comprehensive understanding of how managers should manage the business model innovation towards a solution business. While main stream solution business literature is more focused on optimizing the details of a solution business model, this study provides a more holistic and systematic perspective on the whole transformation. By applying a business model perspective, this study integrates the disparate solution literature streams into a more comprehensive understanding of the transformation towards a solution business. The solution business literature is focused on different elements of the transformation and, although these different literature streams give valuable insights, they are missing a more holistic perspective. By taking the business model as a unit of analysis, this research integrated these disparate solution literature streams to get a more holistic overview of the transformation towards a solution business.

The key finding of this research for solution business theory is that companies need to innovate the design elements of their business model simultaneously at all three levels. In other words, companies have to simultaneously change the content, structure, and governance of their activity system in order to successfully transform towards a solution-centric business. The model developed in this research shows the important role of interdependencies between the different design elements.

Table of Contents

Acknowledgements	2
Abstract	3
Executive Summary	4
1. Introduction.....	10
2. Theory	13
2.1 Solution business	13
2.2 Advantages Solution Business Model.....	20
2.3 Business Model Innovation.....	23
2.4 Organizing Solution Business	27
3. Methodology	38
3.1 Research Design.....	38
3.2 Case and Unit of Analysis.....	41
3.3 Data Collection	42
3.4 Data Preparation and Analysis.....	49
3.5 Reliability and Validity of Research.....	53
4. Findings	56
4.1 Triggers of Transformation.....	56
4.2 Business Model Innovation.....	60
4.3 Additional Findings	72
5. Discussion	74
5.1 Experimenting with the Business Model	74
5.2 Interdependencies between Elements of the Activity System	76
5.3 Development of Solution Business Competences.....	78
5.4 Transferability of Findings.....	79
6. Conclusion	80
6.1 Theoretical Implications	80
6.2 Managerial Implications	81
6.3 Limitations	82
6.4 Further Research Avenues	83
7. References.....	84
Appendix A: IBM Transformation Case.....	91
Appendix B: Key Roles for Solution Business Personnel	92
Appendix C: Example Interview Guide.....	93

List of Tables

Table 1: Summary product-centric vs solution-centric business models.....	37
Table 2: Five single-case rationales	40
Table 3: Six Sources of Evidence: Strengths and Weaknesses.....	43
Table 4: Source of evidence used in this research	44
Table 5: Overview interview respondents	47
Table 6: Five analytic techniques.....	50
Table 7: How the four criteria of research quality are improved	55
Table 8: Services offerings during the solution life-cycle	61

List of Figures

Figure 1: The capital goods value stream	17
Figure 2: Value creation and value capture	19
Figure 3: Balance between value creation and value capture	20
Figure 4: Extreme types: solution sellers and solution integrator	28
Figure 5: Basic Types of Designs for Case Studies	39
Figure 6: Boundaries of the case.....	42
Figure 7: Convergence of the multiple sources of evidence	49
Figure 8: Research processes and outcomes	51
Figure 9: Code-aggregation diagram	53
Figure 10: Managing the transformation towards a solution-centric business model.....	56
Figure 11: Transformation towards a solution-centric organization.....	67
Figure 12: Standardization of the solution components.....	69

1. Introduction

During the past two decades, firms increasingly define themselves by the commercial problems they solve and not by the products or services they sell (Storbacka & Pennanen, 2014). As a result, firms also define their markets by means of what kind of solutions they are offering instead of what kind of products (Storbacka & Pennanen, 2014). This change in mind-set among manufacturers gave rise to the so-called offering of “solutions”; a broad and complex bundle of products, services and software that are not only focused on technical integration, but also on the total usage context, in order to solve customer-specific problems (Nordin & Kowalkowski, 2010). These bundles create more value for the customer than if they would buy stand-alone products and services (Galbraith, 2002). For instance, Rolls-Royce is providing airlines with ‘Power-By-The-Hour’, in which they are selling their jet engines along with services to maintain, repair and even upgrade them over an extended period of time for a fixed price (Davies, Brady, & Hobday, 2006). For customers, solutions can be seen as a limited form of outsourcing, allowing them to focus on their core businesses (Galbraith, 2002). Offering solutions, therefore, extend the suppliers focus into the use-phase of their product offering, which includes extensive involvement in the operations and maintenance of their installed base, on behalf of their customers (Kujala, Artto, Aaltonen, & Turkulainen, 2010). This extension into the use-phase gives manufacturers potential benefits to increase their revenues, margins, and receive a more continuous cash-flows (Raddats & Easingwood, 2010; Storbacka & Pennanen, 2014), because they maintain a larger share in both the customer business and the overall value stream of the supply-chain (Kujala et al., 2011).

Despite the effort of many manufacturers to transform to a solution provider, the transformation often does more damage than good to these manufacturers (Neely, 2008; Reinartz & Ulaga, 2008; Stanley & Wojcik, 2005). The term ‘*servitization*’, developed by Vandermerwe and Rada (1988), is often used to describe the transition from pure product offerings towards solution offerings, in which services play a major role. (Kindström & Kowalkowski, 2014; Kujala et al., 2010; Rubalcaba, Michel, Sundbo, Brown, & Reynoso, 2012). According to this “servitization” literature stream, these manufacturers fail to successfully provide solutions, because they are unable to successfully develop and align services with their product-offerings. Manufacturers invest heavily to develop their related service offerings, but eventually they are unable to generate significant value out of these services (Neely, 2008). This is what they also call the service paradox: “*High investment in extending service business leads to increased service offering and higher costs, but does not generate the expected correspondingly higher returns*” (Gebauer, Fleisch, & Friedli, 2005, p. 15).

This research, on the other hand, claims that these manufacturers fail because they are unable to fully adopt both their ‘business model’ to the new situation. These manufacturers perceive the solution business as another product category or an extension of their current product business

(Storbacka & Pennanen, 2014). However, successfully offering customer-specific solutions is only possible when a manufacturer fully adapts a “solution business model” (Kujala et al., 2011; Storbacka & Pennanen, 2014; Storbacka, Windahl, Nenonen, & Salonen, 2013; Storbacka, 2011). Meaning, that manufacturers need to reinvent their entire business model if they want to make their solution offering successful. This is also called Business Model Innovation (BMI) (Amit & Zott, 2012; Chesbrough, 2007).

The literature regarding solution business and, subsequently, their solution offerings has increased significantly over the past decade (Kowalkowski, Windahl, Kindström, & Gebauer, 2015). Several articles are dealing with the conceptualization of solution business and solution offerings (Kujala et al., 2010; Nordin & Kowalkowski, 2010), while others already outline different solution business models (Storbacka & Pennanen, 2014; Storbacka, 2011). What is missing are studies that explain how companies are actually transforming from a “product-centric” business model to a “solution-centric” business model. In other words, how these manufacturers are successfully introducing new business models to their original one in order to provide solutions. Manufacturers cannot change their business model overnight. There are too many stakeholders involved that need time to adjust, or that don’t want to change at all, to the new situation. Moreover, manufacturers need to adopt completely new organizational structures (Galbraith, 2002) and gain new capabilities (Davies et al., 2006). These aspects make business model innovation a very complicated and long-term process. Strangely, there is a general lack of studies that describe these business model innovation processes towards a solution business model.

The aim of this paper is to see how manufacturers can transform from a product-centric business to a solution business. This is done by focusing on how the business model of a manufacturer should be innovated to go from offering products to successfully offering solutions. Moreover, the aim is to see why manufacturers want to transform to a solution business model and, by combining different solutions business literature, how a solution-centric business should be organized. These research aims are translated in the following research question:

How to manage the transformation from a product-centric business to a solution-centric business?

The remainder of this thesis is structured in the following four sub-questions:

4. Why do manufacturers want to transform to a solution-centric business models?
5. How to organize a solution-centric business?
6. How is a manufacturer mastering the transformation process from a product-centric business to a solution-centric business?

To answer these research questions a qualitative single-case study is conducted. A single-case study is chosen as it gives a very detailed, empirical description of particular phenomena’s (Yin, 2014)

and it is the best method to answer ‘ how’ questions in unexplored research areas (Eisenhardt & Graebner, 2007). The unit of analysis is a Swiss Multinational high-tech machine manufacturer with a product portfolio of different machining techniques. This company is chosen as the unit of analysis as the company is a pioneer in offering solutions in their traditional “product” industry. The transformation experience to, and organizational structure of, their solution business is a valuable data source for ‘solution business’ and ‘business model innovation’ theory-building. The company is a great example case for other manufacturers trying to move from a product business model to a solution business model.

This brings us to the theoretical and practical relevance of this paper. First, researching why manufacturers want to transform to a solution business model is important for policy makers. If solution business models would result in higher profits, policy makers could implement policies to help or trigger manufacturers to transform. Second, there is a lack of articles that thoroughly explain the business model innovation process towards a solution business. To generate value out of solution offerings, manufacturers need to innovate their business model. This is a complicated process, involving many variables, that affects all stakeholders of the company. Due to this complex business model innovation processes, a lot of manufacturers fail to successfully transform to a solution business (Stanley & Wojcik, 2005). By researching how a leader in “solution offering” mastered its transformation process, from a product-centric business model to a solution-centric business model, this paper supports managers across different industries to improve their capabilities in transforming towards a solution business model. In other words, this paper is facilitating knowledge exchange between leaders and followers regarding providing solutions and solution business models. Moreover, a model is developed that shows how to manage the transformation from a product-centric business towards a solution-centric business. Finally, this research identifies 8 managerial implications related to the business model transformation towards a solution-centric business.

The paper is structured as follows. In chapter 2 the conceptual background is described and the first two sub-research questions of this study are answered. First, an overview of current solution business and solution offerings literature is outlined. Then, these theories are related to business model innovation theory. In section 3 the research process and methodology are presented. Also, the reliability and validity of the research are discussed here. After the methodology, the developed model and the findings of the case study will be outlined in section 4. This is done by describing how a machine manufacturer successfully transformed towards a solution-centric business model, answering the third sub-research question of this study. Section 5 will discuss the findings of this research and related it to the main research question of this study. Finally, section 6 will conclude the findings of this paper and show both the academic and managerial implications of these findings. Then, a subsection will draw attention to the limitations of this study. On the basis of the findings and limitations of this study, avenues for further research will be provided.

2. Theory

The goal of this chapter is to give the reader a conceptual background in the “solution business” and “business model innovation” literature. Moreover, the first two sub-research question of this research are answered in this chapter. Before going into the first sub-research question it is important to get a better understanding about solution offerings and solution business models. Section 2.1 gives an overview of current literature on solution offerings and solution businesses. Section 2.2 answers the first sub-research question by showing the advantages of a solution business compared to a product-centric business. Then, section 2.3 relates Business Model Innovation literature to the transformation process from a product-centric business model to a solution business model. It is also in this section where the major proposition of this research is proposed. Finally, section 2.4 answers the second sub-research question by discussing several organizational elements and competences of a solution business. Throughout section 2.3 and 2.4, nine propositions are proposed that underlie the major proposition of this research.

2.1 Solution business

2.1.1 History & Background Solution Business

Solution business is a relatively new stream of literature. Shepherd and Ahmed (2000) are one of the first academics to thorough discuss the concept of “solution business”. They develop a model which highlight the different competences of a solution business and how these competences are related to solution offerings. Since then, the number of articles dealing with solution offerings, and solution businesses, increased significantly. In the beginning, the solution business literature focused on the conceptualization of solution offering. Authors were arguing about what was included in solution offerings (Kumar & Kumar, 2004; Matthyssens & Vandembemt, 1998), and which kind of organizational changes a solution provider should make to offer these solutions (Foote, Galbraith, Hope, & Miller, 2001; Galbraith, 2002; Miller, Hope, Eisenstat, Foote, & Galbraith, 2002; Shepherd & Ahmed, 2000).

Although solution business literature developed just recently, Davies, Brady, and Hobday (2007) claim that the origins of solution business models can already be traced back to the early 1960s. During this period, several companies adopted business models to sell complete systems rather than single components (Davies et al., 2007). In, this so called, “system selling” the supplier provides, through an integrated bundle of both products and services, a solution to complex business problem (Hannaford, 1976; Mattsson, 1973). The idea of providing solutions to fulfil customers’ needs has already been central in systems selling (Paliwoda & Bonaccorsi, 1993). Therefore, Davies et al. (2007) claim that solutions are the most recent development in the long-term evolution of systems selling. In their reasoning, offering solutions is the next evolutionary step of system selling.

System sellers are providing solutions to customer's operational problems, by engineering an integrated system that exists of multiple components, like products, services and software (Davies et al., 2007). A major advantage for the customer is that, instead of having a supplier for each component, it only has to deal with one supplier (Davies, 2004). The system seller either has all the components and competences to offer the system in-house, e.g. vertically integrated companies, or has the competences to bundle its components with components of other companies (Davies et al., 2007). Either way, the system selling supplier takes the responsibility for offering, bundling, and maintaining the integrated system. However, the system seller is inherently product-centred, in which the customer-solution takes the form of a complex, augmented good (Nordin & Kowalkowski, 2010).

Solution providers go one step further; they are not only solving operational problems, but also offer strategic advice for senior management decision taking (Davies et al., 2007). This might sound as just an extra service, but it has a major impact on the business model of the solution provider. The solution provider must develop consultancy competences to provide a thorough analysis of a customer's business, identify the customer's needs; often before the customer is aware of these needs (Matthyssens & Vandembemt, 1998; Nordin & Kowalkowski, 2010), and offer a corresponding solution (Shepherd & Ahmed, 2000). Moreover, the solution provider must be able to use the knowledge retrieved from their installed base to a specific customer need. This requires a different organizational structure (Shepherd & Ahmed, 2000). Nonetheless, Davies et al. (2007) are making a valid claim by stating that solution offering is not something completely new, but can be seen as the most recent development in the evolution of system selling.

The shift towards solution offerings started in the early 1990s (Davies et al., 2006). From this period onwards companies like, Ericson, General Electrics, IBM, and Rolls-Royce started competing by providing solutions instead of stand-alone components (Davies et al., 2006) or integrated systems (Davies et al., 2007). A short example of how this shift happened at IBM can be found in Appendix A. The IBM case highlights the difference between "integrated systems" and "solutions". It requires a different way of organizing in order to offer customer specific strategic advice, together with tailor made bundles of both products and services.

Currently, the solution business literature can be grouped in three major research streams (Evanschitzky, Wangenheim, & Woisetschläger, 2011). The first, and largest, stream attempts to identify the role of services in the solution business and its offerings (Fang, Palmatier, & Steenkamp, 2008; Kindström & Kowalkowski, 2009, 2014; Kowalkowski, Kindström, Alejandro, Brege, & Biggemann, 2012; Kowalkowski et al., 2015; Oliva & Kallenberg, 2003; Rubalcaba et al., 2012; Ulaga & Loveland, 2014; Ulaga & Reinartz, 2011; Windahl & Lakemond, 2010). Services play a major role in the transition towards a solution business model. In literature there are several definitions that indicate the increase of services in formally product-centric firms. The term '*servitization*', developed by

Vandermerwe and Rada (1988), is often used to describe the transition from pure product offerings towards solution offerings, in which services play a major role. (Kindström & Kowalkowski, 2014; Kujala et al., 2010; Rubalcaba et al., 2012). Another definition often use is ‘*Service infusion in manufacturing*’, which is a strategy of manufacturers to add more services to their product (Kowalkowski et al., 2012; Ostrom et al., 2010). Finally, some authors use the term ‘*hybrid-offering*’ to highlight how firms are combining products and services into innovative offerings (Shankar, Berry, & Dotzel, 2009; Ulaga & Reinartz, 2011). No matter the academic definition the main underlying assumption is that manufacturers transform from offering products, with basic product-oriented services, towards more customized products and services (Kowalkowski et al., 2015) to eventually solution offerings (Storbacka et al., 2013), in order to create more value for their customers and, consequently, for themselves (Davies et al., 2006).

The second stream is examining how both the supplier and customer can create value out of solutions (Brady, Davies, & Gann, 2005; Davies et al., 2006; Davies, 2004; Jaakkola & Hakanen, 2013; Reinartz & Ulaga, 2008; Storbacka & Pennanen, 2014; Tuli, Kohli, & Bharadwaj, 2007). In this stream studies are concerned with how both seller and customer specific factors are affecting the relationship process regarding solution selling (Jaakkola & Hakanen, 2013; Tuli et al., 2007; Windahl & Lakemond, 2006, 2010), and how solutions can be marketed successfully (Brady et al., 2005; Davies, 2004; Matthyssens & Vandenbempt, 2008).

The third stream in the field of solution business focuses on different solution business models and how firms should organize themselves to provide solutions (Davies et al., 2007; Foote et al., 2001; Galbraith, 2002; Kujala et al., 2011, 2010; Miller et al., 2002; Shepherd & Ahmed, 2000; Storbacka & Pennanen, 2014; Storbacka et al., 2013; Storbacka, 2011; Windahl & Lakemond, 2006). Several authors are arguing what kind of capabilities a company must have if it want to provide solutions (Galbraith, 2002; Shepherd & Ahmed, 2000; Storbacka, 2011). Others focus more on what kind of factors are influencing the choice for solution-specific business models (Davies et al., 2007; Kujala et al., 2011, 2010).

Despite the large body of literature, there is still no unanimous and rigorous definition for solution offerings. Numerous authors came up with, often broad and generic, definitions that are applied to a wide array of different offerings (Nordin & Kowalkowski, 2010). These definitions are often context-dependent. They can vary, for example, by the size and scope of the offering, the different components integrated into the solution, and the type of industry (Storbacka & Pennanen, 2014). It is not the aim of this research to develop a new definition, but the reader should be aware that there is still no consensus among authors regarding the concept of solution offerings. Also, some authors seem to confuse the definition of “solutions” with that of “integrated system”. For example, Evanschitzky et al. (2011, p. 657) refer to solutions as “*individualized offers for complex customer problems that are*

interactively designed and whose components offer an integrative added value by combining products and/or services so that the value is more than the sum of the components". This definition is almost identical to the description of integrated system explained earlier. This view is still product-centred, in which the solution basically takes the form of a complex, integrated good.

For the remainder of this thesis, the solution definition of Storbacka et al. (2013) is adopted. They take a process-oriented view and define solutions as: *"longitudinal, relational processes that comprise the joint identification and definition of value creation opportunities, the integration and customization of solution elements, the deployment of these elements into the customer's process, and various forms of customer support during the delivery of the solution"* (Storbacka et al., 2013, p. 707). This definition is adopted for four reasons. First, the process-oriented view indicates that manufacturers can develop a range of different types of solutions, depending on the industry and customer requirements. Second, it correctly implies that manufacturers that want to offer solutions need to change many aspects of their business model simultaneously. Third, the definition clearly states that value creation must be identified for both the customer and the supplier. Finally, the definition makes clear that the solution should be deployed into the customer's processes. This is one of the major differences between solutions and integrated systems.

2.1.2 Focus of Solution Offering

By providing solutions, manufacturers extend their focus into the use-phase of their product offering, which includes extensive involvement in the operations and maintenance of their installed base, on behalf of their customers (Kujala et al., 2010). In other words, solution providers are moving forward in the value chain (Davies, 2004), as they are taking over processes previously performed by their customers or other customer suppliers (Storbacka & Pennanen, 2014). Figure 1 gives an example of a value stream in the capital good industry. The dotted line highlights the traditional manufacturing-services distinction (Davies, 2004). Solution providers are moving forward in the value stream due to the value-adding services that are included in the solution.

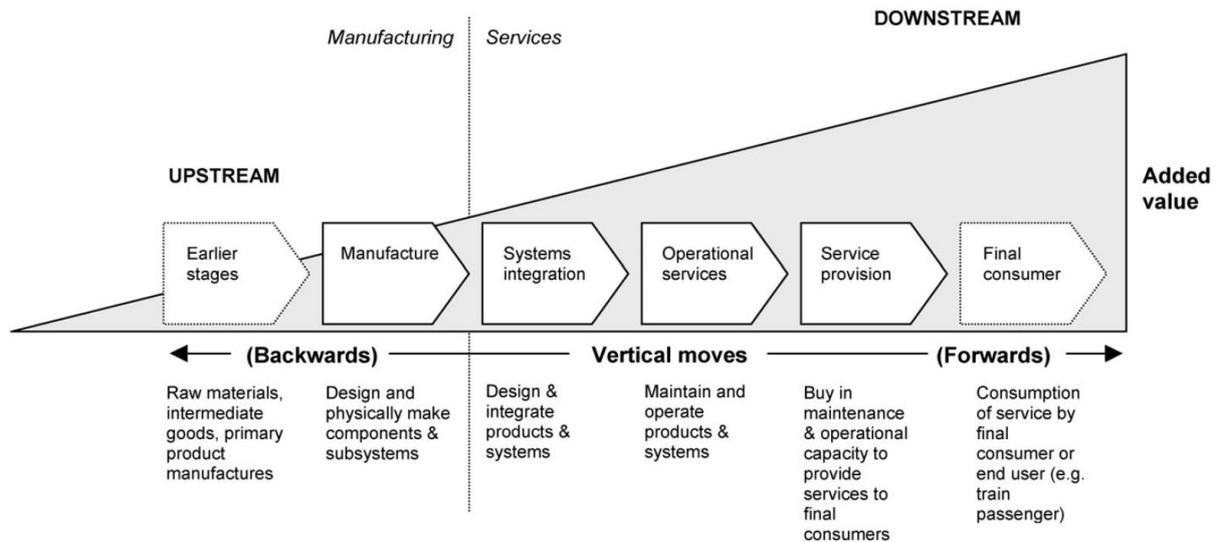


Figure 1: The capital goods value stream (adopted from Davies, 2004)

Solution offerings are generally built around supporting customers in their non-core processes (Storbacka & Pennanen, 2014). Meaning, that the customers are not valuating these processes as strategically important. By (partially) outsourcing these production processes to solution providers, customers are able to focus on their own core-business processes (Kumar & Kumar, 2004), making them more efficient and productive (Galbraith, 2002). The outsourcing trend of non-core processes creates a natural demand for suppliers that can offer complete solutions. In these cases, value-based pricing is usually based on cost-saving for the customer (Storbacka & Pennanen, 2014). For example, the solution offering must optimize the customers' production processes and, subsequently, reduce the price per part produced. There are even suppliers that retain ownership of the equipment (Windahl, 2007). The customer pays according to the level of usage or in relation to cost savings. This makes the solution a variable expense for the customer rather than an investment (Windahl & Lakemond, 2010). However, a general issue with offering solutions in customers' non-core processes is that the customers are not willing to pay a premium price, since the non-core activities are likely to be less appreciated by the customers (Storbacka et al., 2013). In general, solution providers that are focused on customers' non-core processes are offering so-called "horizontal solutions" (Galbraith, 2002). These are more generic solutions and apply across several customer categories. An example of a horizontal solution provider is Sun Microsystems. Sun Microsystems develops and delivers a human-resource portal solution, which can be used for the human resource functions across different industries (Galbraith, 2002).

