

Servitization: Critical factors for successful implementation

Author: Katharina Adams
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT

As manufacturing businesses operate in an ever more competitive environment, where products are easily commoditized, servitization has become a popular strategy to differentiate from competitors. However, many manufacturers seem to struggle with introducing services to their core offering successfully. Thus, the aim is to develop a conceptual framework to recognize the importance of given factors which inhibit a profitable implementation of service offering in the manufacturing industry and to assess the importance and frequency of them occurring. A hypothetical model was developed to provide an effective guidance for companies during the implementation. Therefore, this paper should be seen as an extension of the current literature with regard to servitization implementation, as it offers an insight through the development process of servitization. Related literature and interviews results provide support for the hypothetical model.

Graduation Committee members:

Dr. R.P.A. Raymond Loohuis: first examiner

Hanna Hanna: second examiner

Keywords

Servitization, Manufacturing companies, Performance, Digital transformation, Organizational culture, Resistance to change

Permission to make digital or hard copies of all or all part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on services or to redistribute to lists, requires prior specific permission and/or a fee.

12th IBA Bachelor Thesis Conference, July 9th, 2019, Enschede, The Netherlands.

Copyright 2019, University of Twente, The Faculty of Behavioural, Management and Social sciences

1. INTRODUCTION

1.1 Servitization: The future for manufacturing firms?

In the last years, companies have been facing many transformations, which radically changed the way companies are working with their customers, as well as how products are developed, manufactured and delivered. Manufacturing firms are forced to differentiate themselves as the business environment they operate in is becoming increasingly competitive (Daniel Kindström C. K., 2013). Especially for western manufacturers the competitive pressure from developing markets is increasing. China has been successful in commoditizing products, forcing US manufacturers to cut the production costs by 30% to compete with Chinese manufacturers (Wu L Y. X., 2006). In order to differentiate themselves, manufacturing firms try to extend their value-chain by adding complementary services to their offering. By transforming, manufacturing firms hope to develop new markets and the possibility of gaining higher returns and additional growth opportunities.

The combination of products and services is called servitization by scholars. Servitization has been a heavily discussed concept and is being defined as offering fuller market packages or bundles of customer-focused combinations of goods, services, support, self-service, and knowledge (Vandermerwe and Rada, 1988). Scholars describe it as being a trend towards implementing services to manufacturers product portfolio. In western economies, the proportion of large manufacturing companies, who offer services has increased to almost 60% (Neely, 2008); out of those manufacturing companies who offer services the share of service sales has reached 31% (Fang et al., 2008). According to Brettel, Friedrichsen, Keller & Rosenberg (2014) the current problem for manufacturing firms is that “the demand for customized products is increasing, and product lifecycles are decreasing”. Servitization can provide different benefits apart of increasing sales. According to Neely (2008) the transformation of firms with a product-production structure to a product-service structure provides additional customer value as well as develops further innovation capabilities of the firm. Thus, satisfies customer needs and preferences. Moreover, servitization offers the possibility to generate additional revenue streams throughout the products’ entire product-lifecycle. This results in predictable and continuous revenue streams throughout the lifecycle and stability of income.

1.2 Research objective

Empirical results have shown a positive yet non-linear relationship between service activities and profitability. The initial idea of offering additional services to products should result in an increase in profitability. However, firstly a period of a decline is perceived before the positive relationship between the scale of services and profitability according to Ivanka Visnjic Kastalli’s (2013) observations. At the beginning of implementation of servitization, challenges may appear resulting in a lower financial performance than previous status quo (Gebauer et al., 2008). Difficulties in organizational design and information technology, as well as insufficient capabilities for service management (Gebauer et al., 2008). Since the transition from a product-dominant business model to a service-dominant

model requires radical changes in strategy, structure, and organizational culture. Earlier studies refer to the term “Service paradox in manufacturing companies” (Gebauer et al., 2005). The meaning of the statement that considerable investment in expanding service activity leads to increased service offerings and higher cost, but do not create higher returns as initially expected and planned. It is stated that “service paradox” has an organizational and behavioral dimension, as managers are unprepared with new tasks coming.

Since only few studies have provided analyses of the processes and practices for successful implementation of servitization, the purpose of this bachelor thesis is to recognize the importance of given factors which inhibit a profitable implementation of service offering in the manufacturing industry and to assess the importance and frequency of them occurring. Importance is going to be ranked according to its value, and frequency of occurrence, in order to provide a more effective guidance during the implementation of servitization. Referring to the positive but not yet linear relationship between scale of services and profitability (Ivanka Visnjic Kastalli B. V., 2013) and to the book by (Kohtamäki, M., Baines, T., Rabetino, R., & Bigdeli, A. Z., 2018).