Ideally, solution offerings are involved in the customers' core processes. Then, the customer will almost certainly view the solution provider as a strategic partner. Meaning, that the solution provider will be involved in high-level strategic decision making processes of the customer (Storbacka et al., 2013). This will allow the solution provider to create more value with the customer (Storbacka et

al., 2013) and subsequently ask for a price-premium (Lay, Hewlin, & Moore, 2009). However, in order to become embedded in customers' core-processes, solution providers must define focus segments and customers for their solutions, and develop specific value propositions for these segments and customers. As a result, they must develop a very industry specific solution offering, which Galbraith (2002) calls "vertical solutions". Offering vertical solutions requires a more customer-centric organizational than offering horizontal solutions (Nordin & Kowalkowski, 2010). An example of a vertical solution is the, as mentioned earlier, "power-by-the-hour" offering of Rolls-Royce. This is a very specific solution for a specific customer segment.

The market for solution offering should not be defined by the products, but by what these products are making possible (Storbacka & Pennanen, 2014). This has important implications on how solution providers define their markets. Product-centric businesses analyse their markets only in terms of the "value of exchange" in products and services. They do not take the value created when customers use their products and services into account (Vargo, Maglio, & Akaka, 2008). Solution business, on the other hand, is based on the idea that most of the value is created when customers use a solution over time (Storbacka & Pennanen, 2014). This distinction, between whether the supplier assumes value is created in exchange or during the use-phase, has significant strategic implications. When a firm applies a use-value view, it assumes that the main value creation in a market happens when customers are using products and services (Vargo et al., 2008). In this view, customers are viewed as active players in value creation, instead of passive receivers of value created by the firm (Storbacka & Pennanen, 2014). Customers have their own assets, competences and capabilities, which they use in value creating processes. Combining these value-creating processes with that of the solution provider will, if done correctly, increase the total value created. Hence, the supplier and customer are creating value together. This is also called "value co-creation". As a result, the reciprocal interdependencies between customers and suppliers increase with solution offerings compared to traditional product offerings (Windahl & Lakemond, 2010).

The role of the solution provider is to support customers to create value over time. This is done by providing them with the right solution that fits into the customers' business processes. The right solution is not a one-time delivery. The solution provider should adopt and improve the solution to customer business processes over time. A solution provider can, therefore, no longer view its customers as an extension of its own production processes. On the contrary, the solution provider should realize that it is an extension of customer value-creating processes (Storbacka & Pennanen, 2014). Not the other way around. In practise, however, there is often a gap between what is actually a solution for the customer and what the supplier considers to be a solution (Tuli et al., 2007). The supplier often views the solution as a customized and integrated bundle of products, software, and services for meeting a customer's business need (Tuli et al., 2007). The customer, on the other hand, often only sees this bundle as part of the solution. Besides this bundle they require longer customer-supplier relational processes,

which means also support before-, during-, and post-deployment of the solution bundle (Tuli et al., 2007).

When the supplier and customer take this relational process, the total value (co-)created during the interaction between the firm and customer over time is called the “relationship value” (Storbacka & Pennanen, 2014). Figure 2 gives a graphical overview of how this relationship value is created. The figure clearly shows that value creation for the customer is a prerequisite for the solution provider to capture value in the long term. The relationship would come to an end when the customer does not perceive the solution as valuable, or if the provider cannot capture value from the relationship (Storbacka & Pennanen, 2014).

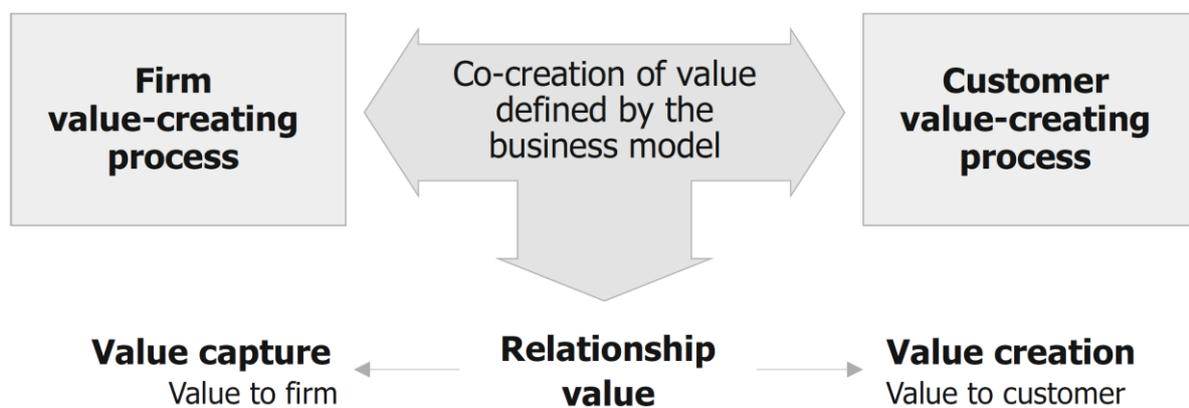


Figure 2: Value creation and value capture (adopted from Storbacka & Pennanen, 2014)

When the relationship is creating value, an essential aspect is to determine how to divide the co-created value between the firm (value capture) and the customer (value creation). Figure 3 gives three illustrative examples of how the co-created value is shared. In this figure, point A indicates the point where the level of value creation maximizes the level of value captured. For the long-term relationship, this is the ideal point as the value created for the customer and the value captured by the provider is in balance.

Point B depicts the point at which customers are treated unfairly. The customer is overpaying for the amount of value created by the solution. In this case, there is a high risk of losing customers to competitors, since the customer is not experiencing a lot of value creation through the relationship. In this case, providers should increase the level of value creation if they do not want to lose customers. For example, designing a more complete solution or add services (Storbacka & Pennanen, 2014).

Finally, point C illustrates the point where the supplier creates too much value in comparison to what it captures. It is subsidizing the extra value creation to the customers, who were not asking for this additional value and, therefore, are not willing to pay for it. In this case, the provider should change

the level of value creation by re-scoping the solution offering, which usually entails to offer fewer solution components (Storbacka & Pennanen, 2014).

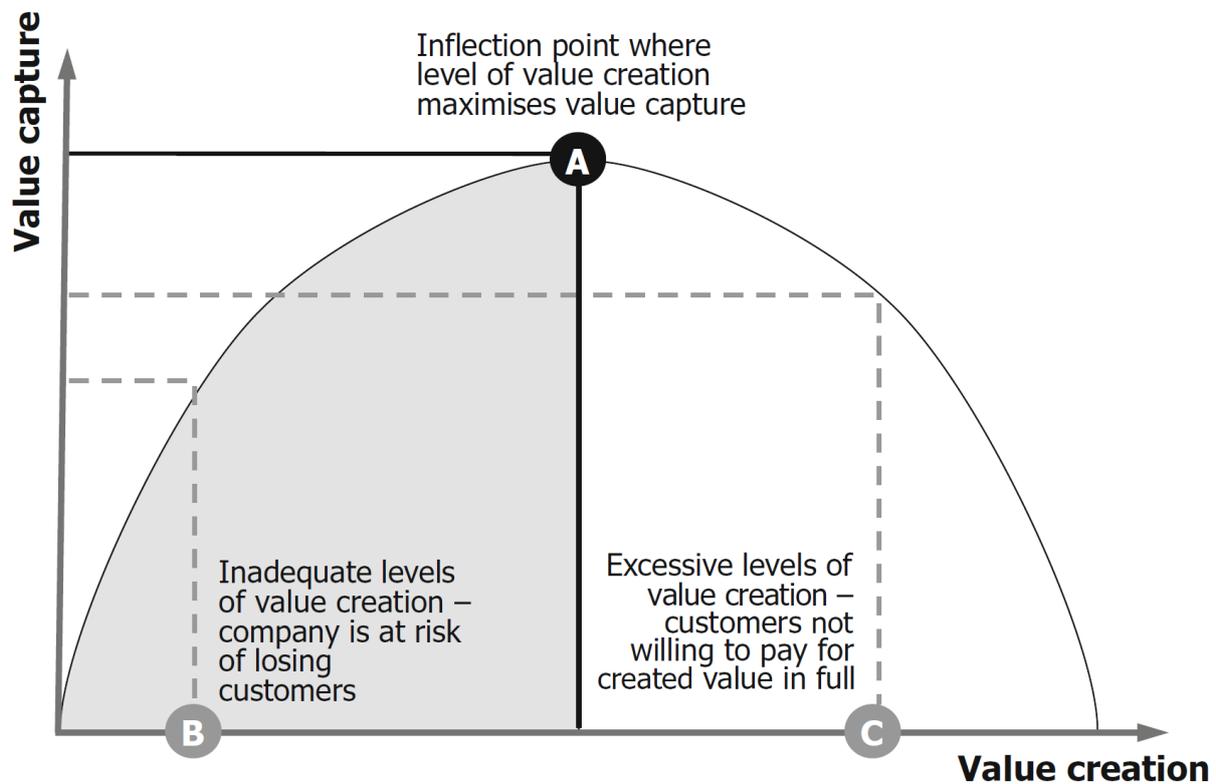


Figure 3: Balance between value creation and value capture (adopted from Storbacka & Pennanen, 2014)

2.2 Advantages Solution Business Model

The transformation to a solution business is costly and challenging, but if done correctly, the benefits can be substantial. According to literature there are four main drivers for product manufacturers to go into solution offering. First of all, for manufacturers it becomes increasingly difficult to grow their installed base. To maintain top-line growth, companies must either acquire new businesses (inorganic growth) or grow their own business by developing product related services (organic growth) (Kumar & Kumar, 2004; Reinartz & Ulaga, 2008). Solution offerings can drive organic top-line growth - gross sales and revenues - as the total amount of products and/or services offered to the company's customers becomes larger (Storbacka & Pennanen, 2014; Ulaga & Reinartz, 2011). Especially, the revenues out of services will increase with the transformation to solution offerings (Kindström & Kowalkowski, 2009).

Second, solution offerings enables bottom-line growth - higher margins and profit - as the company becomes more important for, and integrated in, the customers processes (Davies, 2004; Lee, Yoo, & Kim, 2016). Due to commoditization in many product markets, manufacturers are facing

product price erosions, which decreases their product margins (Reinartz & Ulaga, 2008). In order to remain profitable, firms must differentiate themselves from competition. A good differentiation strategy is going into solution offering, since solutions are unique offerings and difficult to imitate (Fang et al., 2008). Moreover, as mentioned earlier, supplying value creating solutions for customers' core-processes allows the supplier to ask for premium-pricing (Evanschitzky et al., 2011). The larger the co-creation of value, the larger the value capture and consequently the larger the margins. Finally, Davies (2004, p. 733) claims that solution provider can in particular earn high profit when "the value of the integrated package exceeds the value of the individual components".

Third, the demand for traditional products can be irregular, which results in an unstable cash-flow. This is especially a painful issue for product providers during a financial crisis. By adding services, the solution provider is able to generate a more stable cash-flow (Raddats & Easingwood, 2010; Storbacka et al., 2013). The reason for this is that services are not a one-time fix payment, like with most products offerings, but are based on monthly or yearly payments. The more services are included in the offering, the more stable the cash-flow gets, and the relatively less important the revenues for the product itself are getting (Kindström, 2010).

Fourth, solutions offering can result in a sustainable competitive advantage (Gebauer, Gustafsson, & Witell, 2011). First, the solution business and its solution offerings are very intertwined with each other. Meaning, that companies who would like to imitate the solution offering must imitate the whole organization structure of the company (Day, 2004). This is very complex; as most of the solution organization is not visible to the market (Storbacka & Pennanen, 2014). Additionally, providing solutions is a powerful way to lock-in customers and increase their switching costs. A solution is implemented within the customer's processes, which makes it hard for the customer to switch after a while. This results in a more secured market position for the solution provider.

Not directly mentioned in literature, but also an important driver for going into solution offerings are product innovations. There are two reasons why product innovation can drive a firm to go in solution offerings. First, the introduction of a new product occasionally requires a new business model to fully utilize the product's market potential (Chesbrough, 2007; Johnson, Christensen, & Kagermann, 2008). For a particular product this could be a solution business model. Second, the new product can be an important factor to be able to offer customers a solution (Shepherd & Ahmed, 2000). Meaning, the new product is complementary to the other product in the firm's portfolio and enables the firm to offer a solution to the customer. For instance, a machine manufacturer develops a device that can fully automate the production process of their current product portfolio. Due to this new automation product they are able to offer their customers the full production solution, which they maybe could not offer before.

Thus, in theory the transformation towards a solution business is a very appealing and worthwhile investment. It can enable organic growth, higher margins and profits, a stable cash-flow, and it can create a sustainable competitive advantage. This is also the reason that a lot of top-managers are pushing for this transformation. The empirical data, on the other hand, provides a quite different picture. Despite the many advantages of a solution business models, a lot of manufacturers struggle with or fail in the transformation. Stanley and Wojcik (2005) did a survey among more than 200 sales executives at fortune 1000 companies that were offering solutions. Their conclusion was that only half of all solution providers realize modest profit, while 25% is losing money because of solution offerings (Stanley & Wojcik, 2005). As possible reason, they explain that these companies were unable to deal with the complexity of solution offering. These companies were not able to identify unique sources of value with their customers or could not achieve the necessary coordination, across different business units and functions, to effectively provide solutions (Hancock, John, & Wojcik, 2005; Stanley & Wojcik, 2005). Additionally, Neely (2008) compared the financial data of over 10,000 companies from 25 countries with each other. The paper concludes that although product manufacturers that offer sophisticated services with their products enjoy higher revenues, they also generate, at the aggregate level, lower profit as percentage of sales.

Clearly, top-managers of manufacturers are interested in solution business models, but the transformation includes considerable risk and challenges; often resulting in financial losses (Stanley & Wojcik, 2005). The transformation towards a solution business model requires substantial financial and managerial investments over a long-term period of time. According to several authors (Kindström & Kowalkowski, 2014; Oliva & Kallenberg, 2003; Storbacka, 2011), these investments into the transformation to a solution business will not directly pay-off, which can make it difficult to get the necessary resource allocations for building new competences related to solution business.

Despite the overall agreement among academics that the transformation towards a solution business is challenging, their arguments why companies fail are quite dispersed. As mentioned earlier, most of the authors are focused on the role of service in solution offerings (e.g., Kowalkowski et al., 2015; Rubalcaba et al., 2012). They claim that companies fail in their transition, because they are unable to develop and align their service components with their product offerings. Another group of authors claim that the transformation fails, because some companies are unable to create a customer-centric organization and/or effectively organize their back-office to offer solutions (e.g., Foote, Galbraith, Hope, & Miller, 2001; Galbraith, 2002; Storbacka, 2011). Some state that firms fail, because they are unable to create strategic partnerships in order to provide the complete solution (e.g., Jaakkola & Hakanen, 2013; Windahl & Lakemond, 2006). Others state that the major problem of the transformation lies at the sales force (Reinartz & Ulaga, 2008; Ulaga & Loveland, 2014), as they are not capable of making the switch from selling products to selling solutions.

Though these studies are all intriguing, they remain fragmented. They are explaining different parts of the transformation without a holistic view on the whole transformation. This paper seeks to draw together the different bits and pieces in order to provide a holistic view on the transformation process. This is done by combining “solution business” literature with “business model innovation” literature. The business model innovation literature, and its relation with solution business, will be explained in the next section.

2.3 Business Model Innovation

Offering solutions requires a new business model (Oliva & Kallenberg, 2003). Not only to be able to provide solutions, but also to capture value from ‘solution’ offerings (Wise & Baumgartner, 1999). Several authors emphasize the importance of a good business model (Afuah, 2014; Amit & Zott, 2012; Chesbrough & Rosenbloom, 2002; Chesbrough, 2007; Johnson et al., 2008; Teece, 2010). Most of these authors even state that, in our current society, the business model is more important than the products themselves. An often given example to demonstrate the importance of a good business model is the company Apple (Amit & Zott, 2012; Johnson et al., 2008). The success of Apple’s iPod was not due to the technological performance of the iPod. It was because Apple radically changed its business model by providing their iPod customers an easy and convenient way of legally downloading music (Amit & Zott, 2012; Johnson et al., 2008). This was a service that other mp3-player manufacturers were not offering. Apple was the first company with an effective business model that combined hardware, software and services into one mp3-player (Johnson et al., 2008). This change in their business model allowed them to become the largest player on the market (Amit & Zott, 2012).

In the transition from product to solution providers, companies must also reinvent their business model. In literature this is also called ‘Business Model Innovation’ (BMI) (Afuah, 2014; Amit & Zott, 2012; Cavalcante, Kesting, & Ulhoi, 2011; Chesbrough, 2007, 2010; Clauss, 2016; Cortimiglia, Ghezzi, & Frank, 2015; Kindström & Kowalkowski, 2014; Zott, Amit, & Massa, 2011). To make sense of the definition business model innovation, it is good to first define business model and innovation separately. For this paper the business model definition of Amit and Zott (2012) is adopted. They define a company’s business model as: *“a system of interconnected and interdependent activities that determines the way a company “does business” with its customers, partners, and vendors. In other words, a business model is a bundle of specific activities – an activity system – conducted to satisfy the perceived needs of the market, along with the specification of which parties (a company or its partners) conduct which activities, and how these activities are linked to each other.”* (Amit & Zott, 2012, p. 42). Thus, the business model is seen as an activity system, which includes a set of interdependent organizational activities centred on a focal company. Yet, the activities include those that are conducted by the focal company, its partners, vendors and customers. The company’s activity system therefore transcends the

focal company and spans its boundaries, but the company remains the centric focal point of the activity system (Zott & Amit, 2010).

Innovation, in the context of the activity system, is changing the activity system in a novel way (Afuah, 2014). In other words, business model innovation is changing the activity system and consequently changing the way “how” the company does business (Zott et al., 2011). As a result, companies that innovate their business model can either create new markets or create and exploit new opportunities in existing markets (Afuah, 2014). Of course, before innovating the business model managers should have some kind of goal or strategy in mind. A business model is always aimed to create value for customers and simultaneously capture some value from the value that is created for the customers (Chesbrough, 2007). Thus, when managers perceive opportunities to create more value for customers, for instance with solutions offerings, they will try to innovate the business model in order to address that opportunity (Johnson et al., 2008).

Business model innovation can occur by changing design elements of the activity system (Chesbrough, 2010). Amit and Zott (2012) identify three design elements that characterize a company’s activity system, namely: content, structure, and governance. When a company is changing one or more of these elements enough; it will have innovated its business model (Amit & Zott, 2012).

The *content* of a activity system refers to the selection of activities (Zott & Amit, 2010). In other words, the content is about which activities are performed within the activity system. Here, business model innovation can occur by adding novel activities to the activity system. For example, by forward or backward integration in the value chain (Amit & Zott, 2012), like Microsoft did when it started to produce its own hardware like phones and tables.

The *structure* of a activity system shows how the activities are linked with each other and in what sequence (Zott & Amit, 2010). This highlight the importance of the activities for the business model. Thus, whether the activities are core, supporting or peripheral for the activity system. Companies can innovate their business model by linking activities in novel ways. The company is then restructuring the activity system. As a result, the core activities of the company might have shifted with the peripheral activities. This is also what IBM did in the 1990s. They shifted their core from being a hardware supplier to becoming a services supplier (Gerstner, 2002). For more details about this example, see Appendix A.

The *governance* of a activity system refers to who is performing the activities, meaning which business unit or which party in the activity system (Zott & Amit, 2010). Thus, here business model innovation can take place by changing one or more parties that perform any of the activities in the activity system. For example, franchising is a possible approach to innovate the governance of an activity system (Amit & Zott, 2012). The design elements of the activity system are described

independently for simplicity and concept clarity. However, they can also be highly interdependent (Zott & Amit, 2010). For example, adding an activity to the activity system can also require that the system has to be restructured and/or that the governance must change (Amit & Zott, 2012).

For a successful business model innovation, it is of vital importance that managers see these interdependencies between the design elements, and that they make decisions on all these parameters accordingly. Often it even requires managers to simultaneously change elements of the activity system (Zott & Amit, 2010). By only focusing on one design element of the activity system, managers might optimize this element, but deteriorate the overall activity system (Afuah, 2014). Managers should have a systemic and holistic approach to the activity system instead of concentrating on isolated elements. In other words, they should not look at the trees, but look at the whole forest. Try first to get a good overall design, before optimizing the details (Amit & Zott, 2012).

Adopting the business model innovation perspective can give new insights why a lot of companies, that try to transform from a product-centric business towards solution-centric business, fail. The majority of current “solution offering” literature argues that they fail, because they are unable to successfully develop and align their new services to their product offering. This might be a correct statement, but it probably covers only a part of the problem. It seems that these authors are only focused on the content of the activity system of the companies, as they only focus on the activity of offering services together with the products.

However, by combining business model innovation literature with solution business literature, the transformation picture looks more complex. It seems that there is much more complexity and interdependencies in the transformation process than just successfully develop and align services with a company’s product offering. This research suggests that successfully offering solutions is not just about developing good products and services into a solution, but is more about developing a good business model that is aligned with the solution offering.

Therefore, the major propositions of this research is:

“Manufacturers that want to successfully transform, from being a product provider to a solution provider, must simultaneously innovate their business model on all three design levels, namely: content, structure, and governance.”

In order to successfully innovate the business model, managers should first understand the current activity system, before they can start changing it (Afuah, 2014; Chesbrough, 2007). So they should understand their customer value proposition, profit formula, key processes, and key resources (Johnson et al., 2008). When managers don’t have a clear understanding of their current business model, they won’t be able to effectively innovate it (Afuah, 2014). Indeed, the current business model influences future business models (Chesbrough & Rosenbloom, 2002). Meaning, that there is path-

dependency that influences through which trajectories the new business model can be reached (Cavalcante et al., 2011). By not understanding the current business model, managers cannot figure out these trajectories towards the new business model.

Managerial cognition plays a key-factor in business model innovation (Cavalcante et al., 2011; Eggers & Kaplan, 2013; Tikkanen, Lamberg, Parvinen, & Kallunki, 2005). The way how managers interpret and perceive environmental threats and opportunities shapes how the business model responds to it (Eggers & Kaplan, 2013; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010). When managers perceive an opportunity in the market, they will look whether the organization has the capabilities to address this opportunity (Eggers & Kaplan, 2013). If yes, this “opportunity” will be the starting point for business model innovation. They will try to innovate the business model in such a way that it can address this opportunity. Thus, the cognitive capability of managers have a large impact on the success of business model innovation (Helfat & Peteraf, 2015). Their interpretations, decisions and actions directly influence the evolution of the business model (Tikkanen et al., 2005).

Chesbrough (2007, 2010) argues that successful business model innovation is highly based on the commitment to experiment with the business model. After managers have identified a new opportunity, they should experiment with the activity system to innovate the business model (Sosna et al., 2010). Managers might have some vague perception of what the business model should be, but the right business model is never known beforehand (Chesbrough, 2010). Emergent opportunities generally lack data that is necessary to justify corporate actions in the mainstream business. By first experimenting on a small scale with new potential configurations of the activity system elements, the firm can generate data that can boost the change process (Chesbrough, 2010). Of course, some experiments will fail; this is a natural outcome of experimentation processes. Yet, as long as failure is within affordable loss and provides a better understanding about alternative business models, the experiment can still be perceived as successful. When experimenting with a new business model demonstrates real potential, managers can decide to shift resource towards this new business model and deploy it more widely throughout the organization (Chesbrough, 2007). On this basis, the following proposition is derived:

P1: “The transformation towards a solution business requires experimenting with the business model”

Experimenting is also important to cope with organizational inertia and resistance to change (Chesbrough, 2010). Nelson and Winter (1982, p. 99) argue that ‘organizations remember by doing’. Meaning, that their prevailing routines and beliefs tend to support continuity in their behavioural patterns, which results in strong inertial pressures within the firm to preserve them (Nelson & Winter, 1982). This creates barriers for the company to experiment and change the whole business model at once. However, by first experimenting with the business model on a small scale, and internally protect it from the mainstream business, the new business model can be nurtured. It can create its own routines,

beliefs and competences without directly competing with the mainstream business model. Then, when the newly developed business model shows potential, the company needs to deploy that model more widely (Chesbrough, 2007). At this stage, it is unavoidable that the new business model “competes” with the established business model for resources. This competition can and must be managed accordingly. The customer will finally decide whether the new business model is better than the established one (Chesbrough, 2007). However, there are also cases that the two different business models can co-exist. Creating a new business model does not mean companies immediately have to abandon their existing one (Markides, 2013).

Some authors are stating that firms can have multiple business models for different markets and customers (Kowalkowski et al., 2015; Kujala et al., 2010; Markides, 2013). If correct, this could be highly relevant for manufacturers that wish to offer solutions. For some markets it is likely that not all customers are demanding solutions. These customers just want their equipment with basic product-oriented services and they are not willing to pay for more than that (Kowalkowski et al., 2015). When a manufacturer would only focus on offering solutions it could lose a lot of these former ‘product’ customers (Kowalkowski et al., 2015). Being able to sell both products to a group of customers and solutions to another group can be a very profitable scenario for manufactures. Due to the significant difference in organizing, between products and solutions selling, this can only be possible with multiple business models (Kujala et al., 2010; Markides, 2013). Also, in the case of multiple business models for different customers and markets, it will only be successful as long as the offerings are perfectly aligned with the business models (Kujala et al., 2010; Storbacka et al., 2013). On this basis, the following proposition is derived:

P2: *“Manufacturers will have multiple business models at the same time during the transition towards a solution business model”*

Thus, business model innovation shows that the transition towards a solution business model can be a very complex transition, which requires great systemic and holistic thinking from managers.

2.4 Organizing Solution Business

In this section several organizational elements and competences of a solution business are discussed. Also, the second research question of this research is answered in this section: *“how to organize a solution-centric business?”* Moreover, propositions are derived which underlie the major proposition of this study. Meaning, that propositions are derived that are focused on the content, the structure, or the governance of the activity system for a solution business.

There are several ways to organize a solution business in order to provider solutions to customers. Figure 4 shows two extreme types of how solution providers make up their solution offering.

The “solution seller” is a vertically integrated company that has all the competences in-house to provide the solution (Davies et al., 2007). They produce or assemble all the physical components, design and integrated the system, and provide all the related services (e.g. consultancy, operations, maintenance, field updates etc.) to deliver a solution. As a result, the customers get all the products and services from one company. The main advantages of organizing solutions this way is that only one company is responsible for the whole solution.

On the other hand, the “solution integrator” is a company only focused on the design and integration of the solution. All the products and services needed for the solution are provided by companies within the network of the solution integrator (Davies et al., 2007). The solution integrator is specialist in integrating all the components from different companies into one complete solution. The main advantage of solution integrators is that they can combine the best components available in the market with each other. Moreover, the external network extends the capabilities and range of components that can be integrated to create value for the customer (Davies et al., 2007). Resulting in a solution consisting of superior products and services. A major disadvantage of these kind of solution offering is that, when there are product defects, it can take a long time to find out whose component is responsible for the breakdown.

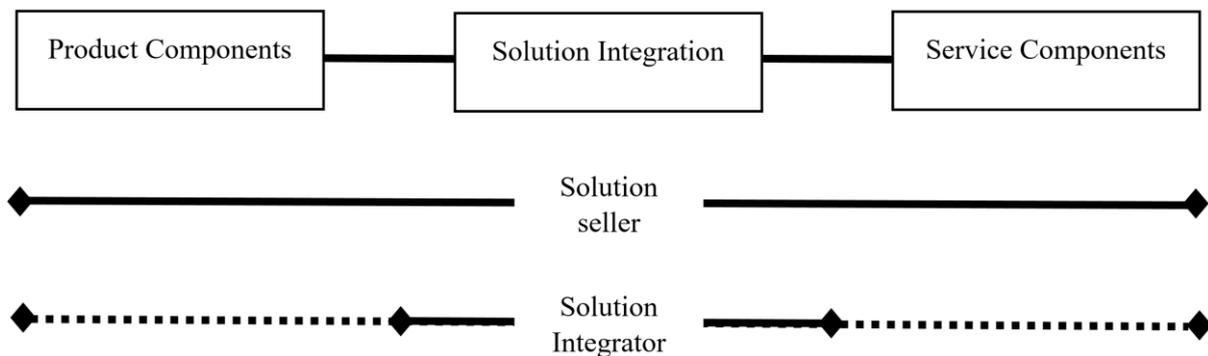


Figure 4: Extreme types: solution sellers and solution integrator (based on Davies et al. (2007))

In general, solution providers are somewhere in-between these two extreme types (Davies et al., 2007). Due to the complex nature of solution offerings, it is very difficult to have all the competences in-house and still be efficient. On the other hand, having no in-house production and services competences makes it very difficult to truly understand the customers’ technical needs. This research, therefore, mainly focuses on the "hybrid" forms of solution providers.

Several authors identify different organisational adjustments that are required in the transformation from a product business to a solution business. These adjustments are on: organizational

structure (Galbraith, 2002), key processes (Shepherd & Ahmed, 2000), roles and responsibilities (Storbacka & Pennanen, 2014), strategic partnerships (Windahl & Lakemond, 2006), and incentive systems (Ulaga & Loveland, 2014). Each topic will be discussed in the next paragraphs, including some related competences and capabilities. Combining the different organizational adjustments will give insights in how to organize a solution-centric business and, therefore, answer the second sub-research question of this study.

2.4.1 Organizational Structure

Due to the complex nature of solution offerings (Davies et al., 2006), there is a major issue of cross-functionality in managing a solution business (Arnett & Badrinarayanan, 2005; Storbacka, Polsa, Saaksjarvi, & Sääksjärvi, 2011; Storbacka, Ryals, Davies, & Nenonen, 2009). For instance, Storbacka et al. (2009) argue that with solution selling the sales functions have really important cross-functionalities with “finance, manufacturing, supply, engineering, and servicing” (p. 903), instead of just the classical marketing and sales interface. Storbacka (2011) clusters these cross-functional issues of organizing into three groups, namely: *commercialization, industrialization, and solution platform*. These three groups are similar to the idea of ‘front-end’, ‘back-end’, and ‘top management’ respectively (Davies et al., 2006; Pawar, Beltagui, & Riedel, 2009), which form the basic organizational structure of a solution provider.

Commercialization refers to a company’s ability to understand its customers value-creating processes, to create solutions that enable improved value creation for these customers, create demand for these solutions, sell the solutions to individual customers, and finally capture value based on customers’ value-in-use (Miller et al., 2002; Storbacka, 2011). These activities are performed by the customer-facing business units; the front-end of the organization (Davies et al., 2006; Foote et al., 2001). Commercialization of solutions consist of “*activities related to market- and customer-sensing as well as to customer-linking and co-creation of value*” (Storbacka & Pennanen, 2014, p. 13). Therefore, the commercialization of solutions is performed on both a managerial and conceptual level. This requires the alignment of multiple functions of the provider (Storbacka, 2011). According to Storbacka et al. (2009), commercialization is a process that starts long before the actual customer purchasing process, and ends after the solution is delivered.

Besides the commercialization of solutions, firms also need to build capabilities to effectively produce, integrate and deliver solutions. These capabilities are covered under industrialization and are performed in the back-end of the organization (Miller et al., 2002). Industrialization means “*standardizing and ‘productizing’ the solutions in order to create the prerequisites for repeatability and scalability* (Storbacka & Pennanen, 2014, p. 14).” Standardizing solutions might sound contradicting, but it is necessary to secure scalability, repeatability and quality delivery of solutions (Davies et al., 2006). This does not mean that every solution provided is the same. Standardization in

this context is focus only on the components (product and services) of which the solution is composed (Ulaga & Reinartz, 2011). The solution is still customized in a way that the combination of the modular components is customer specific. However, the components need to be modular and standardized in order to scale up, and sequentially reduce the cost of, solution offerings (Davies et al., 2006). The largest and most sophisticated customers might still require more customized components/solutions. Experiences from these customer-specific solutions should be codified into manuals and business processes to be reused in upcoming projects (Storbacka, 2011), making today's customized solutions into tomorrow's standardized solutions (Davies et al., 2006). Thus, the back-end units provide the solution-ready components, existing of product and services, that can be mixed and matched in different combinations by the front-end units (Davies et al., 2006; Miller et al., 2002). On this basis, the following proposition is derived:

P3: *“Manufacturers need to standardize and modularize both products and services in order to provide solution effectively”*

The solution platform relates to “creating the appropriate support for an effective solution business” (Storbacka, 2011, p. 702). In other words, the solution platform is an overarching corporate centre that is required to force effective links between the organizations on the commercialization- and industrialization-side (Miller et al., 2002). The created links must enable a speedy and rich flow of knowledge and information between the two sides (Davies et al., 2006). An important role for the solution platform is to adjudicate between the commercialization pull for customization and the industrialization push for standardization. The commercialization-side is driven to meet customers' request for “unique” solutions, while the industrialization-side want to secure scalability and repeatability. The solution platform must balance these two diverging forces (Davies et al., 2006). Storbacka and Pennanen (2014) group the solution platform into four capability categories: strategy planning, management system, infrastructure support, and human resource management. A key factor with setting up and organizing the solution platform is that all these different functions are aligned with each other, and with the commercialization and industrialization side. Most of the core capabilities of a solution business are embedded in the solution platform (Storbacka & Pennanen, 2014).

Going into solution business requires a clear *strategy planning*. Top management need to define visions and goals incorporating the solution business. Moreover, they need to define the solution business focus by selecting markets, segmenting the markets, creating a value proposition for each of these segments, and develop strategies to deliver that value (Storbacka & Pennanen, 2014; Teece, 2010). A core practice in the transformation towards a solution business is the development and management of a solution portfolio. This involves decisions on what solutions to develop for which segments, what to invest, what to drop, and what to outsource (Storbacka & Pennanen, 2014). Efficient portfolio

management is an important source of competitive advantage. Finally, they need to make clear how the solution business direction can result in long-term financial growth and profit.

Secondly, a different *management system* should be implemented. A solution business model requires a different logic than that of a product business (Storbacka & Pennanen, 2014). It cannot be managed, planned, controlled, and measured in the same manner as a product business. Therefore, firms that want to succeed as a solution business must develop their management system accordingly (Storbacka, 2011). First, they have to develop an organizational design with an effective front-end and back-end. Second, besides the organizational designs, also new roles and responsibilities have to be defined. Finally, solution business requires different key measures for planning, controlling, and measuring success. The metrics to measure success therefore has to be changed as well (Storbacka, 2011).

Thirdly, a solution business requires new types of *infrastructural support* (Miller et al., 2002). Firms must develop capabilities in new business and customer intelligence, knowledge management, legal support, and information and communication technologies (Storbacka & Pennanen, 2014). ICT platforms are of vital importance for a high-quality, cost-efficient solution business. Their impact on the profitability of the solution provider is truly significant (Storbacka & Pennanen, 2014). ICT systems for Enterprise Resource Planning (ERP), Product Data Management (PDM), and customer relationship management (CRM) have to be developed and integrated with each other.

Finally, a solution business requires a different approach in *human resource management*. Firms moving into solution business should define the skill profiles for all the functions related to solution business. Then they need to decide what the best way is to acquire these skills (e.g. hiring vs training). Also, firms need to adopt the bonus incentives to the solution business. For example, rewarding cross-functional teamwork.

Manufacturers that want to have an effective solution business model should invest into these solution platform capabilities. The solution platform is not directly visible to customers and it will take some time to develop (Kindström & Kowalkowski, 2014). However, the solution business platform is of vital importance for a sustainable competitive advantage in solution business (Storbacka et al., 2011). Additionally, firms that are not able to both commercialize and industrialize their business will have difficulties to capture value from their solutions (Storbacka & Pennanen, 2014).

Thus, successful solutions businesses need to have an organizational model that exist of three elements: a customer-oriented front-end, an efficiency oriented back-end, and a strategic centre (Davies et al., 2006). On this basis, the following proposition is derived:

P4: “*Manufacturers must reorganize their organizational structure to facilitate more collaborations between business units in order to provide solutions*”

2.4.2 Key Processes

The solution business process is categorized into four main phases, derived from several authors (Kindström & Kowalkowski, 2009; Pawar et al., 2009; Storbacka & Pennanen, 2014; Storbacka, 2011; Tuli et al., 2007), namely: *develop solutions*, *create demand for these solutions*, *sell solutions*, and *deliver solutions*. Note that the solution business process is not a linear process. The different phases are iterative and highly interconnected (Storbacka, 2011). The first two phases are focused on the “solution”, while the last two phases are focuses on the customer.

The *develop solutions* phase aims to combine customers’ insights, with the provider’s resources and capabilities, to create a solution that enable value creation for both the provider and its customers (Storbacka, 2011). The commercialization part of this phase aims to collect more information about the customers’ value creating processes (Storbacka, 2011). This is also called “value research”. To understand what is valuable to customers, the provider should get in-depth understanding of segments’ and customers’ business opportunities and concerns (Storbacka, 2011; Windahl & Lakemond, 2006). For example, by selecting and involving lead customers in the development process (Storbacka & Pennanen, 2014). The industrialization part, on the other hand, focuses on developing solution components, that can be produced effectively, and to build solution configurations on the bases of the value research and the extant portfolio (Storbacka, 2011). Thus, in the “develop solutions” business process a solution portfolio is developed. On this basis, the following proposition is derived:

P5: “Manufacturers need to increase the level of service innovations in order to provide solutions”

The *create demand* phase aims to make relevant customer segments aware of the developed solution portfolio and its value (Storbacka, 2011). The provider will try to shape the market towards its solution offerings. The commercialization activities involved in shaping the market depends on the solutions and the readiness of the market. If the market readiness is low, the firm must actively try to create customer awareness for the content of the solutions. If the market readiness is high, the focus of this stage will be more sales-oriented. Meaning, generating sales leads that can be turned into sales processes. Sales leads can be created by giving “value proposition” to customers (Storbacka, 2011). Value proposition is a suggestion about how the provider’s solution can enable customers to create value (Brady et al., 2005). The industrialization part focuses on producing solutions in an effective manner, and that they are priced on the value they generate (Storbacka & Pennanen, 2014).

The *sell solution* phases focuses on, as the name suggests, turning identified individual opportunities into orders (Storbacka, 2011). This process is the key-responsibility of the sales force (Ulaga & Loveland, 2014). Yet, they require support from other functions in order to excel (Storbacka, 2011). The commercialization part is aimed to quantify the value of the solution to both the individual customer and the provider (Oliva & Kallenberg, 2003), and to price that solution accordingly (Storbacka & Pennanen, 2014). The industrialization part aims to configuring solutions according to the customers’

requirements. This usually requires providers to develop both solution configuration and value pricing tools (Davies & Brady, 2000).

The final stage in the solution process, the *deliver solution* phase, aims to secure long-term value creation for the customer and, consequently, capture value for the provider (Storbacka, 2011). The commercialization part of this final phase is focus on value verification (Storbacka, 2011); a set of capabilities and practices to verify and document, to both the customer and provider, that the agreed value has been created (Reinartz & Ulaga, 2008). The industrialization part is focused on the actual solution delivery. This requires capabilities and practices to integrate the agreed solution into the customer's operations and processes (Storbacka, 2011). Generally, the deliver solution phase lasts for a long time, especially for firms that provider life-cycle solutions.

2.4.3. Roles and Responsibilities

In addition to the key process mentioned above, providing solutions requires both the establishment of new roles and the realignment of responsibilities within the company. Storbacka and Pennanen (2014) also identify six new roles that are important for solution business, but which are generally not found in product-centric businesses. An overview of these identified roles and responsibilities can be found in Appendix B. Additionally, Galbraith (2002) states that a solution business create a larger demand for the roles of account managers and project managers. However, most product-centric businesses don't have any project management competences, and therefore need to be developed by either hiring or training people. On this basis, the following proposition is derived:

P6: *"Manufacturers should get project-management competences in order to provide solutions"*

Several authors state that the greatest magnitude of change will take place in the roles and responsibilities of the sales force (Reinartz & Ulaga, 2008; Storbacka et al., 2011; Ulaga & Loveland, 2014; Ulaga & Reinartz, 2011). Selling solutions requires completely different skills and abilities than those required in selling products. As stated earlier, providing solutions is fundamentally based on a value co-creation logic (Vargo et al., 2008), while product-centric sales is typically based on a persuasion model (Sheth & Sharma, 2008), i.e. persuading the customer that the company's product offering is the best. This requires a totally different mind-set in approaching the customer (Ulaga & Loveland, 2014). The product-centric sales process is focused on deal closing and can therefore be seen as a hunter perspective. The solution-centric sales process is focus on share growth and renewal of the contract, and therefore can be seen as a farmer perspective (Ulaga & Loveland, 2014).

Secondly, product-centric sales are based on the existence of a predefined "need" that needs to be match by a predefined offering (Azimont, Cova, & Salle, 1998). The customer is in this case typically driving the process by issuing requests for quotes at different companies (Ulaga & Loveland, 2014). On the other hand, in solution-centric sales the customer specifications are still ill-defined. The sales force

must work together with the customer to specify its needs and then integrate product, services, and software to solve this need (Reinartz & Ulaga, 2008). Third, there is a large difference in the number of stakeholders involved in the different sales processes. In product-centric sales processes the stakeholders in the customer company are typically clearly defined. For example, purchasing, maintenance, and the product operators. However, with solution-centric sales process there are often multiple stakeholders at the customer, the vendor company's partners, and the vendor company itself (Sheth & Sharma, 2008; Ulaga & Loveland, 2014).

The transformation towards a solution business therefore requires different sales processes and different skills among the sales force. However, several studies highlight that the transition of the sales force comes with major hurdles. Reinartz and Ulaga (2008) showed that there can be strong resistance in the sales force to change. In their multiple case-study several companies experienced, even after extensive training, that they had little choice but to replace a significant part of their sales force; some companies even up to 80 %. Similar, Ulaga and Reinartz (2011) state that only one-third of the sales force can easily transform to sales of solutions instead of product. The others require either extensive training to gain the new required skills or preferred to be reassigned to sales of product offerings (Ulaga & Reinartz, 2011).