1.3 Research question

In order to investigate the core concept the following research question need to be answered:

“What are the critical factors that have an influence on the implementation of servitization in manufacturing companies?”

The main reason for this bachelor thesis is to analyze the importance and frequency of given factors in the manufacturing industry. To get a better understanding of Servitization concept, the further chapter defines the key characteristics. Afterwards, the following sections are describing critical factors, which appeared having an influence on the transition.

1.4 Practical relevance

The research describes the current condition of manufacturing companies. Nowadays they are facing increased competitive pressure from countries, where products are easily commoditized. By the reason that the market has changed, customers are expecting to receive additional services to their products. Currently, the challenge for local manufacturing firms, is the transformation of product-centered firms towards product-service.

2. THEORETICAL FRAMEWORK

2.1.1 The definition of Servitization and its Key Characteristics

Servitization is referred to as being the transformation in which manufacturers are offering services that are integrated to their products. Therefore, mainly focusing on adding value to the customer. The transition of manufacturing firms from selling products to selling solutions is expected to offer high returns as well as additional growth opportunities. Currently servitization is considered as a strategic alternative to product innovation a method to build loyal customer relationships (Tukker, 2004). According to the book, Kohtamäki, M., Baines, T., Rabetino, R., & Bigdeli, A. Z. (Eds.). (2018). *Practices and Tools for Servitization: Managing Service Transition*, there are four key

characteristics facilitating servitization in various configurations, namely: service development capability, network management capability, mass service customization capability and digitalization capability.

2.1.2 Product Service System

Product Service System (PSS) is an integrated combination of products and services, which extends the traditional functionality of a product by adding services (Baines, Lightfoot, Steve, Neely, Greenough, Peppard, Roy, Shebab, Braganza, Tiwari, Alcock, Angus, Basti, Cousens, Irving, Johnson, Kingston, Lockett, Martinez, Michele, Tranfield, Walton & Wilson, 2007, p. 1). The desired state is connecting products and services to a single offering (PSS). Switching to product-service systems requires understanding of servitization as a transition process, as the transition is crucial part of adopting the strategy. It transforms the strategic and operational logic by focusing on customers and services. Thus, the system change requires a radical shift in the business model and mind-set of employees. Current studies do not contain a practice theory, which provides a useful conceptual landscape. According to multiple case studies, companies encounter three types of barriers in servitization: operational, strategic and organizational. From an operational perspective, companies may lack sufficient knowledge or skills to develop a service business and might not have an appropriate market strategy. As well as on organizational level, companies might have significant cultural and corporate challenges, that hinder of becoming a solution provider (Coreynen, Matthyssens, De Rijck, et al., 2017).

3. LITERATURE REVIEW ON SERVITIZATION IMPLEMENTATION

3.1 Creating Value Opportunities for Manufacturers

The research is implemented on the basis of different studies and literature analysis. After examination of literature, the following factors are being identified as critical, since they have influence on service offerings performed by a company. The servitization strategy is determined as successful, if a company manages to avoid a profitability gap, and realizes a profit with its new service.

3.1.1 ICT infrastructure

According to (Brettel et al., 2014) *digitalization* is being seen as a critical factor, which decreases the complexity of production processes and therefore increases flexibility sharing only relevant information related to specific process steps. Leveraging digital technologies for improving efficiency and expanding firm's reach into the market (Coreynen, Matthyssens, & Van Bockhaven, 2017). For instance, digitalization options can be seen in "back-end" and in "front-end" operations, which therefore can improve company's performance (Coreynen W. M., 2017). Concerning "back-end", which deals with improvement of operations in manufacturing being effective and efficient (Storbacka, 2011) and "front-end" system, deals with better understanding customer's preferences, thus by adding online monitoring or tracking devices to products (Porter & Heppelman, 2014) or by creation of self-service like personal digital assistants (Yao, Strombeck, & Chi, 2005). It is of essence to share important

information between departments within the organization as well as to customers.