An important issue in these cases was that the top-management underestimated the magnitude of change needed at the sales force (Ulaga & Loveland, 2014). Top-management saw solution offerings just as an extension of product sales instead of a completely different process. As a result, they were not as deeply involved in the transformation process as they should be. They thought that their sales force could handle the transformation, since they expected that selling solutions would, with some trainings, quickly become "business as usual" for the sales force. Not realizing that it requires totally different sales structures, processes, competences, and mind-sets among sales people (Ulaga & Loveland, 2014).

Top management should steer the transformation, from a product-centric to a solution-centric sales model, by embedding their sales forces more in both their own organization and that of their customers. This is done by developing a more customer-centric organization, as discussed above. Moreover, managers need to get a better understanding of the specific competencies and skill sets of each member of the organization. Based on this understanding, teams can be developed with the appropriate competences to provide solutions (Ulaga & Loveland, 2014). The understanding also allows managers to give more "customized" trainings in order to improve team and individual competences. Or to recruit new employees with the required competences.

One important topic is also the redesign of the incentive structure to align the sales organizations with the overall corporate strategies (Ulaga & Loveland, 2014). Adopting the incentive

system gives a great extrinsic motivation to sales people and shows the dedication of the top managers to transform towards a solution business. The incentive system will be discussed more in detail later on.

2.4.4 Role of Partnerships

Solution providers normally have product components, service components and integration competences, but also have strategic partners for certain products and/or services components. The importance of having good relationship is becoming more important in providing solutions compared to providing products (Jaakkola & Hakanen, 2013; Windahl & Lakemond, 2006), since “*relationships enable companies to cope with their increasing technological dependence on others and the need to develop and tailor offerings to more specific requirements*” (Håkansson & Ford, 2002, p. 133). Although only one firm in the network is offering solutions, the other actors in the network have a significant influence in the development of solutions (Windahl & Lakemond, 2006). These actors offer important components that significantly increases the value of the solution offering. In many cases, the solution provider won’t be able to offer complete solutions without its partners (Windahl & Lakemond, 2006). Offering solutions, therefore, should not be seen as only an exchange between the provider and customer, but more as a collaborative effort among different actors in a value network (Davies et al., 2007; Davies, 2004; Windahl & Lakemond, 2010).

Due to the fact that the solution provider is integrating all the components into one solution offering, it must also coordinate the activities of all its suppliers and partners (Davies, 2004; Jaakkola & Hakanen, 2013). The solution provider is thus more than just an assembler of product components from its partners. It is responsible for the overall solution design, for which it must select and coordinate a network of partners, and it must have the competences to integrate these components into the solution offering. This requires strong and long-term relationships, in which some of the partners’ business processes and IT systems must be integrated with those of the solution provider. Ideally, the partners should also “*industrialize*” their product components in order to be make the integration within the solution more efficient. The role and procedures of each of the partners must be clearly defined in contracts. As a result, the transformation towards a solution business makes companies more dependent on their suppliers and partners (Windahl & Lakemond, 2010). On this basis, the following proposition is derived:

P7: “*Partnerships with external parties are more important in solution business, as manufacturers don’t have all the capabilities in-house to provide the complex solution*”

2.4.5 Incentive System

Another important organizational change is the restructuring of the incentive system (Galbraith, 2002). The incentive structure has to be aligned with the new overall corporate strategy of the company (Ulaga & Loveland, 2014). In other words, an incentive system need to be developed that encourage the development and selling of solutions instead of promoting product-centric sales (Shepherd &

Ahmed, 2000). Given that solution business is a joint effort across different functions, the incentive system must reflect this as well. The incentive system in product-centric business is mostly focused on stimulating the performances of each separate business unit; defined by geography or product (Hancock et al., 2005). Not changing the incentive system can completely prevent the transformation towards a solution business. Both people at the front-end and the back-end will perform “business as usual”, since they have no incentive to change. Matter of fact, if the incentive system does not change they even have an incentive not to change; as that will affect their income (Hancock et al., 2005).

The incentive system therefore has to support the whole solution business, meaning that it must increasingly reward team effort more than just individual effort. Due to this cross-functionality it also becomes more complex to measure the single product business unit performance and accountability. Galbraith (2002) therefore claims that a solution business should change its incentive system focus from business unit performance to overall company performance. This incentive system would also reward functions that are indirectly involved with the solution sales strategies. For example, functions involved in the solution development process, sales case development (Storbacka et al., 2011). These functions are also very important in supporting the overall development and success of the solution business (Storbacka, 2011).

2.4.6 Summary Differences in Business Models

Traditional product businesses are based on the existence of a predefined “need” that needs to be match by a predefined offering (Azimont et al., 1998). Solution businesses, on the other hand, are based around customer specific process requirements that need to be addressed by a customer specific bundle of different components. Therefore, offering solution requires a completely different way of doing business than offering products (Shepherd & Ahmed, 2000). Product offering has a more short-term mentality, with limited customer contact, independent highly standardize products, and basic after sales support, in which the total revenue is mainly determined by the selling of products. Solution offering, on the other hand, requires a long-term relational interaction with customers (Tuli et al., 2007), value-based pricing (Storbacka & Pennanen, 2014), cross-functional sale processes (Storbacka et al., 2009), customized integrated products and services (Brady et al., 2005), and extensive after sale support (Ulaga & Loveland, 2014), in which services determine a large share of the total revenues (Kowalkowski et al., 2015). Table 1 gives an overview of the major differences between a product-centric business and a solution-centric business based on all the literature discussed in this theory chapter. Again, all these difference clearly show that a more holistic perspective on the transformation towards a solution-centric business is needed.

Table 1: Summary product-centric vs solution-centric business models

	Product-centric business	Solution-centric business
Goal	Best product for customer	Best solution for customer
Value creation	Value in exchange	Relationship value / Value in co-creation/ use-value
Price based	Value of product	Value created
Main offering	Specific products	Customer specific bundle of components
Mentality	Short-term	Long-term
R&D focus	New product development	Product and service innovation
Revenue model	Product	Services
Product margin (%)	High	Low
Incentives system	Individual / business unit performance	Team / Cross-functional performance
Customer embeddedness	Transactional	Relational
Most important customer	Largest customer	Most profitable, loyal customer
Organization structure	(Silo) Business units	Cross-functional
After sales support	Basic	Extensive

3. Methodology

This chapter outlines the methods that are used in order to answer the research questions. The chosen methods are extensively described and reasoned in this chapter. More specifically, section 3.1 outlines the overall research design and the reason why to perform a single case-study. Section 3.2 explains and describes the chosen unit of analysis. Moreover, the contextual conditions that lie outside, together with the limitations of, the case are discussed in this section. Based on the unit of analysis, the different forms of data collection are described in section 3.3. Then, section 3.4 outlines how the collected data is prepared and analysed in order to answer the research questions. Finally, section 3.5 addresses the quality of this research by focusing on its reliability and different validities.

3.1 Research Design

The main research question this study tries to answer is: “*how to manage the transformation from a product-centric business to a solution-centric business?*”. In order to answer this research question, a qualitative descriptive case study is performed. There are several “related” reasons why a case study is conducted for this research. First of all, a case study gives a very detailed, empirical description of particular phenomena’s (Yin, 2014). It allows for a detailed analysis of contemporary real-life events. In this research, the contemporary event is the transformation period from a product-centric business to a solution-centric business. By analysing this particular phenomena, this study is able to develop theory out of an event that otherwise would be lost. Second, a case-study is the best method to answer “how” questions in unexplored research areas (Eisenhardt & Graebner, 2007). There is already a lot of literature regarding solution business models, however it is not clear how manufacturers are actually managing the transformation towards a solution business model. Due to the fact that this transformation towards a solution business model is still an unexplored research area, a case-study is the best method to get an understanding about the topic and to develop theory. The theory developed in this research can later be tested through quantitative research methods. Finally, this research focuses on offering insights into complex transformation processes. These processes are hard to reveal with quantitative data (Eisenhardt & Graebner, 2007).

Yin (2014) argues that there are four basic types of designs for a case study, namely *single-case holistic design*, *single-case embedded design*, *multi-case holistic design*, and *multi-case embedded design*. Yin (2014) therefore makes a distinction between single-case and multiple-case designs, and between holistic and embedded designs. Figure 5 gives a matrix overview of the different basic case studies designs. The matrix shows that single- and multiple case studies have different design situations. Moreover, within these two variants, there can also be unitary or multiple units of analysis (Yin, 2014). The best case-study design depends on the aim of the research.

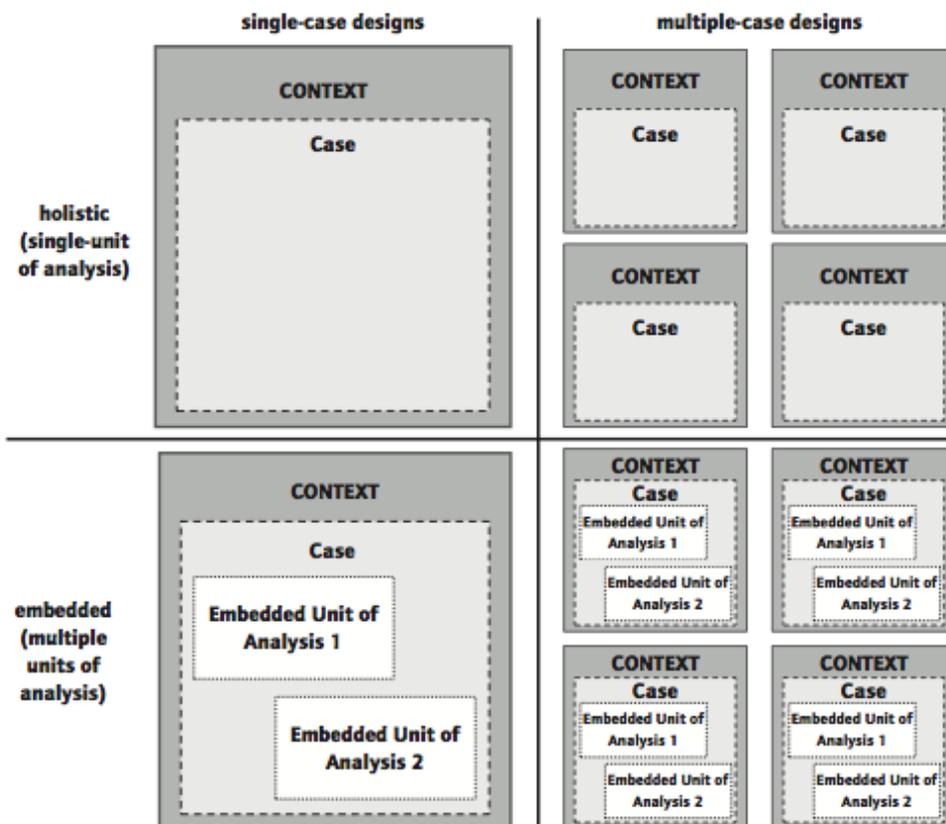


Figure 5: Basic Types of Designs for Case Studies (adopted from Yin, 2014)

For this research, the holistic single case design is chosen. First of all, a single case-study is chosen, since it allows for the most detailed and in-depth analysis of a phenomena. The research question of this research is focused on complex managerial processes. To understand these processes a very detailed and in-depth analysis is necessary. Adding more case-studies to this research would be at the expensive of truly understanding the complicated processes, and is hence undesirable. Second, a holistic case design is chosen, since literature showed that the transformation towards a solution business model influences the whole firm. Moreover, this research expects that the business model innovation, towards a solution business model, affects all the design elements of the business model, which are highly interrelated and interdependent. In order to see these interdependencies, a holistic case design is needed.

According to Yin (2014), the single-case study is eminently justifiable under five conditions. An overview of these five single-case rationales can be found in Table 2. For this research, a “critical case” was selected. Meaning, that a single case was selected that was critical to the solution business theory and, subsequently, to the related theoretical propositions of this research. The reasons to choose for a critical case was to determine whether the propositions made in this study are correct, or whether some alternative set of explanations or more relevant. More about the rationale of the critical single-case selection in section 3.2, where the unit of analysis is described.

Table 2: Five single-case rationales (based on Yin, 2014)

Single-case type	Research objective/rational
Critical case	Study a case that is critical to theory or theoretical propositions
Extreme or unusual case	Study a case that deviates from theoretical norms or everyday occurrences
Common case	Capture the circumstances and conditions of an everyday situation
Revelatory case	Study a phenomenon that was previously inaccessible to social science inquiry
Longitudinal case	Study the same single case at two or more different points in time

The qualitative single-case study research design has certain implications on how the researcher is ought to see and interpreted observations (Bryman, 2012). The epistemological orientation of this research is interpretivism. This means that the researcher is required to grasp the subjective meaning of social action (Bryman, 2012). The ontological orientation of this research is constructionism, also called constructivism. Constructionism asserts that: *“social phenomena and their meaning are continually being accomplished by social actors. It implies that social phenomena and categories are not only produced through social interaction, but that they are in a constant state of revision* (Bryman, 2012, p. 33)”. This ontological orientation has important implications for this research, namely that the organization and the business model of the case study are not pre-given, such as in an objectivism view, but are “constructed” and “adjusted” by the social actors. The social actors in this case study are the managers of the company.

This research used “grounded theory” as a general strategy for the collection and analysis of the qualitative data. Strauss and Corbin (1990, p. 12) define grounded theory as *“theory that was derived from data, systematically gathered and analysed through the research process. In this method data collection, analysis, and eventual theory stand in close relationship to one another”*. Thus, grounded theory has two central features. First, it is concerned with the development of theory out of data and, second, that the approach is iterative, meaning that data collection and analysis proceed simultaneously (Bryman, 2012). In other words, grounded theory is an “iterative approach to the analysis of qualitative data that aims to generate theory out of research data by achieving a close fit between the two” (Bryman, 2012, p. 712). Although grounded theory is mainly based on an inductive approach (Dubois & Gadde, 2002; Strauss & Corbin, 1990), which means that generalizable inferences are drawn out of observations (Bryman, 2012), it also entails some elements of deduction due to the weaving back and forth between data and theory (Bryman, 2012).

3.2 Case and Unit of Analysis

The case of this research is a Swiss Multinational high-tech machine manufacturer that from here on is called “TechLution”. During the past years, TechLution transformed from a product-centric business to a solution-centric business. The manufacturer has a product portfolio of different machining technologies. TechLution is chosen as the critical case, as they are a pioneer in offering solutions in their traditional “product” industry. Whereas their competitors are still mainly focused on product or operational excellence, this company is differentiating by offering solutions to their customers. Instead of just selling machines, TechLution is trying to understand what their customer wants to produce with their machines, and how the current processes of the customer are working, in order to provide it with a suitable solution. TechLution, therefore, invested a lot in its consultancy competences in order to find the right solution for each of their customers.

An example of a solution that is offered by TechLution is the fully automated production cell. This is a cell in which different machines of the company’s portfolio are combined with automation, software, and services in order to provide the customer with a fully automated production solution. How these different machines, automation, software, and services are integrated with each other to one solution is depending on the specific customer’s needs. Another related example is the development of special features on an existing machine. These features are developed to answer the need of a specific application within a given market. TechLution calls such products “Dedicated Machines”, which are developed and promoted within the targeted market with their market-specialists. So far, these approaches are making this manufacturer unique in its industry. The only reason that TechLution is able to offer solutions is because it innovated its business model to a solution business and, subsequently, invested a lot in its consultancy competences.

The transformation experience to, and organizational structure of, their solution business is a valuable data source for ‘solution business’ and ‘business model innovation’ theory-building. The company is a great example case for other manufacturers trying to move from a product business model to a solution business model. Making this manufacturer a great critical case to test the theoretical propositions developed in the theory chapter.

This research is focus on how managers interpreted and change the activity system of the company to become a solution business. In order to stay focused on these topics, the case has certain limits and boundaries. First of all, this research only focuses on the activity system of the company. This means that the empirical data collection is only based on the case company. Of course, there are factors that have a direct influence on the activity system of the company, like governments, customers, suppliers, partners, and competitors. These factors are taken into account, but they are not included in the unit of analysis. Thus, as the aim is to see how the business model changes due to the transformation towards a solution business, the unit of analysis of this research is the activity system of the case

company. An illustrative overview of the unit of analysis, the activity system of the company, within its system can be found in Figure 6.

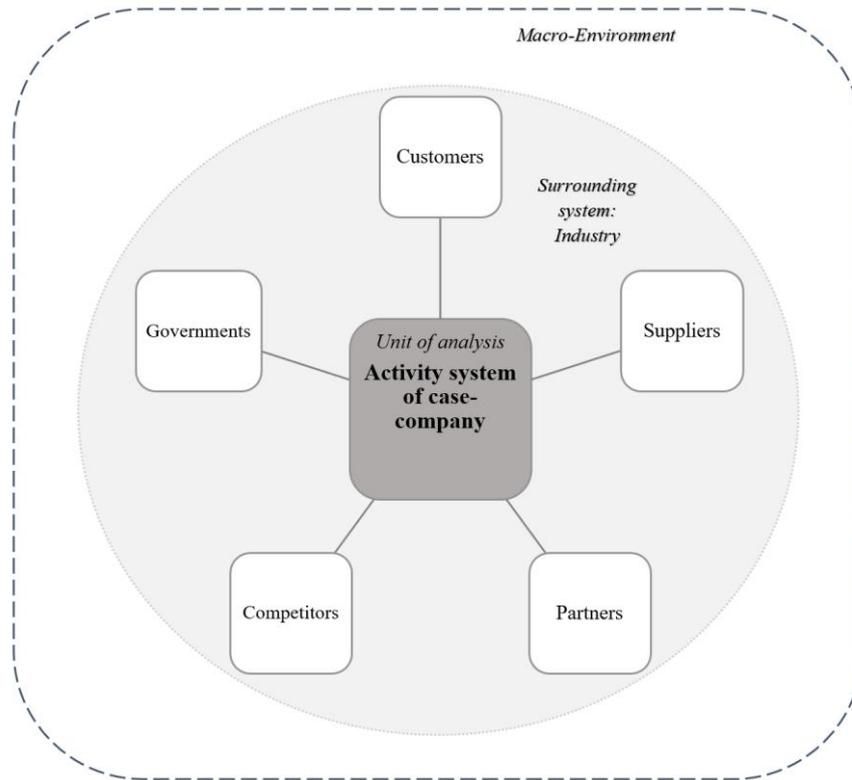


Figure 6: Boundaries of the case

3.3 Data Collection

Case study evidence can come from many sources. Which sources and how many sources to use depends on the aim of the research. According to Yin (2014), the most common sources of evidence are: *documentation, archival records, interviews, direct observations, participant-observation, and physical artefacts*. The advantages and disadvantages of these six sources of evidences can be found in Table 3. Note that no single source of evidence has a complete advantage over all the others. On the contrary, the various sources are highly complementary (Yin, 2014). In order to perform a good case study, this research will rely on multiple sources of evidence.

Using multiple sources of evidence in a case study research allows to use a broader range of data, but more importantly it allows the development of “converging lines of inquiry” (Yin, 2014). Converging lines of inquiry means that there are multiple sources of evidence that corroborate the same findings (Yin, 2014). This cross-checking of findings is also called “data triangulation” (Bryman, 2012). Findings from just one source of evidence have the possibility to be incorrect or biased, as can be seen in Table 3. By applying data triangulation, the case study findings and conclusions of this research are likely to be more convincing and accurate. In other words, data triangulation significantly reduces the chance of incorrect or bias findings and conclusions.

Table 3: Six Sources of Evidence: Strengths and Weaknesses (adopted from Yin, 2014)

SOURCE OF EVIDENCE	Strengths	Weaknesses
Documentation	<ul style="list-style-type: none"> • Stable – can be reviewed repeatedly • Unobtrusive – not created as a result of the case study • Specific – can contain the exact names, references, and details of an event • Broad – can cover a long span of time, many events, and many settings 	<ul style="list-style-type: none"> • Retrievability – can be difficult to find • Biased selectivity – if collection is incomplete • Reporting bias – reflects (unknown) bias of any given document’s author • Access – may be deliberately withheld
Archival records	<ul style="list-style-type: none"> • [same as those for documentation] • Precise and usually quantitative 	<ul style="list-style-type: none"> • [same as those for documentation] • Accessibility due to privacy reasons
Interviews	<ul style="list-style-type: none"> • Targeted – focuses directly on case study topics • Insightful – provides explanations as well as personal views (e.g., perceptions, attitudes, and meanings) 	<ul style="list-style-type: none"> • Bias due to poorly articulated questions • Response bias • Inaccuracies due to poor recall • Reflexivity – interviewee gives what interviewer wants to hear
Direct observations	<ul style="list-style-type: none"> • Immediacy – covers actions in real time • Contextual – can cover the case’s context 	<ul style="list-style-type: none"> • Time-consuming • Selectivity- broad coverage difficult • Reflexivity – actions may proceed differently because they are being observed • Cost-hours needed by human observers
Participant-observation	<ul style="list-style-type: none"> • [same as those for direct observations] • Insightful into interpersonal behaviour and motives 	<ul style="list-style-type: none"> • [same as those for direct observations] • Bias due to participant-observer’s manipulation of events
Physical artefacts	<ul style="list-style-type: none"> • Insightful into cultural features • Insightful into technical operations 	<ul style="list-style-type: none"> • Selectivity • Availability

The data collection for this research took place from March 2016 until July 2016 and is based on the following sources of evidence: documentation, archival records, semi-structured interviews, direct observations, and physical artefacts. A short summary of what includes the data collection of this research can be found in Table 4. Note that documentation and archival records are combined under “company documents”, since different company documents cover both sources of evidence. Each source of evidence for this research are more elaborate below. The attentive reader will have noticed that the ‘participant-observation’ is not included in the data collection of this research. There are two reasons why this research did not collect any ‘participant-observation’ data. First of all, it is assumed that the insights into interpersonal behaviour and motives would not add any significant new insights regarding the aim of this research. Additionally, it is also a very time-consuming source of evidence which would, due to the limit time and resources of this study, not be worth the effort.

All the data collected for this research, with exception of the data from physical artefacts, is stored in a database. Data from the physical artefacts are not stored in the database, as this data was more for the researcher to understand the context, and not directly relevant for the theoretical outcome of this research. A case study database was developed for the sake of reliability. In other words, this data base allows other people to control whether the correct conclusions are drawn from the collected data. Unfortunately, due to confidentiality reasons, this case study database is not included in the Appendix, but added as a separate document. The case study database is only accessible for persons who are authorized to review it. Nevertheless, the case study database is not necessary to understand this paper. It is just created to allow other people to control the findings.

Table 4: Source of evidence used in this research

Source of evidence:	Consisting of:
Company documents (documentation + archival records)	Public documents (e.g. annual reports and customer magazines) + internal documents (e.g. presentations and strategy documents)
Interviews	12 semi-structured interviews, lasting between 1.5 to 2 hours, with top- and middle- management
Direct observations	3 guided tours through different production facilities + 3 guided tours through different sales companies of different market regions + guided tour through headquarter + guided tour through warehouse-hub + guided tour through “centre of competence”
Physical Artefacts	Different machines + Integrated solution cells + components/modules of the machines + several products created by the machines

3.3.1 Company Documents

Company documents are very rich and meaningful data sources for researchers conducting case studies on organizations (Bryman, 2012). Companies, like the case company of this research, produce many, both public and non-public, documents. A lot of these documents are not relevant for this research, but some of these documents contain valuable information. The search for these valuable documents went as followed. First, through internet searches, a lot of public company documents were reviewed. Documents that were considered as relevant for the aim of this research were stored. Second, the researcher was also allowed to access non-public company documents that were stored in the company's database. In order to make the search process through this large database effective, the researcher asked the interviewees of this research where he could find relevant documents. These documents were screened and, when perceived relevant, added to the data collection. As a result of this search process, the following company documents were included in the data collection:

- **Public documents:** five annual reports from 2011 to 2015, mission statement, company profile and history, five customer magazines, and three press releases related to solution business
- **Internal firm material:** management presentations, training presentations, market analyses, product information, functional organization sheet, and documents regarding organizational change and strategy.

The research is aware that company documents have issues with objectivity and credibility. Therefore, the most important use of these company documents is to corroborate and augment evidence from other sources, especially interviews.

3.3.2 Interviews

The most important source of data collection for this research are interviews. Interviewing gives access to the observation and experiences of others (Weiss, 1995). For this research the managers of the company are an essential source of data, since they initiated and managed the transition towards the solution business model. The insights and experiences of these managers are of great value for the development of a holistic and comprehensive database.

In total 12 semi-structured interviews were carried out between March 2016 until July 2016 with both people from top- and middle- management. Consistent with (Huy, 2001, 2011), Middle managers are defined as two levels below the CEO and one level above first-line supervisors. Top management, on the other hand, includes the CEO and those who report directly to him, also known as senior-management. Each interview lasted between 1.5 to 2 hours. Semi-structured interviews were chosen, as it gives interviews a certain direction, but at the same time leaves it open enough for new insights from interviewees into novel areas (Bryman, 2012). This openness in the interview is needed, since the respondents are perceived as the experiential experts on the subject and should therefore be

allowed maximum opportunity to tell their perspectives (Gioia, Corley, & Hamilton, 2013; Jonathan Smith & Osborn, 2015).

Only people from top- and middle-management were included into the case-sample, since it was assumed, on the basis of literature, that only these managers were primarily responsible for initiating and managing the transition process on the aggregated level. Lower management functions were not included in the sample, as this research is more focused on the aggregated level and, though lower management insights might be valuable on specific operations, their insights on the aggregated level are assumed to be limited. In addition, this group of managers was not included due to time limitations.

The sampling of interviewees was based on purposive sampling (Bryman, 2012). Only respondents were approached who both were particularly knowledgeable about the solution business transformation and for whom the transformation had a significant impact on their daily operations. All the interviewees were contacted personally and anonymity was assured. The first six interview respondents were chosen on the basis of literature together with the advice of a key informant within the company. As shown in the theory chapter, Storbacka (2011) stated that commercialization and industrialization are very important factors for a solution business model. For this reason, the key informant and the researcher decided to start with three managers involved in production, and three managers involved with markets and customers. From these first six interview respondents, the remaining six interview respondents were chosen through snowball sampling (Bryman, 2012). In other words, the remaining six interviewees were chosen on the basis of either the recommendations of the previous interviewees or based on the topics addressed by the previous interviewees. A chronological overview of all the interview respondents can be found in Table 5. Due to confidentiality reasons, the names of the respondents are not mentioned.

Before conducting the interviews, an interview guide was developed based on the interview guide described in Weiss (1995). The interview guide consists of a listing of areas, which consists of a listing of questions, that together suggest the line of inquiry for the interview. Consistent with (Weiss, 1995), the interview guide consisted of five areas per interview. The areas and related questions of the first interview guide were based on literature and insights of the researcher. This interview guide was checked by, and tested on, peers several times. On the basis of these peer tests, several small adjustments were made to the interview guide, after which it was used for the first interview. The interview guide underwent several modifications as more was learned about the topic through interviewing. Additionally, the interview guide was adjusted depending on the interviewees' function and expertise within the company. An example of a used interview guide can be found in Appendix C. Specific interview techniques were applied during the interviews, such as "prompts" and "funneling" (Jonathan Smith & Osborn, 2015). Sometimes an initial question was insufficient to elicit a satisfactory response;

either a short or superficial reply. In these cases, the interviewer moved to a prompt question; which is more specific in order to get the respondent talking. A related used technique was funnelling. For certain issues, the interviewer started with more general questions in order to get the respondent’s general view on a certain topic. After the general view was established, the interviewer moved into more specific questions. By asking questions in this sequence, the respondents were allowed to give their own view before funnelling them into more specific questions (Jonathan Smith & Osborn, 2015). Moreover, the interviewees were often asked to describe concrete examples or events in order to get a more comprehensive overview and understanding of the subject. The later interview technique was specially applied when the respondent was speaking rather general about a topic.

All the conducted interviews were audio-recorded and transcribed as soon as possible after each interview. The transcripts of the interviews were then sent to the respective respondent in order to be reviewed. This was done to minimize any potential misunderstandings of the researcher. Besides the interviews, also numerous informal conversations and follow-up conversations with some of the interviewees and other TechLution informants were conducted. These conversations helped to get an even further understanding about the solution business transformation.

Table 5: Overview interview respondents

Function within company	Level	Reason
1. Head of production facility technique X.	4	Insight in production process and production integration
2. Head of production facility technique Y	3	Insight in production process and production integration
3. Head of Market Region A	2	Insights in markets and customer embeddedness
4. Head of Market Region B	2	Insights in markets and customer embeddedness
5. Head of production facility technique Z	4	Insight in production process and production integration
6. Head of Market Region C	2	Insights in markets and customer embeddedness
7. Head of Services	1	Insights in the role of services and service innovation
8. Head of Strategic Planning	1	Insights in how the transformation towards solution business was planned
9. Head of Technology/Market Intelligence	2	Insights in technology and market opportunities related to solution business
10. Head of Industry 4.0	3	Insights in the role of industry 4.0 in solution business
11. Head of Human Resources	1	Insights in the role of human resources in solution business
12. Head of Special Projects	1	Insights in the role of special project in the transformation towards a solution business

3.3.3 Direct Observations

The observations done for this study added new dimension for understanding the context of a solution business. Moreover, the observations gave insights in how the company is organized to offer solutions. The following direct observations are performed:

- Three tours through different production facilities.
- Three tours through different sales companies of different market regions.
- A tour through the company's headquarters.
- A tour through the warehouse-hub for the European market.
- A tour through a "centre of competence", which is a place for training and product demonstrations.

The guided tours through the different production facilities and sales companies were given by the related interviewees. In other words, these guided tours were given by the heads of the related facilities. The guided tour through the headquarters and centre of competence was given by the key informant of the company. Finally, the tour through the European warehouse-hub was given by the head of the warehouse-hub. On average all the guided tours lasted between 30 to 60 minutes. The notes taken during the tours are included in the case study database.

3.3.4 Physical Artefacts

Just like the direct observations, the physical artefacts helped for understanding the context of a solution business. Moreover, they helped to understand the topics addressed by the interviewees better, as the artefacts are the physical components of the solution offering. The following physical artefact were observed:

- Numerous machines based on different techniques
- Two integrated solution cells
- Components/modules of the machines
- Several (test) products created by the machines
- Spare and wear parts of the machines
- Consumables for the machines

3.3.5 Converging Lines of Inquiry

In the data collection phase it was tried to find data triangulation for all the findings. At least two sources of evidence must support a finding in order to get data triangulation. The data triangulation, from the converging lines of inquiry, follows the principle in navigation; here the intersection of different reference points is used to determine the precise location of an object (Yardley, 2015). The more sources of evidence support the same finding, the more convincing and accurate the finding is. For this research, the aim was to have at least two sources of evidence supporting a finding. For

example, an interviewee mentioned the components included in an integrated solution cell. This solution cell and its components were later also observed by the researcher, which results in data triangulation for the solution cell.

For some findings out of the interviews, it was not possible to find another source of evidence to support the finding. The reason that no converging lines of inquiry could be found for these findings was because the interviewee mentioned an experience or own observation. In these cases, a finding must be supported by another interview to have some kind of data triangulation. Meaning that at least two interviewees mentioned or supported a finding. Figure 7 gives an illustrative example of the converging lines of inquiry used in this research.

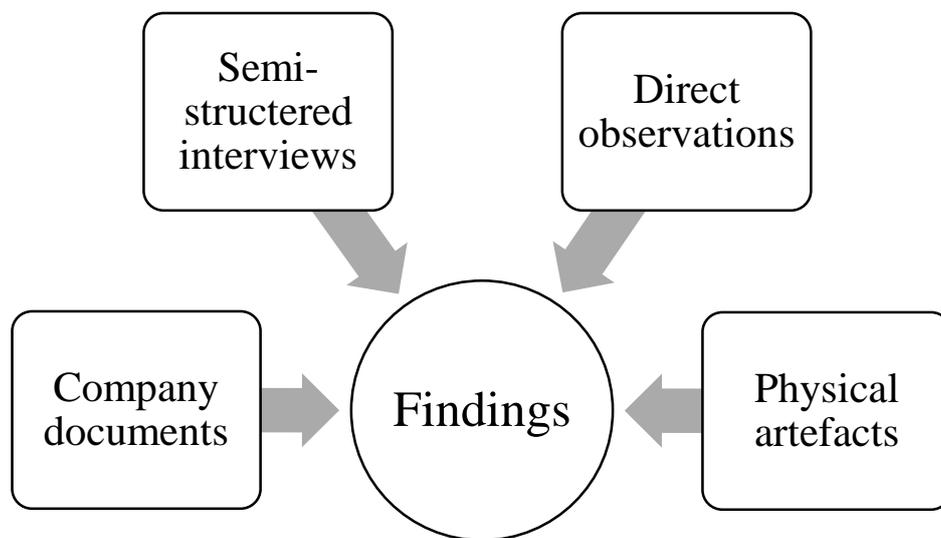


Figure 7: Convergence of the multiple sources of evidence

3.4 Data Preparation and Analysis

The analysis of case study evidence is one of the least developed aspects of conducting case studies (Yin, 2014). There are no fixed formulas as in statistical research. The case study analysis is highly depending on the researcher's own rigorous empirical thinking. Fortunately, there are certain techniques and tools that support the researcher to guide his analysis. Yin (2014) describes four general strategies and, related to these strategies, five analytic techniques that can be used by case study researchers. The four general strategies are: (1) *relying on theoretical propositions*, (2) *working your data from the ground up*, (3) *developing case descriptions*, and (4) *examining rival explanations* (Yin, 2014). The general strategy for this research was relying on theoretical propositions, since it helped to organize and guide the case-study analysis. This guidance was important as it kept the data collection and analysis focused on the research questions.

The five analytic techniques from Yin (2014) can be found in Table 6. For this case study research, "pattern matching" is chosen as the analytic technique. Pattern matching compares predicted

patterns with an empirically based pattern based on the findings from the case study (Yin, 2014). According to Yin (2014), pattern matching is one of the most desirable techniques for case study analysis, since it can strengthen the internal validity of the case study. The internal validity is strengthened if the predicted and empirical patterns are similar. More about internal validity in section 3.5. In this research, the predicted patterns are the theoretical propositions proposed in the theory chapter.

Table 6: Five analytic techniques (adopted from Yin (2014))

Analytic technique	Explanation
1. Pattern matching	Compares an empirically based pattern with a predicted one made before you collected your data.
2. Explanation building (special type of pattern matching)	Analyse the case study data by building an explanation about the case.
3. Time-series analysis	Analyse the case by tracing changes over time and to identify related relationship of events.
4. Logic Models (special type of pattern matching)	Developing a logic model that stipulates and operationalizes a complex chain of event over an extended period of time, in which the events are staged in repeated cause-effect-cause-effect patterns.
5. Cross-case synthesis	Analyse of the data from multiple cases using a single uniform framework.

3.4.1. Data Analysis

As mentioned earlier, this research uses grounded theory for analysing the qualitative data. One of the most central processes in grounded theory is the “coding” of data (Bryman, 2012). Strauss and Corbin (1990) define coding as: “*the analytic processes through which data are fractured, conceptualized, and integrated into theory*”. Figure 8 gives an illustrative overview of all the research processes and outcomes of this study. The figure shows that the coding of qualitative data is a very iterative process.

The general structure of coding data in grounded theory is as followed. Coding entails reviewing the collected data by giving labels to components parts that seem to be of potential theoretical relevance. Labels that observe the same common features are grouped under concepts, which can be seen as the building blocks of theory (Strauss & Corbin, 1990). Concepts that have been elaborated in such a way that they are regarded as representing real-world phenomena are called categories. A

category usually exists out of two or more concepts and are, therefore, at a higher level of abstraction than concepts (Bryman, 2012). The most important categories become the core-categories around which the other categories pivot. On the basis of the categories, substantive theory can be developed (Bryman, 2012; Strauss & Corbin, 1990).

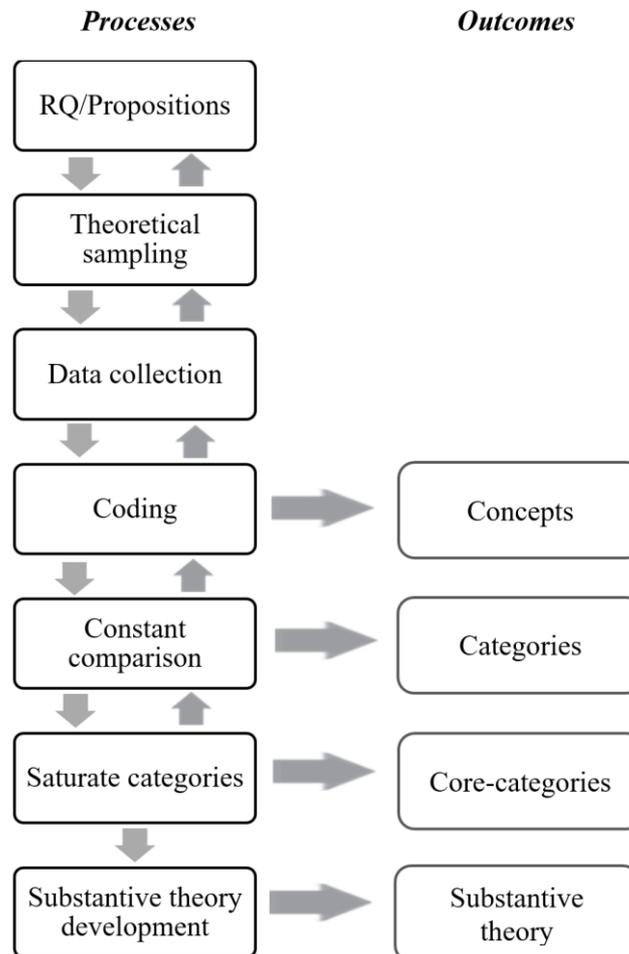


Figure 8: Research processes and outcomes

The computer software “NVivo” (QSR International Pty Ltd., 2015) was used to assist the researcher with the analysis and coding of the collected data. NVivo was chosen to assist with this analysis, as it is one of the most used and recommended “Computer-assisted qualitative data analysis software” (CAQDAS) among academics. Additionally, the researcher already had experiences with this software, which made the analysis more efficient.

The following sources of evidence were coded: company documents, interviews, and field notes from the direct observations. However, for the company documents only highly relevant parts were coded. Meaning, that only small parts of each document, that were included in the database, was coded. This was done due to limited resources and a lot of irrelevant information in the company documents. The interviews and field notes of direct observations, on the other hand, were fully coded.

Based on both Strauss and Corbin (1990) and Charmaz (2014), the coding of the collected data was done in three phases. The first phase of coding was based on so-called “open coding”, which is “*the process of breaking down, examining, comparing, conceptualizing and categorizing data*” (Strauss & Corbin, 1990, p. 61). In this phase, the collected data was first coded on a very detailed level; resulting in sometimes several codes per line of text. The researcher tried to be open-minded and to generate as many codes as possible to encapsulate all the data. Simultaneously with the coding, concepts were developed. Initially, this open-coding resulted in 192 concepts, which were referring to 2176 pieces of text. These initial concepts covered various topics, such as “project management done by sales organizations” or “difference sales process product vs solution”. After the open-coding of all the data was finished, the concepts were compared with each other and conceptualized. This resulted in numerous initial different categories.

The second phase of coding was based on “axial coding”, which is “a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories” (Strauss & Corbin, 1990, p. 96). Thus, in this phase codes were linked to context, to consequences, to patterns of interaction, and to causes in order to make connections between categories (Bryman, 2012; Strauss & Corbin, 1990).

The final phase of coding was based on so-called “selective coding”, which Strauss and Corbin describe as “the procedure of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development” (1990, p. 116). Therefore, this phase focused on the most common codes and those that are seen as most revealing concerning the data. The data-set was reevaluated in terms of these selected codes. As a result, numerous initial codes were dropped or were combined to generate new codes. This process resulted in more holistic categories. An aggregation overview of all final concepts, categories and core-categories, that were produced during the data-analysis, can be found in Figure 9. The structure of the figure is based on the Gioia method (Gioia et al., 2013). Note that some specific company related concepts are “renamed” due to confidentiality. During the whole coding process, the researcher wrote several memos to develop theoretical insights.

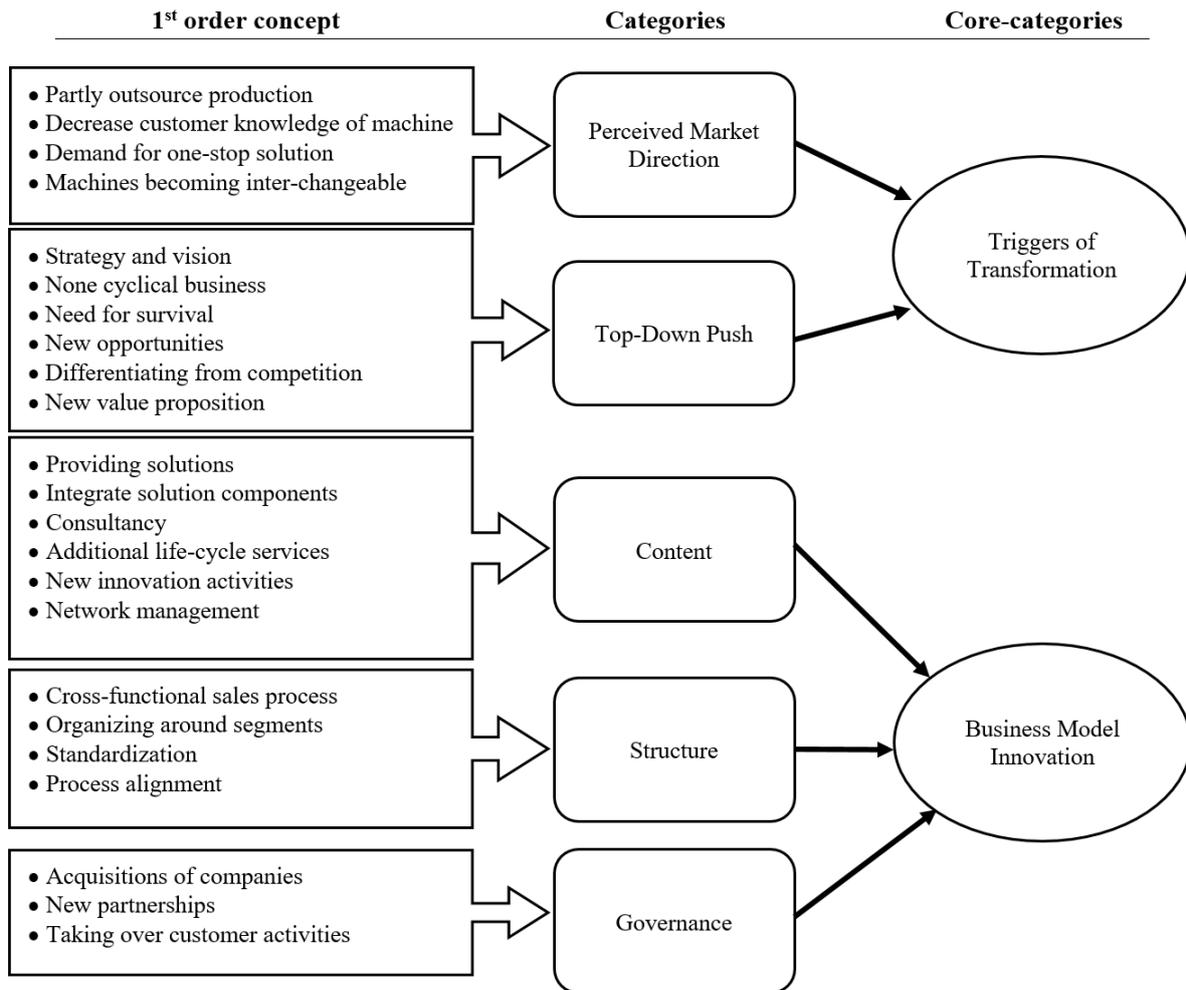


Figure 9: Code-aggregation diagram

3.5 Reliability and Validity of Research

The case study research design, as became clear in this methodology chapter, is not as standardized and straightforward as a quantitative research design. The data collection and analysis is mostly relying on the researcher’s “own style of rigorous empirical thinking” (Yin, 2014, p. 133). It is therefore, for the quality of the research, very important that the researcher clearly states how he developed its conclusions. According to Yin (2014) there are four criteria that have been commonly used to evaluate the quality of any empirical social research. These criteria are also relevant for case study research. These four criteria are (Bryman, 2012; Yin, 2014):

- **Construct validity** (also known as “internal reliability”): concerned with the question whether correct operational measures are used for the concepts being studied.
- **Internal validity**: concerned with the question whether the claimed causal relationships between two or more variables are correct. In other words, it is concerned whether there is a correct match between the case-study data and theory.