A favorable IT infrastructure is expected to help to adopt a servitization strategy, as technology acts as an interface between products and services. Literature analysis has shown that following factors if met, a company is being seen as having a favorable IT structure:

- Predictive analysis using a combination of hardware and software technologies, in order to predict specific failure of a product or machinery;
- GPS technologies used to track machines/products;
- The use of dash boarding technologies providing KPIs to make services more tangible and visible, is being seen as essential. Dashboards highlights issues, provide possible strategies to overcome problems;
- Consumption monitoring to create customer-specific service offerings. If manufacturing companies have a better understanding of how their customers use the products, it is easier for them to offer personalized service offerings, tailoring to the needs of the customer. Which therefore creates a competitive advantage;
- Pushing information to employees or customers via mobile platforms. Which is being considered important, to communicate with customers and directly edit data for enterprise purposes, meaning sending real-time data via smart phones. The use of mobile communications supports the implementation of the early stages of servitization.

The research provides a study of the most important technologies in the future of manufacturing firms (Veit Dinges F. U., 2015). The research by Veit Dinges (2015) includes the discussion with Capital Equipment Manufacturing (CEM) experts and academic experts, there were 85 technologies identified as being the most important for servitization. Table 1 identifies top 5 ranked technologies, dash boarding (67%) being seen from CEM panel as important, which is used to provide KPIs in order to make services visible and tangible. As well as Consumption monitoring (69%) is being seen from academics as important, usage of it helps to create consumption driven supply chains for consumer specific offerings. Also, mobile platforms (54%) are ranked as important, since the operation of it supports the implementation of the early stages of servitization. Lastly, ranked as the most important category is the predictive analysis (100%). After analyzing a following study companies that have these technologies are being recognized as having favorable ICT infrastructure, which therefore supports servitization implementation.

Table 1. Ranked List of Top 5 Technologies (Cambridge Service Alliance, University of Cambridge)

Rank	% in Top Five	Capital Equipment Manufacturers Panel	Rank	% in Top Five	Academic Panel
1	100%	Predictive Analytics used to predict specific failure modes.	1	77%	Predictive Analytics used to predict specific failure modes.
2	92%	Increasing analysis of existing data sets used to find causality and patterns of failures, instead of simply tracking trends.	2	46%	Remote communications used to remotely adjust, fix, or send software updates to Machines/Products.
3	83%	Remote communications used to remotely adjust, fix, or send software updates to Machines/Products.	3	62%	GPS or Geo-spatial technologies used to track Machines/Products, People, or Components.
4	67%	Dash boarding technologies used to provide KPIs to make services more tangible and visible.	4	59%	Consumption Monitoring used to create consumption driven supply chains for consumer specific offerings.
5	58%	Case Based Reasoning (using historic data) in failure pattern recognition, frequent failure pattern analysis.	5	54%	Mobile Phones (or other mobile platforms) used to receive internal data or customer information in real time. Eg. control system data or information pushed to customers.

3.1.2 Customer/supplier interface capabilities

Customer/supplier interface capabilities has been identified as being critical, meaning a greater degree of integration among the actors is required, involving increased information exchange. As a company decided to become a provider of an integrated product-service offering, a specific insight into the different issues and applications of customers is necessary; thus, it is required of having a greater level of cooperation between a provider and its supply chain network (Martinez et al., 2010). Capabilities at the customer interface are needed to develop an understanding of customers' needs and requirements to pursue productivity and innovation objectives. As well as the same capabilities are key to understand the service delivery network, and therefore effectively delivering servitized product or offering. In case of miscommunication between suppliers and firms' specific product parts cannot be delivered on time. The evaluation of the following variable is going to be implemented based on the analysis by Luis Araujo (1999). There are four identified interface categories: standardized, specific, translation and interactive.

Table 2. Consequences of different supply interfaces from a customer-based perspective (Luis Araujo 1999)

Interface Category	Characteristics	Customer Benefits Productivity	Customer Costs Productivity	Customer Benefits Innovativity	Customer Costs Innovativity
Standardized	No directions. No specific connection between user and producer contexts.	Cost benefits from supplier economies of scale and scope, as well as learning curve effects.	Adaptation to standardized solutions may create indirect costs elsewhere.	None	No direct costs. Allows only indirect feedback to suppliers based on sales figures.
Specified	Precise directions given by customer on how to produce.	Supplier can pool together similar orders; economies of scale and scope can be attained.	Supplier's resource base "locked in". Limited possibilities to influence specifications. Supplier may reap benefits that are not shared with customer.	Minimal (supplier can propose changes to blueprints).	Suppliers used as capacity reservoir. Development of supplier resources may suffer.
Translation	Directions given by customer based on user context and functionality required.	Supplier can propose efficient solutions that improve its own and well as the customer's productivity.	Supplier has some leeway to propose innovative solutions.	Supplier may not know enough about customer context to innovate radically.	Supplier may not know enough about customer context to innovate radically.
Interactive	Joint development based on combined knowledge of use and production.	Open-ended exchange allows full consideration of direct and indirect costs for both parties.	Investments in knowledge of how best to make use of existing resources.	Supplier learning about user context opens up the gamut of solutions offered.	Requires investments in joint development and learning.