- **External validity:** concerned with the question whether the results of the study can be generalized beyond the specific research context.
- **Reliability** (also known as “external reliability”): concerned with the question whether the results of the study are repeatable.

The following four paragraphs describe how this research took these criteria into account. Table 7 summarizes all the steps taken to improve the four criteria.

The construct validity of this research is improved by applying three tactics. First of all, this research tried to apply data triangulation for all its findings. The convergence of multiple source of evidence is essentially multiple measures of the same phenomenon (Yin, 2014). This increases the confidence that the case study has measured the concept accurately. Second, since the interviews are the most important source of evidence, the transcripts of all the interviews were sent to the respective respondents to review. This was done to minimize any potential misunderstandings of the researcher. Third, the draft case study report is reviewed by several key informants and interview respondents of the case study company. This gave the key informants and respondents the opportunity to challenge any of the findings. The corrections made through this process enhanced the accuracy of the case study (Yin, 2014).

The internal validity of this research is improved by applying two tactics. First of all, this research applied “pattern matching” as an analytic technique. The pattern matching technique in this research compared empirically based patterns with patterns predicted out of theory. The internal validity of this research is strengthened if these patterns appear to be similar (Yin, 2014). Second, the research developed a clear coding scheme based on the Gioia et al. (2013) method. This results in a higher internal validity of the research findings.

A major discussion among academics is the criterion of external validity regarding qualitative single-case studies. A frequently ask question is “how can you generalize the finding of a single case study?” (Bryman, 2012; Yin, 2014). The answer to this question is that it depends on what kind of generalization the study wants to make. A single case study, like an experiment, is not representing a sample. Therefore, the findings of a single case study are not generalizable to populations or universes (Bryman, 2012; Yin, 2014), which is done in statistical studies. Yet, the goal of a single case study is to expand and generalize theories. The single case study is, therefore, able to make analytic generalizations. Thus, the goal of a single case study is to do a generalizing of theory, and not to extrapolate probabilities (Yin, 2014). Yin (2014) identifies two ways that positively influence the external validity, and thus generalization of theory, of a single case study. The first one is developing “how” and “why” research question(s), since these questions help with the preference for seeking analytical generalizations. Additionally, the identification of theoretical propositions helps to strengthen the external validity of the single case study. The theoretical propositions shaped the data collection

plan and as a result yields analytic priorities (Yin, 2014). Both ways, identified by Yin (2014), are applied in this research.

The final important quality criterion is the reliability of the single case study. Of course, the researcher of this study tried to minimize any errors and biases, but there are also two general tactics applied to address the criterion of reliability. First of all, in this methodology chapter it is tried to thoroughly explain the data collection and analysis to allow other researchers to replicate the case study. Also, the code-aggregation diagram clearly shows how the concepts, categories and core-categories are build-up. Second, all the data collected from the case-study is stored in a database. This allows other researchers to inspect the entire database apart from just the case study report. Unfortunately, this database cannot be shared with everybody due to data confidentiality. The database is only shared and reviewed by researchers who were authorized to review the data.

Table 7: How the four criteria of research quality are improved (based on Yin (2014))

Criteria:	Improved by:
Construct validity	<ul style="list-style-type: none"> • Use of multiple sources of evidence • Transcript of interviews reviewed by respondents • Draft case study research reviewed
Internal validity	<ul style="list-style-type: none"> • Pattern matching • Code-aggregation diagram
External validity	<ul style="list-style-type: none"> • How and why Research Questions • Extensive use of theory
Reliability	<ul style="list-style-type: none"> • Case study database • Code-aggregation diagram

4. Findings

The case study research provides a holistic view on how to manage the transformation from product-centric business towards a solution-centric business. This chapter outlines all the findings from the case-study research. Moreover, it answers the sub-research question: “*how is a manufacturer mastering the transformation process from a product-centric business model to a solution-centric business model?*”. Corresponding with the Gioia method (Gioia et al., 2013), the different findings are supported with extensive quotes from the respondents of this research. In exploring the research question there are two main themes to the model of solution business transformation, as illustrated in Figure 10, that emerged from the case-study, namely: (1) triggers of transformation, and (2) the business model innovation process towards the solution-centric business. To better understand the business model innovation process, it is important to first understand what triggered TechLution to transform towards a solution business.

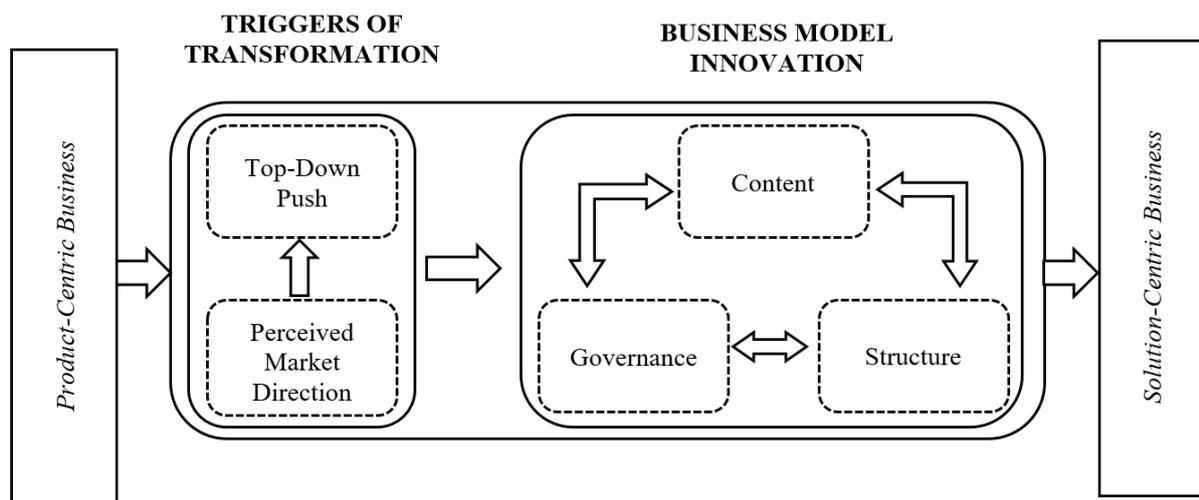


Figure 10: Managing the transformation towards a solution-centric business model

4.1 Triggers of Transformation

Two specific categories relating to the origins of the transformation are identified: (1) perceived market direction by top-managers, and (2) the related top-down push from top-managers to go into a solution business. Indeed, the transformation towards a solution business is clearly initiated by top management. The managerial cognition capabilities play a central role in triggering the transformation towards a solution business.

4.1.1 Perceived Market Direction

The first trigger of transformation involves the perceived market direction by top-management. The top-managers of TechLution perceived that the market was changing in four ways, namely:

customers are more focused on their core-processes, customers' decreasing knowledge about operating the machines, customer demand for one-stop solutions, and related to that the decreasing relevance of the machines in the total value creation.

A great part of both their traditional and new customers started to change their processes and consequently developed different needs. Their customers started to focus on their own core-processes, which is the designing and producing of their parts. The skilled people are no longer operating the machine, but they are making the designs of the parts. As a result, the top-management perceived that the customer knowledge about the machines themselves is decreasing. In the past, the machine operator was highly skilled and sometimes even "knew more about the machine than we did", as stated by a manager. However, nowadays the highly-skilled people are not focused on the machining itself. Meaning, that the customer knowledge about how to operate and setting-up the machine is decreasing. As stated by the head of market intelligence:

"No, the customer is changing he. They are changing, because they also don't want to spend too much time in setting the machine; to make the settings. And the people they have are less skilled. The people that are skilled, they don't want to operate the machine. They want to build the CAD-system. That means that the machine should not be a machine, but should already be a little bit of a solution. Don't expect the programming of the "X"-machine on the machine he. This is done [for example] on the first-floor at the CAD/CAM system. Where you have the specialists. And the machine should be enough intelligent, enough solution, being designed to accept the message. This is a change of the customer we have... Yes, this is what I can see from the trend. You cannot stop this, that is impossible. This is for everything, not only machine-tools he." (Case study database, p. 57)

The customers' focus on their core-processes, instead of operating the machines, triggers a demand for so-called one-stop solutions. The customer wants to focus on its core-processes and therefore does not want to focus on managing all the processes of the production machines. The customer is looking for a supplier who can take care for managing these production processes. These customers are, therefore, partly outsourcing parts of their production processes to a supplier who can offer the solution. The customer wants to have one supplier who is taking care of it. As this perception is described by a head of a market region:

"They don't want to have a company A for technology x, company B for technology y, company C for the software, company D for the measurement... I mean it is not their business. They want to produce parts. They don't want to do project management for seven partners. They want one guy. Also to hold responsible..." (Case study database, p. 142)

Related to the one-stop solutions, the management of TechLution started to realize that their machines, which were their core-offering for value creation, started to become less important to fulfil their customers' needs. Or as one of the manager's described it "the machines are becoming interchangeable to some extent". It is becoming more important how the machines are integrated with each other, and with the whole production process, than just having great single machines performances. As related by a head of a market region:

"for me this is the message. This is old-style. It is too complex. You don't get the people skilled enough to operate. Make it easier. The machine is not important. It has to executed, and you have to have an umbrella over it, which is managing the whole stuff, the whole complexity"

(Case study database, p. 114)

Thus, the cognitive capabilities of management play a central role in triggering the transformation towards a new business model (Eggers & Kaplan, 2013; Helfat & Peteraf, 2015). Before managing the transformation towards a new business model, managers first have to perceived signals from their environment that they need to change their business model. In the case of TechLution, the managers started to perceive that their core-offering, their machines, were not enough anymore to fulfil their changing customers' needs. They have to provide them with more than just products. They have to provide them solutions.

4.1.2 Top-Down Push

Perceiving changes in the market, the top-management realized that they were not able to offer these new needs with their current business model. They knew that they had to change their business model in order to offer solutions. As a result, the top-management started to push in order to change the business model. Top-management saw great new opportunities if they could manage to become a solution provider. Providing solutions would create a new value proposition for their customers, they could differentiate themselves better from competitors, and it would make their business less cyclical, as they could target less cyclical segments and retrieve more revenues from services. Yet, the real value proposition of providing solutions became clear to the management after an internal competition. As related by the head of Strategic Planning:

"We [top-management] organized an [internal] world application championship. That means we really said "Okay, you now get the CAD to produce this part, and you can use the whole spectrum of our machines. Please give me your solution." And then we recorded the whole time. I think between 10 to 15 teams participated. So they were application people out of the global sales organizations. Then, the best four teams [with the best production time] were invited to do a second part in our facility in Switzerland. And again to use all the technologies in the best way. The difference between the first and the second was somehow around 50%. That means that, or 100%, depending on from which side you see it. But so the first one took half of the time

compared to the second one. And this really shows you; on the pure machines we are fighting about 3%, or 5%. And then if you are looking for the whole solution, we are talking about 100%. So it is not about having the fastest machine. It is about using the technologies in the best way to give the best solution.... On the machine you fight on some percentage points, but over the process, over the right solution you fight about 100 %.” (Case study database, p. 189)

Besides the opportunities of the transformation towards a solution business, the transformation was also perceived to be of vital importance for the survival of the company. As one top-manager mentioned: *“You know, we are a Swiss based company and our president always says “you can make one promise, we are not the cheapest, and we will never be the cheapest”. So that means that you have to somehow see what is your differentiation”*. The company’s differentiation always used to be, and still is to a large extent, on product innovation. However, competing on only the machine is getting more difficult. That is why the top-management perceived that it was of vital importance to become a solution provider. As explained by the head of Human Resources:

“It is just we made a choice. And we are already going into that direction, because we are too expensive compared to the competition. So we don't question this strategy anymore, because that is what we have to do if we want to survive. If we keep selling machines, we are 30% more expensive than the Japanese, and they do more or less the same [in terms of machines]. So if we sell only machines, we are dead. So there is no question about this. We have to go in that direction. We have to be closer to the customer need, and we have to understand it better. We have to sell more than just one machine, because otherwise it is over.” (Case study database, p. 254)

Another top-manager put the emphasis of becoming a solution provider more on differentiating from their product-oriented competitors:

“It is not about the topic on the machine; it is about the whole process... It is extremely difficult to differentiate on the machine. Especially on mechanical topics. If you see the Japanese and their machines, they are really good on machining. It is extremely difficult to differentiate there. So, I think we have to differentiate by being able to deliver this knowledge, this solution over the whole process.” (Case study database, p. 178)

Overall, the management had a clear vision that becoming a solution provider was the way to go. This resulted in the development of a strategy to gradually transform from a product-centric business towards a solution-centric business. In their five-year strategy planning from 2010, they identified yearly goals and targeted markets in which they wanted to offer their solutions. Also, to show their commitment and to stimulate the transition, top-management changed the name of the company in 2013. Their new name clearly put the focus on “solution”, which was done to communicate the new

focus and strategy of the company both internal to the employees and external to the market. The top-management was unanimous; solution business was the new direction.

4.2 Business Model Innovation

After top-management defined the strategy and vision to transform towards a solution business, they started to innovate the business model. The business model innovation took place simultaneously on three levels, namely on: (1) content, (2) structure, and (3) governance. The business model innovation, taking place at these three levels, was based on both the vision of managers and by experimenting with the business model. In their five-year strategy, top-management identified a market segment that was less cyclical than their other markets. They decided to start a pilot business unit for this segment. This pilot segment business unit was only responsible for offering complete solutions in this segment, which resulted in a very focused approach. Meanwhile, they were also making changes in the other parts of the organization to make it more solution oriented. The remaining part of this chapter outlines the changes made by TechLution on all three elements of the activity system. Additionally, several challenges that the company faced during the transformation are described, including the competences which they had to develop to become a solution provider.

4.2.1 Content

The transformation towards a solution business requires the development of several new activities and competences within the activity system. As mentioned in literature, a solution consists of a specific bundle of products and services in order to fulfil a customer need. TechLution added the following activities to their activity system in order to provide solutions: new life-cycle services, integration of solution components, and new innovation activities.

As already described by the “servitization” literature (Kindström & Kowalkowski, 2014; Vandermerwe & Rada, 1988), an import factor to become a solution provider is the development of new services. Traditionally, TechLution had mainly four basic services, namely: maintenance of the machines, consumables, wear parts, and spare parts. In some special cases they also offered trainings to their customers, but this rarely happened. These four basic services were not enough to offer their customers the complete solution. TechLution therefore developed, and is still developing, new services to complement their solution offering. As mentioned by the head of Services:

“In customer service we don't have yet enough products. We have to innovate like crazy, but this goes to the next thing. If you want to be customer driven, you need to have innovation on the service-side.” (Case study database, p. 163)

The next step for TechLution is to provide services over the whole life-cycle of their solution offering. Table 8 gives an overview of these life-cycle services. Thus, TechLution is now aiming to support the customer in every phase of the solution life-cycle. From pre-sales until the re-cycling of the

machine; TechLution is offering the customer its services. For all these new services in the activity system, TechLution had to develop, and still is developing, several new competences. First of all, providing services is highly based on human resources. Providing more services therefore required TechLution to hire more human resources that are focused on services. Also, TechLution had to increase its technical competences for better understanding the customer and to provide integrating the solution. These technical competences were added by giving trainings to service technicians. The services technician where offered trainings in at least one different technology than their main competence. As a results, all the services technician of TechLution are at least familiar with two different technologies of the company’s product portfolio. When TechLution was still a product-centric business, most services technicians were only familiar with one technology of the company’s product portfolio.

Table 8: Services offerings during the solution life-cycle

Life-cycle phases	Offered services
Pre-Sales	Dedicated Service Packages, Consultancy
Sales	Installation, Ramp-up support, Training
Operating	Preventive Maintenance, Consumables, Wear parts, Spare parts, Training
Upgrading	Consulting, Upgrade/Retrofit, Training, Factory repair
Re-cycling	Refurbishment, Reselling, Recycling

One of the most important and first service that has to be developed to provide solutions is consultancy. Consultancy is key, because it covers the process in which the solution provider tries to find and understand the specific customer need and, subsequently, develop a solution offering to address this targeted need. In other words, it is the process in which the customer need is translate into a solution offering. The consultancy is not just focused on the part-handling or on the machines, it is focused on the whole production process of the customer. The consultancy service requires time and resource and therefore should only be offered to “highly” potential customers. As described by one head of a market region:

“It is on the potentials. It is on the focus let me say, because you cannot act as consultant for every customer in the database. It is on the focus. Because if you are becoming a consultant for the customer means that you know what the customer is doing, you know the process, you know the people, you have information so that you can have an exchange. If you don't have information, you cannot consult. It is very risky. So normally you can do it with customers where you penetrate already very well. So it is in this stage: opportunity project [pre-sales]. So you becoming a consultant there. Then when you win you provide a solution, you have to follow up

again [upgrading phase] ... Sometimes also a specialist of processes can be a consultant without knowing perfectly the part of the customer, because consultant does not only mean that you consult on how to do this specific part, maybe you can also consult about automation, production, data-exchange. There are many things that can be an added value for the customer.” (Case study database, p. 64)

Another new activity, that is performed by the front-end of the company, is the integration of the different solution components into one offering. Previously, the company just sold its machines separately to the customer. There was no need to integrate different machines or technologies with each other. Currently, with the customer demand for one-stop solutions, the company has to integrate different solution components into one offering. The different solution components exist of different products, services, and software. Adding to the complexity of integrating the components is that a part of these components are produced by partners. Although it is a complex process, it also provides great opportunities to create value for, and subsequently capture value from, the customer. As a head of a market region relates:

“before we just sold the machine and said "okay you need automation? You can ask this guy [other company]. Take care, dear Mr. customer" It was much easier. Today he said "hey guy, I bought from you, or I like to buy from you, and you are responsible that I am getting this part, and then if it is not working, it is your problem". And customers are willing to pay for that. There you can earn money. There you can say "okay, I do it but you have to spend more". And then often bigger companies, as well as smaller, "okay I will pay you more, but I now actually get this part [that the customer wants to produce]. You need to guarantee that I get this part".” (Case study database, p. 100)

The need for new services and integrating of solution requires TechLution to perform new innovation activities. Previously, TechLution innovation activities were focused on the product itself. Meaning, that the focus was on increasing product performances, develop new product features, new options, and sometimes to develop specific adjustments when requested by a customer. These product focused innovations remain vital for the long-term survival for TechLution. Nevertheless, with the transformation towards a solution-centric business, TechLution R&D activities are also focused on other issues besides product-excellence. As mentioned above, the development of new services is becoming an important R&D activity. Machine manufactures cannot become solution providers without developing new services for their customers. Another R&D activity that requires more emphasis in a solution business is the standardization of the solution components. As mentioned by a head of a production facility:

“standardization is key in R&D. Trying to use the same parts. Doing the same function on as many machines as possible. For instance, the feed of the machines or the main switch. If we can

be able to have the main switch in all the machines. Then quality will be for sure, I think, better. Because you choose the best one. And also economy of scales and so on.” (Case study database, p. 90)

Thus, the R&D activities should be focused on the development of the whole solution and not anymore just on the product. As another head of a production facility relates:

“...basically to further innovate. We need always to stand ahead of competition. Thus by new innovations, by providing better support, better applications, by moving more into solution. I mean this is key.” (Case study database, p. 50)

4.2.2 Structure

The transformation towards a solution business requires new structures and processes. TechLution made several changes in the structure of their activity system. They implemented a cross-functional sales process, they organized their organization around segments, they standardized the components of the solution offering, and they aligned processes throughout the company. In the traditional product selling, the sales force did the selling of machines mainly by themselves. They would approach the customer, they discussed the details, made the quotation, and finally sold the machines. Then, when they sold the machine, they would send the definite order to the production facility; who would then produce the machine and send it to the customer. This were very clear, separate processes. The sales force focused on their business, and the production facilities did their part. This is not possible anymore in a solution business.