3.1.3 Employees' expertise

Another factor has been determined namely *employees' expertise*. For Industrial companies to acquire new potential customers and to secure the loyalty of existing customers may reach to servitization. Improving customer loyalty can be achieved especially during the customer service process. An employee who is in direct contact with the customer, while he is providing a service, is automatically delivers an image of the company. Usually, customers equate the service quality provided by the firm's employee with the quality of the entire company. Additionally, employees having direct contact with their customers are able to provide important data on how customers consume their service. Due to these factors, the qualifications of the employees in a firm providing a service is becoming crucial

for the desired customer satisfaction nowadays. The successful transformation of a traditional industrial company to a product-service provider requires employees to have additional qualifications and skills, besides the traditional competences. Literature reports positive as well as negative consequences on employees by servitization effects. The increasing job requirements on the service personnel can be described as very challenging for the individual employee. For instance, employees have to implement different tasks, such as meeting customer needs, while proving a service simultaneously, or increased communication intensity. Besides the challenges, employees can extend their area of responsibility (Gotsch, 2014). Due to the direct relationship to the market through service, employees are being an appropriate connection of market information and early trends. Thereby employees who perform service activities have greater importance within the company, and feeling self-confident and valuable in the company. This can be linked to the esteem needs by Maslow, namely prestige and feeling of accomplishment (Maslow, 1954).

According to the following Figure 1 qualified employees are more demanded:

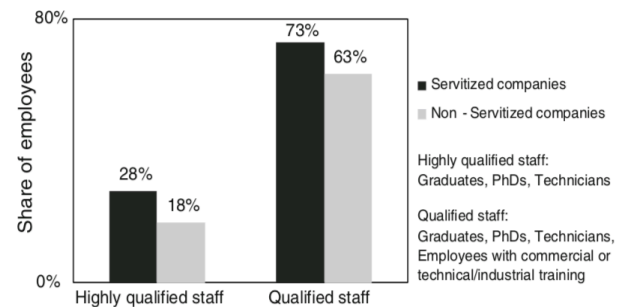


Figure 1. Staff qualification in servitized and non-servitized manufacturing companies (Germany Manufacturing Survey 2009, Fraunhofer ISI)

Due to the increased qualification requirements with the additional service offerings, companies need to invest into learning programs in order to keep the standard on a high level. According to the literature, following factors contribute to a more desirable servitization strategy:

Specific working time models for older employees;

Specific training programs for older employees;

Retaining programs as well as mixed-age teams, mentoring;

Special human resources plan for older employees.

3.1.4 Cultural readiness

Scholars define it as being an important because manufacturing companies that originally do not operate in service-related market, might need cultural changes to adopt to the new strategy (Heiko Gebauer E. F., 2005). It is a difficult task to execute the change from a product-centered organization to become service oriented. Barriers may result from lack of attention from management team, as well as insufficient service capabilities (Gebauer et al., 2008). Specifically, literature refers to cognitive and cultural barriers of managers and service personnel for specific values in service offerings such as innovation,

customization and flexibility, since these approaches contradict traditional manufacturing goals and practices such as standardization, efficiency and economies of scale (Bowen et al., 1989). The managerial task is to find a balance between values and norms of an old culture and a new (service) culture. Hence, cultural readiness is going to be evaluated based on the model by Zeira & Avedisian (1989). Commitment of top management is responsible to introduce the change and support employees throughout the process. Capable evangelist means that a capable executive person on the top management team is regularly present, available for consultation, who strongly believes in the change, and has power and an appropriate leadership style. Lastly an organization culture should create and sustain existing beliefs, norms and values.

Table 3. The Diagnostic Tool for Predicting the Success of Organizational Planned Change (Zeira & Avedisian, 1989)

Client Characteristics	Rating	Consulting Team/Client Characteristics	Rating	Environmental Characteristics	Rating
Commitment of top management		Values fit		External stakeholders' current dissatisfaction	
Capable evangelist		Goals fit		External stakeholders' anticipated future dissatisfaction	
Supportive organization culture		Methodology fit		Common perception among internal stakeholders regarding the environment	
Flexible organization structure		Competence fit		Level of consensus between the consulting team and top management regarding the environment	
Readiness of employee population					

3.1.5 Resistance to change

Resistance to change might be seen as a critical factor as well, by the reason that employees do not want to lose something of value, which is commonly referred to as parochial self-interest (John P. Kotter L. A., 2008). As a result, they focus on their own interest and not on those of organization. Moreover, they might believe that the change does not make sense for the organization. Although managers are aware of some form of human resistance to change, sometimes it takes a long time to prepare employees for the change, as people who are affected by it will experience some emotional confusion. As a consequence, symptoms like anxiety rises and motivation falls, leading distortions during work (John P. Kotter L. A., 2008). Anxiety refers to low tolerance for change, because of the fear they will not be able to develop the new skills and behavior that will be required, since it is necessary to have more employees with qualified knowledge in a particular field (Gotsch, 2014). Hence, this factor has a negative effect on servitization implementation. A successful execution of the service activities requires the positive commitment of service workers. This commitment refers to the motivation deriving from understanding the benefits as well as seeing the results from change implementation (Heiko Gebauer E. F., 2005). This effect of commitment is being called "employee-pull" effect (Shiba S. G., 1993).

3.1.6 Financial resources

Lastly, a critical factor is being identified is *financial resources*. According to (Ślusarczyk B, 2018) 41% of the responding

German enterprises claim that having access to high financial investment requirement plays a key role in the technological development of a firm. Especially, local manufacturers and medium sized companies, usually do not have the required resources as well as the experience for an additional service orientation (Hernandez-Pardo et al, 2012). The lack of financial resources is considered not to be a variable, which impacts the degree of servitization directly, but a mediating variable. Missing financial resources might complicate the operating process, as well as lack of these may hinder the needed ICT infrastructure, which therefore has an indirect influence on the variable. Moreover, financial resources have influence on employees' expertise, since the needed trainings in form of proper communication and learning practices, which are very cost intensive. Missing financial resources might hinder the extension of the supporting network, thus influencing also the customer/supplier interface capabilities variable.

4. METHODOLOGY

The research approach for the current thesis consists of gathering scientific articles and analyzing data based on qualitative design approach in form of interviews. Interviews allow gaining a deep insight into company's situation. The secondary data, in form of relevant articles, is used to acquire information regarding the definition of servitization, its key characteristics and influencing factors on the strategy implementation. Therefore, Scopus, Google Scholars, Research Gate, Springerlink and other relevant databases and websites are going to be used for gathering relevant information. It was paid attention to use the most cited papers. It is expected that the most cited papers are seen as relevant and the most examined.

Since the existing literature offers limited insight into servitization strategy, a hypothetical model was developed in form of given variables affecting the implementation strategy. Hence, a model was elaborated based on the literature review, combining key aspects having influence on servitization strategy in a firm. The Dependent variable is the servitization implementation, since it is affected by the level of ICT infrastructure, also the supplier/customer capabilities which is the level of cooperation between a provider and its supply chain network, as well as employee's expertise, cultural readiness, resistance to change and lastly financial resources which are independent variables.

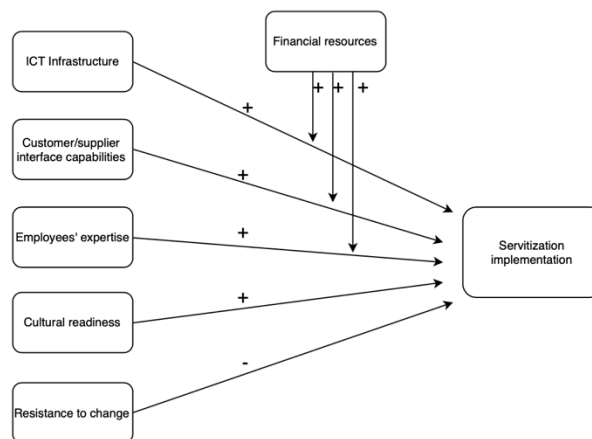


Figure 2. Hypothetical Model (Source own illustration)

ICT infrastructure was defined favorable according to the study by Veit Dinges (2015), when having dashboarding technologies providing KPIs to make services more tangible and visible. Also, consumption monitoring to create customer-specific service offerings as well as pushing information to employees or customers via mobile platforms. Lastly the analysis of existing data sets and its usage in order to find causality and patterns of failures. The study contains the discussion with Capital Equipment Manufacturing (CEM) experts and academic experts, there were 85 technologies identified as being the most important for servitization as well as having a positive effect on it.