Due to the complexity of providing solutions, the sales processes also requires the involvement of different functions. The front-end sales force is not able to have all the competences in-house to perform all the processes that are required to offer the right solution for each customer. The adding of new product and service component, which also have to be integrated with each other and into the customer processes, requires the involvement of different functions and competences. In other words, providing solutions requires a cross-functional sales process and also new functions for the sales organizations. The sales organizations are still responsible for the sales leads and coordinating the sales process. However, for offering consultancy services or for the integration of all the solution components, he can request support from different functions. This support is especially vital for the more complex solutions offerings. As described by a head of a market region:

“And in theory the guy of the TU producing the machine, when we penetrate the customer, sometimes he is also coming, because sometimes I need his role into the game. So it is a teamwork in front of the customer. The guy is coming and giving his added value when we need. So the sales company normally coordinate activities in order to be successful... So the technical support was coming from some specialist. We have a specialist of engine-manufacturing, a

specialist for dye and mold, a specialist for automated, a specialist for aerospace, a specialist in five-axis technology, so that when I need to convince with the solution the customer, I am not teaching the application the first time. I am coming with somebody that is speaking the same language of the customer. Yes. So you have also some segmentation, because the level of discussion is not on the product. So if it is not on the product, you need to be in front of the customer with somebody that speaks the same language. Yes. So the full company is involved”
(Case study database, p. 64)

Due to the fact that providing solution involves multiple functions, technologies, and parties, there is a clear need for project management. As stated by a top-manager: *“if you are going into these solutions, it is always a project.”* All respondents within TechLution stated that the development of project management competences is one of the most important elements to be able to provide solutions. When TechLution was still a product-provider, they did not have well established project management competences. Therefore, they developed these competences both by hiring external people and by giving project management trainings to people within the sales organizations. As described by the head of Strategic Planning:

“We are building up these resources in the sales organization. So sometimes they are hired externally, sometimes they come out of the sales organization. And of course, within the technology unit, you also need these project management capabilities, but the customer project is mainly managed by the sales organization. Technically supported by the technology units.”
(Case study database, p. 185)

The project managers are responsible for managing the whole solution project. The project manager is responsible for the solution; from the moment that the sales person comes in with the lead until the complete solution is delivered at the customer. The project manager has to make sure that all the different components, from the different parties, are successfully delivered and integrated on time. The project manager becomes the contact person of the solution project for the customer, the partners, and the different internal business units. As described by a head of a market region:

“There is one project leader for one solution. Not for one customer. This is key-account management. That is again something different. There is one that is more sales related. There is one guy for taking care for one customer, for several departments whatever. This means one order, for one solution, one project manager.... The project manager will say to the customer: “I am responsible for everything until the machine is installed, if a screw is missing, if the colour is the wrong one, if a function is not working, you can call me every time”. So single-point of contact. Everything is going through him, same he is doing with the TU “dear TU, I am the project manager for this order. If there is any question, you can call me.” Okay?” (Case study database, p. 96)

The project manager must, besides project management competences, also have some basic knowledge of all the solution components involved. Meaning, that it must understand both the basics of the different technologies behind the solution and it has to understand the processes of the customer. This is necessary to be able to understand and manage the different parties involved. As mentioned by the head of Strategic Planning:

Of course, he needs to have the basic knowledge so that he can understand the problems. But the basic idea of the project manager is to really manage the project. To follow up really each week have a meeting, have a follow up call. "What is the problems?". He has to have the technical knowledge to understand all the topics and to manage all the topics. But he does not have to solve all the topics himself. That is because this is not possible. (Case study database, p. 185)

Another major change in the structure of the activity system is that the company starts to organize itself around specific market segments. This segment approach was defined in the five-year strategy of the company, before they started to innovate the business model. The top-management selected strategic segments where they perceived to be able to provide solutions using their complete product portfolio. Meaning, segments that have demands for a solution that consist of all the different technologies that the company is offering. Additionally, they selected segments in which they have the competences to understand the customers' processes. As described by the head of Special Projects:

"I think that is, a solution provider, as I see it now, is really to understand the complete process of the solution. And there we have to make sure that we address, and we focus and concentrate on projects or on solutions where we can offer our complete portfolio... Because we are not an engineering solution provider. We have a portfolio, which can offer solutions. Therefore, with the maximum of, let say, standard components on the basis of the project, of the solution. And on the application, clearly, the application is engineered, is targeted for a specific application. But there again, really define those segments, and solutions where we have the biggest chance to realize with our portfolio. And I think that is key... To find the segment, then to find the customer where we can offer our portfolio, and not single machines. The so called solutions yes, this is key... We have to speak the language of the customers. Of the targeted segment. Say for instance, if you go now to the aerospace, and they are speaking about rotating parts, and we are speaking then about turbine parts, and we need to know the function of those parts. That needs a specific language. And if you don't speak this specific language, the customer will not accept us as a partner. Therefore, for me, the more and more important becomes that we have a unified focus team to sell solutions. That is the difference between selling machines... that is a horizontal sales approach. And what we need, we need a segmented sales approach with a clear target." (Case study database, p. 269)

This segment approach started as a pilot. Top-management selected one strategic important segment for which they developed a segment business unit. The segment business unit team consists of solution engineers, one sales “champion” at each sales organization, and the heads of the different sales organizations. After two years, the pilot was already very successful. For this reason, they are currently starting to implement new segment business units for the other strategically selected segments. Using the experiences and good practices of the pilot segment business unit.

The sales organizations all have a special sale “champion” that is only focus on these segment customers. Then, there is a segment business unit behind the sales organizations that is specially focused on integrating and providing the solution to these segment customers. Thus, the segmented business units do the whole process of integrating and consulting instead of the sales organizations. As described by the head of Special Projects:

“Technology units will supply their standard machines, or dedicated machines, to this [segment] group, which then makes the customizing, the pre-commissioning, and the installation... And therefore over the different technologies, therefore the responsibility within, to provide the complete solution and then bringing the different technologies to the end-user goes over this segment group, in this market segment... They will get the machines from the technical units, and as I say the application, the project management, the engineering, the commissioning, including the installation at the customer-side, is then the responsibility of the [segment] group.” (Case study database, p. 276)

Figure 11 gives an illustrative overview of how the organization is transforming towards a segment business approach, instead of a more horizontal sales approach. Besides the segmented markets the company continues to address its “traditional” customer base. This could become challenging, since it requires some kind of different business models. The segment business units are providing, what Galbraith (2002) called, “vertical solutions”, while the remaining customers are provided more “horizontal” solutions. Nevertheless, in both models the focus lies on providing solutions. Only the segment approach is more focused and consequently better able to offer a highly customer specific solution.

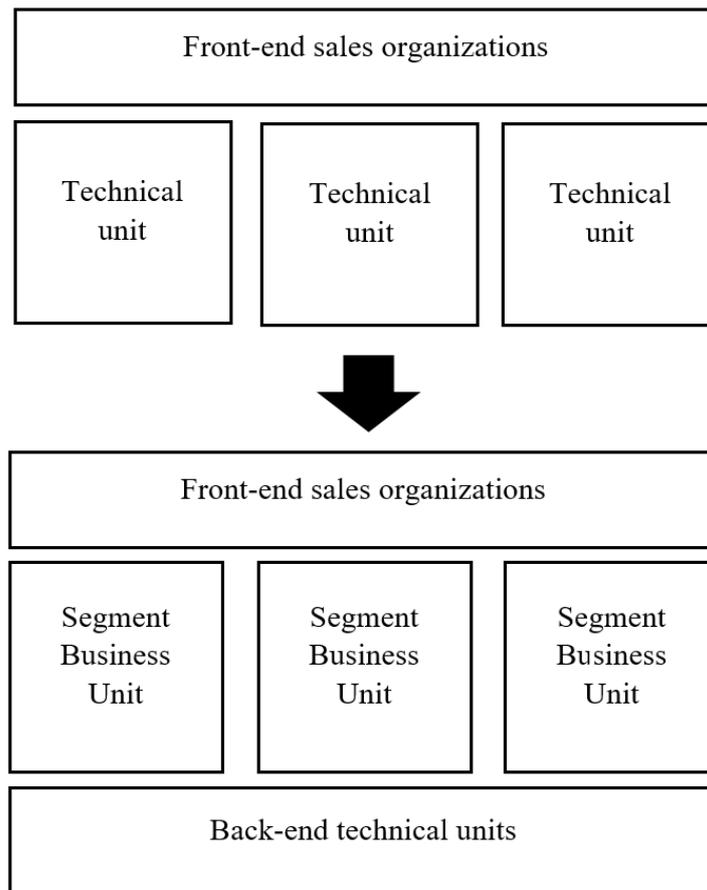


Figure 11: Transformation towards a solution-centric organization

Another factor which all the respondents addressed for successfully providing solutions is the need for standardization of solution components. As stated by a head of a production facility: *“The real need that we have is on standardization. We need to standardize. We need to act by modules, and we are starting doing this”*. Traditionally, the different technical units of TechLution were only focused on their own products. They had their own R&D, which resulted in a wide variety of different machines, components and an enormous amount of different parts. There was almost no alignment and coordination between the different technical units. In addition, the technical units developed customized parts if requested by a customer; resulting in even more parts variety. When the company wanted to commercially provide solutions, this wide variety of different machines and parts led to efficiency and reliability complications. First, it became hard for the company to select the right solution from all these components. Secondly, it became difficult for the technical units to deal with all the varieties. TechLution therefore came with a strategy to slowly reduce the variance of parts and work more in modules. As related by the head of a production facility when asked which direction they should go in terms of customization:

“I would say going in this direction [customization] and focusing on more standardization, because this gives you a good opportunity to continuous flow. As long as you have standards,

then you can say 'it all looks the same'. Then you can do that kind of flow okay. Then, if you go into the higher customization; here you don't get the volume. Then, you are having an overload headcount factory. You don't have the load. So you must be here in-between. For me this, reducing variants, focusing on solutions but to a certain standard... You need a flow in the production. You need flexibility and so on. And here you maybe have topics from the customer point of view which you say 'I will cover this, this and this. This one I cannot cover. Or you say 'okay I make a dedicated machine for the customer, but in this field'. Which we are doing, which is good.' (Case study database, p. 23)

One of the top-managers even takes it a step further, by stating that almost every component of the solution must be standardized:

"97 % of the products need to be standard. The three percent can be customized... the biggest challenge is that we take the translation from customer need into product and then restrict this to "this are the range of products that we have, and with this we have to work". So the standardization, this is the biggest challenge. This includes for me a culture change. This company should not only be polemic, but should really argue why they need what they need. And then afterwards we have to develop the product, but we have to have a big degree of standardization... the more you can standardize the product-range. The less important it is that you tell the customer, the plant, exactly which machine they have to have. Which leads again to "flexibilization" through standardization." (Case study database, p. 163)

Thus, the standardization of solutions requires a clear platform strategy. Solution provider must develop a clear platform strategy that is sufficient to provide complete solutions to their customers, but at the same time can be efficiently produced. An illustrative overview of how to customize with standard solution components can be found in Figure 12. The customization of the solution with standard products work as followed. The solution consists of a selection of different "standard" components, which components are included depends on the solution that is required for the customer. These included components can, again, be customized by adding "standardized" options. Through this set-up, solution providers are able to provide customized solutions based on "standard" products. By only using standard products, the solution provider can provider solutions more efficient. Moreover, it will increase the reliability of the different solution components.

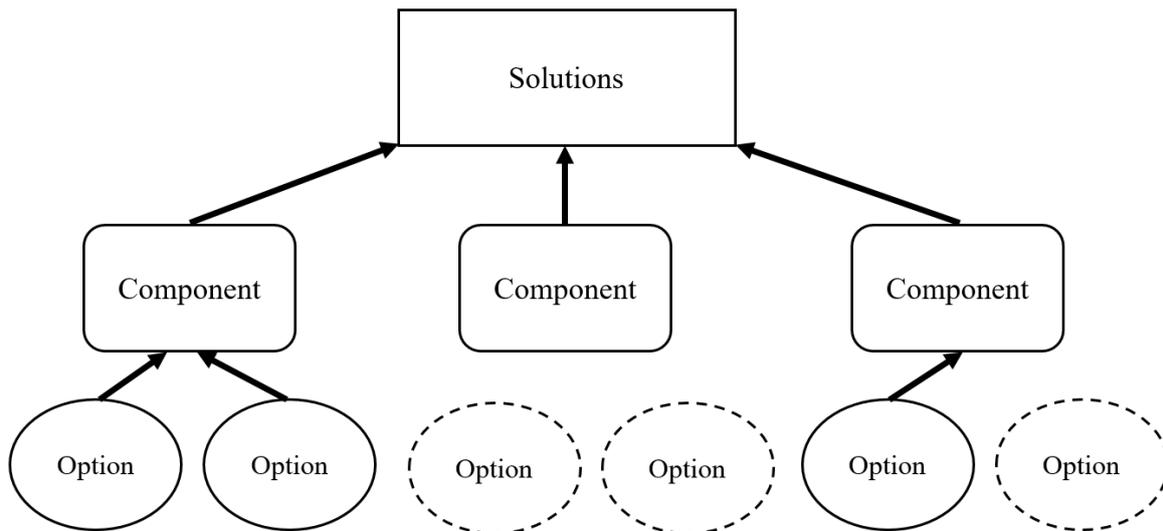


Figure 12: Standardization of the solution components

Related to standardization of the physical products and services, also the processes within the company need to be alignment with each other. Traditionally the business units of TechLution worked in silos. They were very autonomous in creating their own processes and routines. As a result, almost each geographical sales organization has its own systems and processes.

The transformation towards a solution business requires more alignment between the systems and processes of different business units. As stated before, selling solution is a cross-functional process. It requires the involvement of several business units, which sometimes are located in different geographical locations. Currently, these processes are still not aligned which each other in TechLution. As described by a head of a market region:

“I think this is one of the most important things. You need processes over the whole company. If we like to succeed with solutions, you need processes. Sales, services, application, solution does not matter what. You have cultural differences whatever, but the sales processes are sales processes. And it is the same, it should be the same everywhere. Now we have 20 sales companies, and 20 different systems, 20 different processes. So it is horribly complex to manage it as [TechLution]... you can only have flexibility if you have a certain standard, which you know is working in every case. If you order the cheapest single machine, or very complex solution, make sure that it is going the right way. And not because you have the perfect guy doing a lot of work. Because of the organization and not because of the commitment of an individual employee. Today we are succeeding because of the commitment of individual employees. This we should not accept as an organization” (Case study database, p.107)

Currently, TechLution is working on this process alignment throughout the company. The focus lies particularly on aligning all the different ICT-systems within the organization with each

other. The alignment of these ICT-systems is important, as the different functions involved in the providing of the solution must have access to the same information. Taking together, the standardization of solution components and the alignment of processes are very important for solution providers in order to be agile and flexible in their solution offering.

Finally, another important factor that has to be restructured is the incentive system. In traditional product selling the incentive system is pretty straightforward. Each business unit and sales organization has its own targets and related incentive system, depending on the strategy of the business units. In a solution business the incentive system is more complex, as the selling of solutions involves multiple functions, sometimes even from different geographical locations. Therefore, when a solution is successfully sold it is more complex to “split the cake”. Likewise, the incentive system must be changed to address the new strategy; the incentive system must be focused on selling solutions instead of products. This means that the incentive system should not just be focused on just the selling of products, but on the whole solution. The changing of the incentive system is currently still a problem at TechLution. As stated the head of Human Resources:

“for example we made a project with a customer in Singapore. We sell a solution and somebody will come from Sweden for the automation. And a component from it will come from Switzerland, from a TU. Okay but we couldn't sell that without the help from the R&D, and the machine will come from China. It will be a bit more difficult with the current organization, the current way of thinking. We need to think about all of this. We will always border-line on some topics, and if people begin to fight on this instead of fighting to help the customers. It is not our target... I don't know what kind of system we should have, but we need to work on it.” (Case study database, p. 249)

4.2.3 Governance

Simultaneously with the development of new activities and the restructuring of the activity system, the company also made changes in the governance of the activity system. They change the governance of the activity system in three ways, namely: (1) with their solution offering they took over processes formally performed by their customers, (2) they acquired two solution focused companies, (3) they made several new partnerships aimed at providing solutions,

The governance of the activity system changes because the solution provider is taking over customer activities. Solution providers are integrating all the elements of the solution for the customer and are also maintaining the solution. Traditionally, the customer used to do both the integration of different components themselves. Also, the customer was responsible for upgrading and maintaining their production processes. They are now able to outsource these activities to solution providers. Therefore, TechLution is taking over activities that used to be performed by their customers.

In the period from 2014 to 2016, TechLution acquired two companies that are specialized in providing solutions in their respective markets. There were three main reasons to acquire these companies. First, the acquired companies brought in complementary technologies that increased the solution portfolio of the company. Second, the companies had specific solution oriented competences that were missing in TechLution. With the acquisitions TechLution hopes to spread these competences throughout the company. As the head of Special Projects describes:

“we have purchased now almost two years ago [Company X], which is definitely a specialist engineering company that is selling solutions for many years, many years. And we also decided then last year to bring that sales and service approach to the sales companies. And the sales companies had a 180 degrees’ different sales approach than so far [Company X] had. [Company X] is a project solution selling organization. And the sales organization, our sales organization, were 100 % machine selling organizations.” (Case study database, p. 267)

Finally, the acquisition gave TechLution access to excel in new markets. One of the acquired companies is a major player in one specific market segment, in which TechLution was less well established. Noteworthy, the market segment of the acquired company became the segment for the pilot with the segment business unit. The segment business unit team exists for a large part out of this acquired company.

Apart from acquisitions, TechLution also developed numerous new partnerships to complement their solution offerings. These partnerships were necessary to be able to offer the complete solution to a customer. TechLution is not able to address all the needs of their customers internally. They need partners that can provide certain components of the solution. This can be product, service or software components. As a head of a market region states:

“Then you need partners. And you will never do everything on your own. So we have developed, during the last three years, partnerships. With CAD/CAM supplier, with tool-suppliers, Tool-holder supplier, with automation suppliers.” (Case study database, p. 100)

Providing solution therefore requires a more active management of the network. TechLution constantly needs to evaluate if they are able to improve their solution offering by, among others, include another partner in their network. The more TechLution is moving towards offering the complete solution over the whole life-cycle, the bigger the need will be to develop new partnerships. As one top-managers relates:

“No basically we are, we cannot do everything ourselves. So especially if we are talking about our second trust for the strategy 2020 is, you know, offer the complete solution for the whole life-cycle for in the target segments. So complete solution is the solution focus that over the whole-life... and we say basically the later parts of the life-cycle, which means for example the

refurbishment of the machine, recycling of the machine. Depends a little bit on the country, but we cannot do everything ourselves. So that means we will work with partners together.” (Case study database, p. 180)

4.3 Additional Findings

Apart from all the changes made in the activity system of TechLution, in order to transform to a solution business, the case-study of TechLution also provided some other interesting findings which are worth mentioning. First of all, a lot of the respondents mentioned that the reliability of each machine is becoming key. This would make another argument why solution providers must standardize their product portfolio to a great extent. Reliability is becoming more important with solution offerings, since the machine is integrated into an entire automated process. If one machine is not performing, the whole production-chain will stop producing. TechLution is providing solutions to customers how are producing 24 hours a day. These customers demand an extremely high reliability of the machine, especially when the machines are integrated with each other. As described by the head of Special Projects:

“And for me the biggest, biggest challenge, and the absolutely must win battles is that we, that our machines have then also to cover the reliability requirements of this targeted group. Of these customers. And the reliability of a single machine in a tool-room, which we have sold 3 or 4 years ago mainly, 3 or 4 years ago the reliability of the machine was not that key. But now, it becomes key, because it is in a chain, it is in a process where different machines are linked to. By automation etc. And if I there have a single machine, not being reliable, a complete process-chain is not producing. That is not acceptable. This is a no-go. And for me, this quality mind-set, being absolutely reliable on the performance is key. That is a must win. That is the first must win” (Case study database, p. 273)

Second, the case-study showed that software is becoming more and more the key determinant for integrating different components into solutions. Software and automation are the two elements to integrated each and every machine with each other. TechLution is able, due to the transformation towards a solution business, to differentiate themselves from former competitors. However, with the transformation they entered a new field of competition. TechLution has a wide product portfolio, which gives them an advantage for offering a complete production solution to their customers. They are able to provide solutions that includes the integration of different machining technologies. Yet, as software is becoming the key determinant for integrating different components, software companies are also able to integrate a complete production process. Indeed, software companies are becoming the new competitors for TechLution. As the head of a market region described:

"We have the bricks. We have the LEGO-bricks...There we are ahead for sure, but if there is somebody coming, which is offering the software, is making that having of bricks from us obsolete. Then we do have a problem, because he [software company] can come and say "yeah I know [TechLution] is offering everything, but the laser of [company X] is offering that advantage. That is why you should buy it from [company X], and then you have a milling machine form [company Y], which is offering a lot of functionality. Therefore, you should buy that from [company Y]. Then you need die-sinking; there we have [company Z], which is offering linear drives." Customer saying: "Aa but it is not integrated...". Software company saying: "Don't care, we are going to manage that with our software, we will control all of them. We will buy it for you, we will install it for you. You will have a cell perfectly working. Important is the software, hardware is easy to handle" (Case study database, p. 121)

Software companies are, what Davies (2007) called, the solution integrators. They can take the machines from different companies and integrate them into one automated solution cell. The main advantage that these solution integrators have is that they can include the best available machines in the market. In other words, they can take the machines from different machine providers and combine it into one solution. Moreover, software is a key instrument to make the producing of parts as easy as possible for the customer, which will only become more important in the future. These software companies therefore have a strong selling point in offering solutions. On the other hand, TechLution has the competitive advantage that they can offer product-related services with their solution. Therefore, it becomes vital, for manufacturers that want to offer solutions, to have value-adding product-related services. Nevertheless, software companies are becoming more and more a competitor for TechLution's solution offerings.

5. Discussion

The goal of this chapter is to reflect the implications of the research findings with the main research question. In other words, this chapter will illuminate how the findings illuminate the research question: “*How to manage the transformation from a product-centric business to a solution-centric business?*”. Moreover, the findings will be related to the propositions that were proposed in the theory chapter. The role of management related to the solution business model transformation and business model experimentation is discussed in section 5.1. Section 5.2 goes into the interdependencies between the different elements of the activity system in order to transform to a solution business model. Section 5.3 provides an overview of competences that must be developed in order to be successful in the transformation towards a solution business. Finally, the transferability of the case-study findings to wider domains are discussed in section 5.4. In other words, this section argues to what extent the findings of this research are generalizable.

5.1 Experimenting with the Business Model

The aim of this study was to find out how to manage the transformation from a product-centric business towards a solution centric business. As summarized in Figure 10, the transformation from TechLution towards a solution business was clearly initiated and pushed by top-management. The top-management perceived several changes in the market and reckoned that there were great opportunities for TechLution if they adopted a solution-centric business model. Even more, there were not only great opportunities, for the long-term survival of the company they perceived that it even became a necessity to transform to a solution-centric business model. This shows that the top-managers had the cognitive capabilities to perceive changes in the environment, which is an essential aspect for realizing that the business model need to change, and consequently essential to trigger business model innovation. Based on their perceived interpretations of the market, the top-management of TechLution had a clear vision to transform to a solution-centric business. This resulted in a strategic planning that initiated the transformation towards a solution business.

Despite the clear vision and strategic planning of top-management, it was not beforehand known how the business model should be set-up to successfully offer these solutions. They had the managerial cognition to interpreted from their environment that they had to change, but they did not exactly know how their solution business model should be set-up.

As described in the theory chapter, Chesbrough (2010) states that successful business model innovation starts by experimenting with the business model, since business model experimentation is a relatively cheap and save way to test new business model structures. In their transformation towards a solution business model, TechLution was also experimenting with certain elements of the business

model. TechLution experimented with the development of a segment oriented business unit. As described in the findings chapter, the first segmented business unit of TechLution was a pilot to test whether this organizational structure would work. Top-management perceived that they would be better able to offer solutions if they would develop a business unit that would just be focused on one market segment. As through this segment focus they would be better able to “speak the same language as the customer” and, therefore, be better able to provide solutions to this segment.

As the segment business unit received the full responsibility of the specific segment; it was also internally protected from TechLution mainstream business. Meaning, that the pilot did not compete with other business units of TechLution. On the contrary, the segment even stimulated growth in other business units, as it took the “product” components from the technical units. The segment business unit was able to create its own routines, beliefs and competences without directly competing with the mainstream business unit of TechLution.

The pilot quickly proved to be successful. Currently, the top-management starts to deploy it more widely throughout the organization. More specifically, TechLution has started with the development of two new segment business units. Again, each of these segment business units will be fully responsible for providing solutions in their respective segment. The development of these new segment business units is based on the experiences and good practices of the pilot segment business unit. As the attentive reader might have noticed, the business model experimentation process of TechLution, to transform to a solution-centric business, matches exactly with Chesbrough (2007, 2010) description of how companies should experiment with their business model.

Additionally, Chesbrough (2007) also claims that many companies have a “business model innovation leadership gap”. In these companies there is nobody who has the authority and the capability to experiment with the business model. TechLution, on the other hand, assigned a top-management position to what they call “special projects”. This top-manager is responsible for the pilot segment business unit(s) of TechLution. In other words, this manager has the responsibility and authority to experiment with the business model. So far, this business model experimentation has been very successful and was an important factor for TechLution’s transformation towards a solution-centric business.

A natural outcome of this business model experimenting is that companies are having multiple business models at the same time. This is also the case for TechLution. To the customers in their selected segments they are already providing solutions. However, to their remaining customers, which contributes around 50% to 60% of their turnover, they are selling both solutions and products. This is due to two main reasons. First, for their customers who are not addressed by the segment business units they have a more horizontal solution approach. This means that they are less knowledgeable about all the customers’ processes, which makes it harder to sell the complete solution for each customer. Second,

in their traditional customer-base not all customers are demanding solutions. Some of them still just want the machine with some basic services. Thus, to certain customer group the company is still selling product instead of solutions, which requires a different way of doing business. The product customers are still addressed by the “traditional” business model, while the solution offerings go through the solution business model.

To sum up, managing the transformation from a product-centric business towards a solution-centric business requires first managerial cognition to interpret the environment and to create a clear vision and strategic planning to transform towards a solution-centric business. Second, as the solution business model is not known beforehand, top-management should commit to experiment with the business model. In the case of TechLution, it proved to be valuable to give a top-manager the full responsibility and authority to manage this business model experimentation towards a solution-centric business model. Moreover, the case-study shows that, during the transformation towards a solution business model, a manufacturer will have multiple business models, as they are offering both solutions and products. Therefore, these findings confirm the first two propositions of this research:

P1: “The transformation towards a solution business requires experimenting with the business model”

P2: “Manufacturers will have multiple business models at the same time during the transition towards a solution business model”

5.2 Interdependencies between Elements of the Activity System

Amit and Zott (2012) state that generally business model innovation can already take place when a company changes at least one element of the activity system. Although they also state that the three element of the activity system are interdependent with each other; business model innovation can still take place by just changing one element. The findings of this study clearly shows that the transformation, from a product-centric business model towards a solution business model, requires adjustments on all three elements of the activity system. Indeed, managing the transformation towards a solution business model is a complex process. It requires great attention and capabilities from top-management. Top-management must develop a clear strategic planning for the transformation towards a solution-centric business model. Moreover, they should have a clear understanding of the elements of the current activity system and their interdependencies, before they start changing it.

TechLution made numerous changes to its activity system. First, it added novel activities to its activity system in order to provide solutions, namely: (1) it developed new services focused on the whole life-cycle of the solution, (2) it is integrating different solution components into solutions, (3)

and it started to perform new innovation activities that were more focused on the solution instead of the product. Therefore, providing support for the following proposition:

P6: *“Manufacturers need to increase the level of service innovations in order to provide solutions”*

Second, TechLution also restructured its activity system in numerous ways. It implemented a cross-functional sales process, it developed new segment business units, it developed a platform strategy to increase standardization of the solution components, and it aligned several processes throughout the organization. Therefore, providing support for the following two propositions:

P3: *“Manufacturers need to standardize and modularize both products and services in order to provide solution effectively”*

P5: *“Manufacturers must reorganize their organizational structure to facilitate more collaborations between business units in order to provide solutions”*

Finally, TechLution changed the governance of its activity system in three ways. First, it acquired two companies that already were solution focused. Second, it developed several new partnerships to extend their solution offering. Finally, by providing solution it is taking over activities that were previously performed by the customer. These findings provide support for the following proposition:

P8: *“Partnerships with external parties are more important in solution business, as manufacturers don't have all the capabilities in-house to provide the complex solution”*

These changes made by TechLution on all three levels of the activity system were not implemented independently for one another. On the contrary, the changes made to the activity system are highly interrelated with each other. Adding solution related activities requires changes both in the activity system structure and in its governance. For example, adding consultancy services to the customer in the pre-sales phase requires cross-functional sales processes. The consultancy services to the customer can be on a number of aspects, which cannot only be addressed by the sales organizations. In these cases, the sales organization needs support from the back-end. Another example, in order to efficiently integrate the different solution components into one solution, TechLution had to standardize their own components to a large extent and realign processes between all the business units. Additionally, they needed new partnerships to provide some of the solution components, as TechLution did not have all the components to offer the complete solution in-house.

Of course, changing these different elements will not happen overnight; it takes time to adjust the activity system towards a solution-centric business model. Moreover, top-management cannot change the whole activity system at once. The transformation towards a solution-centric business is a gradual process. TechLution started the transformation several years ago and they are still making

adjustments on all three levels of the activity system. However, it is important for managers to make simultaneously changes to the different elements of the activity system and, more importantly, to see the interdependencies between them. By just changing one element, the activity system as a whole will probably be suboptimal, which results in inefficiencies.

The main stream solution business literature is focused on the so-called “servitization”. There main claim is that product-centric companies often fail to transform to a solution-centric business, because they are unable to successfully add services to their offering (Gebauer, Valtakoski, & Reynoso, 2012; Kindström & Kowalkowski, 2014; Raddats & Easingwood, 2010). According to this literature stream, these manufacturers are either unable to develop value-adding services for their customers (Kindström & Kowalkowski, 2014) or are unable to retrieve sufficient revenues from these services (Gebauer et al., 2012; Lee et al., 2016). A product-centric business cannot become a successful solution provider if it only adds new services with its products. It seems that these authors are just too focused on the content of the activity system. The findings of this research show that the transformation is way more complex. Besides adding new activities, among others services, to the activity system, companies must also align this with changing their structure and governance. This research therefore claims that these companies fail because they are unable to successfully transform their activity on all three design levels. Overall, these findings confirm the major propositions of this research, namely that:

“Manufacturers that want to successfully transform, from being a product provider to a solution provider, must simultaneously innovate their business model on all three design levels, namely: content, structure, and governance.”

Thus, managing the transformation from a product-centric business to a solution-centric business requires a holistic and systematic perspective from top-management on the business model. Top-management should take an activity system perspective and see all the interdependencies between the different design elements of the activity system. Based on understanding the activity system and a clear vision, the top-management will be better able to manage the transformation. During the transformation, it is important to first get the overall design right, before optimizing the elements.

5.3 Development of Solution Business Competences

Changing the activity system to a solution-centric business model also requires the development of certain competences related to providing solutions. The findings of this research provide evidence for certain specific solution business competences. First of all, the case study shows that a solution provider must broaden its technical competences in order to deal with the different technologies that are involved in the solution offering. This is especially the case for the people situated at the front-end of the organization. For example, service technicians, application technicians, and sales people. In the

product-centric business, most of these people had only competences in one technology. This is not possible anymore with the offering of solutions, since these solutions typically exist of multiple technologies. Moreover, as providing solutions requires a company to perform more activities, e.g. services, the company also requires more human resources. Again, these human resources are especially needed at the front-end of the organization, since they are mainly responsible for providing the services.

Finally, the findings chapter showed that there is a clear need for project management competences. Project management is a vital competence in order to provide solutions. Without project management, the solution project will probably end up as a fiasco, since providing solution involve many different parties and components. Therefore, the finding of this research provide support for the following proposition:

P7: “Manufacturers should get project-management competences in order to provide solutions”

5.4 Transferability of Findings

As discussed in the method chapter, a major discussion among academics is the criterion of external validity regarding qualitative single-case studies. In other words, some authors are concerned with the transferability of single-case study findings, including the grounded theory model, to wider domains than the case itself. Although this research applied some techniques, as described in the method chapter, to increase the external validity of the case-study, it can potentially remain problematic to argue for transferability of single-case studies findings. Yet, this study has a number of features that suggest that the business model innovation processes found at TechLution share commonalities with other domains.

Clearly, the business model innovation process will be different for each company that wants to transform towards a solution-centric business model. Therefore, it is also an “innovation”. However, the transformation towards a solution-centric business will most certainly affect all three elements of the activity system. New activities need to be performed, the company has to restructure several processes, and either have to acquire new companies and/or develop new partnerships to be able to provide solutions to their customers. Although, specific characteristics between companies and industries will differ, the general underlying processes will be the same. For that reason, the developed model is likely to have applicability beyond this particular study. The findings provide insights into the management processes and factors underlying the transformation from a product-centric business towards a solution-centric business. The findings of this study also indicate that the transformation to a solution business is way more complex than previously assumed by academics.

6. Conclusion

The primary objective of this chapter is to conclude with the major findings and implications of this research. First, section 6.1 describes the theoretical implications of the research findings. Section 6.2 goes into the managerial implications that can be drawn out of the findings of this study. As is the case with every research method, this study also has certain limitations. The limitations of this study are discussed in section 6.3. Finally, section 6.4 identifies avenues for further research based on the findings and implications of this study.

6.1 Theoretical Implications

In many business market, companies are trying to provide solutions to their customers. Yet, little is known about how companies are successfully managing the transformation from a product-centric business to a solution-centric business. Against this backdrop, this research provides four substantial insights from academic and managerial perspectives.

This is the first article to combine business model innovation literature with solution business literature. Combining these literature stream possibly explains the high failure rate of manufacturers that want to transform to a solution business. Moreover, by applying a business model perspective, this study integrates the disparate solution literature streams into a more comprehensive understanding of the transformation towards a solution business. The solution business literature is focused on different elements of the transformation and, although these different literature stream give valuable insights, they are missing a more holistic perspective. By taking the business model as a unit of analysis, this research integrated these disparate solution literature streams to get a more holistic overview of the transformation towards a solution business.

Second, the study reveals the key-role of top-management in both triggering and managing the business model transformation. Top-managers should first have the cognitive capabilities to perceive opportunities and threats in their environment, create vision and strategic planning, to finally start innovating the business model towards a solution business.

Third, the study provides support for the claims of Chesbrough (2007, 2010) that successful business model innovation requires “experimentation” with the business model and, also, a clear “leader” how has the responsibility and authority to experiment with the business model. Both factors played a significant role in the success of TechLution’s transformation towards a solution-centric business.

Finally, the key finding of this research for solution business theory is that companies need to innovate the design elements of their business model simultaneously at all three levels. In other words,

companies have to simultaneously change the content, structure, and governance of their activity system in order to successfully transform towards a solution-centric business. The model developed in this research shows the important role of interdependencies between the different design elements. Adding solution related content to the activity system requires also changes in the structure and governance. Therefore, when analysing the transition to a solution business, researchers must analyse the business model as a whole, not just the independent elements like services, organizational structure or partnerships. Taking the business model as the unit of analysis shows that the transformation towards a solution business is very complex and, therefore, requires great attention and managerial capabilities from top-managers to manage the transformation.

Overall, this study gives a more comprehensive understanding of how managers should manage the business model innovation towards a solution business. While main stream solution business literature is more focused on optimizing the details of a solution business model, this study provides a more holistic and systematic perspective on the whole transformation.

6.2 Managerial Implications

The research highlight several important implications for manufacturers that want to successfully transform to a solution business. First, before top-managers can manage a transformation towards a solution business, they should first perceive the opportunities of a solution business model. This requires managerial cognition capabilities to interpret the business environment and to find markets where the company could provide solutions.

Second, when managers perceived an opportunity in the market to provide solutions, they should take their business model as the unit of analysis for the transformation. This provides the most holistic and systemic perspective. Top-managers should first understand their current business model and set clear strategic goals where they want to go. Then, simultaneously make changes to the whole activity system to move into the solution business direction. This research shows that it is important for managers to see the interdependencies of the elements of the activity system. Thus, managers should not transform the different elements independently from each other, but gradually transform the whole business model design. Moreover, the study shows that the transformation is a complex process and should not be underestimated by managers.

Third, the study came up with nine propositions related to the transformation towards a solution business model. These propositions give managers important insights in several factors that have to be implemented in order to be successful in providing solution.

Fourth, different solution business related competences that manufacturers should develop during the transformation are identified. An important competence that need to be developed during the

transition is project management. This competence is of vital importance to deal with all the different components and parties that are involved with offering solutions. Moreover, the company must develop a broader base of technical competences. This means that people at the front-end of the company must understand multiple technologies, since the solution exist of different product components and technologies. Finally, providing solutions requires more human resources at the front-end of the company. Providing solutions requires more services for customers. Due to the fact that offering services are highly based on human resources, providing solutions requires more human resources.

6.3 Limitations

As is the case for any research project, the chosen methods created some limitations. This section will describe the limitations of this research. Single-case studies have been subjected to a number of criticisms. The most common criticisms are concerned with methodological rigour, researcher subjectivity, and external validity. In the method chapter, several steps were outlined how this research tried to improve these issues, related to the reliability and validity, of single-case study research. Although, these performed steps already significantly improved the quality of this research, there could have been some further improvements.

One important limitations of this research is that the findings are based on one company case study. As argued in the discussion chapter, it is still plausible that the proposed model and findings of this study can be generalized to other companies and industries. However, the grounded model and findings only serve as an initial, empirical step towards understanding the transformation towards a solution business model.

Second, although the case company is a leader in the transformation towards a solution business in their respective industry, their transformation was, although already successful, still ongoing during the research period. Thus, the company was still making changes to the activity system. For example, as mentioned in the findings chapter, TechLution was still struggling how they should change the incentive system towards their new solution business model. Due to the fact that TechLution was still optimizing some aspects, it could be that the research missed some additional changes to the activity. Despite the fact that some changes might be added, the overall model and findings remain the same.

Finally, another limitation of this research is that it was performed by just one researcher. As a result, there is a higher possibility that “subjective” judgments are made by the researcher during the study. Although, the researcher performed several steps to reduce the chance of subjectivity, like the use of multiple source of evidence, sending the transcripts to the respective interviewees, and discussing the results with managers from the case-company; there could still be certain unintentional subjective judgments. In particular, the coding of the collected data could be bias to the researcher’s interpretation.

As there was only one researcher, the data has not been coded by several researchers. This could increase the chance of subjective judgments. As a counter measure, to reduce the chance of subjectivity, the results were checked and approved by managers of the case company.

6.4 Further Research Avenues

The findings of this research open up several potential avenues for further research. First, it is proposed that further research should not rely so much on the “servitization” concept of Vandermerwe and Rada (1988) in order to study the transformation process towards a solution business. The findings of this study show that studying the transformation towards a solution business requires a more holistic and systemic analysis. By taking an activity system as a unit of analysis, the interdependencies and dynamics of the different elements of the transformation become clearer. Showing that the transformation towards a solution business model is more complex than previously assumed. Hence, it is proposed that further research should concentrate more on the interdependencies between these three levels of the activity system and related it to the transformation towards a solution business. For example, to identify which business model elements are reinforcing each other in the transformation towards a solution business model.

Second, a natural next step would be empirical validation to quantify the findings of this study. For example, study whether companies that innovated their business model on all three levels, in order to transform to a solution business model, are more successful than companies that just innovated on one or two of the elements.

Third, one of the findings of this research was that the case-company experimented with the implementation of segment business units to be better able to provide solutions. This segmented business approach was a great success for the company. Additionally, Storbacka and Pennanen (2014) also state that companies must select customer segment in which they want to offer their solutions, but they do not mention how companies are selecting these segments. Therefore, an interesting research question would be: “how do firms select their segments and/or customers to focus their solution business model on?”

Finally, another interesting research avenue would be to study the role of software in providing solutions. On the basis of the findings generated by this study, software is a key determined to integrated the different solutions components with one another. The case-study company even experiences competition from software companies with providing “machining” solutions. In the future, the importance of software will only increase regarding providing solutions to customers. Especially, with the rise of so-called “Industry 4.0”. Strangely, there are so far no studies dealing with the role of software and providing solutions.

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Appendix A: IBM Transformation Case

IBM was one of the first companies to introduce the solution business model (Davies et al., 2007). IBM used to be the case example of a vertical integrated company. They had all capabilities in-house to provide low-cost, standardized integrated bundles of computer hardware, software and services (Davies, 2004). During the mid-1980s, the computer industry became more modular as specialized firms started to enter. This change in the industry placed high pressure on the vertical integrated approach, almost resulting in the bankruptcy of IBM in 1993 (Gerstner, 2002). IBM desperately had to change its business model, but rather than copying the trend towards vertical disintegration, IBM decided to keep the company and its business units together. However, they decided to change their business model to become a customer-focused provider of computing solutions (Gerstner, 2002). In other words, they focused on providing complete solutions to their customers in the computer industry. Through their broad base of vertically integrated capabilities, IBM had a lot of valuable knowledge, regarding computing requirements, to offer their customers. The challenge, however, was to combine all this knowledge into a complete solution for each customer. So far, the knowledge was spread throughout the different business units; which collaboration was insufficient to offer solutions. IBM solved this problem by both reorganizing the organization to stimulate collaborations. Moreover, they developed both their project management and consultancy capabilities. As a result, IBM was able to tailor and bundle individual components to fulfil each customer's unique requirements (Davies, 2004). This also entailed that IBM moved away from only offering entirely in-house technology. They integrated products from competitors (e.g. HP, Microsoft and Sun), if this was required to provide their customer the best solution (Gerstner, 2002).

Appendix B: Key Roles for Solution Business Personnel

Key roles for solution business personnel (adopted from (Storbacka & Pennanen, 2014))

Role	Responsibilities
Solution portfolio owner	Solution development management Investments and resource allocation for commercialization and industrialization
Solution manager (Commercialization)	Outside-in marketing and sales materials Customer value Rules and guidelines for solution configurations Solution development and lifecycle management
Module or basic sales item owner (Industrialization)	Quality and cost efficiency Lifecycle management Solution fit and integration compatibility Competitiveness – world class
Consultant or principal consultant	Customer business and financial understanding Identifying gaps and opportunities in the customer's business Advanced value quantification
Solution architect	Translation of customer solutions into a solution comprising products, services and software Solution configuration of own and third party solution elements System integration
Tendering support / bid manager	Centralized vs. decentralized bid management Replicated best practice solutions, utilizing knowledge management Risk management

Appendix C: Example Interview Guide

Interview guide for head of special projects

21/06/2016

1. Introduce project ('is there anything about the study you would like me to tell you before we begin?'),
2. Recording & confidentiality.

Subject A: Solution offering

- How would you define a solution offering?
- What is the difference between a solution and a special project?

Subject B: Daily Operations

- What are your daily operations?
- Could you give an example of a special project?
- How are the special projects managed?
 - Who are/how many customers?

Subject C: Challenges

- What do you think were the main challenges for TechLution to become a solution provider?
- Which steps should be taken?
 - What are the must win battles?
- Can TechLution become a 100% solution provider?

Subject D: Learning from special projects

- How is TechLution learning from special projects?
- How is this knowledge transferred throughout the organization?
- What is the role of the special projects in the transformation towards a solution business (model)?

Subject E: Solution business model

- How do you see the solution business model?
- What are the main competences needed for this business model?

3. ASK in the end:

- a. Is there anything you think we missed regarding the discussion about solution business?
- b. If I have any follow up questions, is it okay if I contact you?

4. Close the interview appropriately