Customer/supplier interface capabilities is being evaluated based on the analysis by Luis Araujo (1999). Having four different interface categories namely, standardized, specific, translation and interactive which will be compared with productivity and innovativity. Employees' Expertise is evaluated according to standards of interviewed companies, comparing to the book by Gotsch, Hipp, Erceg, & Weidner (2014), claiming that employees who are providing services to customers are required to be more qualified in the specific field. In order to evaluate and analyze Cultural Readiness model by Zeira & Avedisian (1989) for organizational change is going to be applied. Resistance to change conceptualization was applied using Kotter & Schlesinger (2008). Lastly, questions with regard to budget were asked and are going to be analyzed whether budget was sufficient for the strategy implementing.

4.1.1 Data collection

In order to acquire relevant data, the respondents need to fulfil certain qualifications. All of them need to have executed a servitization project. Out of seven respondents, four companies met the criteria. The interviews were conducted with three different independent respondents and one interviewee was acquired through a personal contact. The structure of the interviews was semi-structured. Therefore, allowing some freedom in discussing certain topics deeply, besides answering predefined questions. All questions mentioned in the questionnaire were constructed by the analysis of scientific articles in the literature review. By the end of the interview each respondent was asked to mention about the importance of each variable, while implementing service offerings.

Table 4. Interviewee information

Interviewee	Organization type	Profession	Location
A	Florist/packaging producer	Department head	Ukraine
B	Car dealer	Head of sales	Germany
C	Chemistry producer	Project manager	Germany
D	Cosmetic/food supplement producer	Project manager	Germany

5. RESULTS

In this chapter, the results from four interviews are going to be discussed. The interviews were carried out with four companies, three of them in Germany, and the other one is in located in Ukraine. Results are provided in this chapter with regard to each company interviewed.

5.1 Company A

Company A is a leading florist company in Ukraine, operating since 1993. An ERP system was introduced in order to simplify the data processes as well as enabling a more flexible production line of flower packaging. As well as the modification of the company's webpage, providing directly customer service without the need for calling. Moreover, giving the ability customizing orders themselves and receiving same day delivery.

5.1.1 ICT Infrastructure

Company's webpage was modified offer the customer the opportunity to chat with an employee for providing guidance, if customer is in a doubt. It works in a following way: while entering the webpage, an icon appears notifying that an employee is available for consultancy. In this way, the employee can be directly contacted in case of complications or misunderstanding. Additionally, they are making use of dash boarding, as they provide customer satisfaction questionnaires. As well as GPS technologies, enabling customers to live tracking their orders via an app, thus using mobile application. Additionally, consumption monitoring is used for creation specific customer offerings, as well as usage of mobile platforms. Predictive analytics are not used. All in all, company A is considered as having a favorable infrastructure, while using four out of five important technologies categories.

5.1.2 Customer/supplier interface capabilities

Company A has a standardized interface category (Luis Araujo, 1999). Which means pre-made products are being sold on the webpage. Although, recently they are trying to provide customized services. They are getting precise directions from customers how to produce. Also, they are being active on different social media platforms, thus informing customers directly though.

5.1.3 Employees' expertise

With the new website feature employees are providing service offering to customers now even more often. Therefore, it is of essence having qualified working staff in a specific field, and specific workshops with regard to different color combination in a floral bouquet were provided. As well as there was a need for employees to have a "working with clients" workshop. As well as having specific training programs for older employees, who needed more time to invest in order to learn.

5.1.4 Cultural readiness

Employees received sufficient attention from top management, making them prepared for change. People needed to start providing consulting services for clients, even who never have done it before.

5.1.5 Resistance to change

There was no resistance mentioned from employees, as they were prepared beforehand. Thus, top management provided a supportive organizational culture.

Concluding as a new service including individual customization was introduced, an observation was made that only few customers used the new feature. This may be explained due to the reason that many customers just do not know how to combine different colors and flowers in a flower bouquet. For this reason, no additional profitability was observed during the time of service offering. Although, they provided a favorable ICT infrastructure, and supportive organizational environment, as well as extra workshops for employees. Resulting in having no resistance to change from employees. Additionally, financial resources were used for the new service feature and also to provide workshops for employees, in order to improve their

knowledge in the field and learn providing qualified consultancy services to clients. Following with regard to supplier interface capabilities variable was seen as being less important by the company A.

5.2 Company B

Company B recently introduced a new service, allowing customers to request status updates online on their car repair. The service was expected to relieve both, the customer and the staff, as from now on the customer can check the current repair status and expected completion date online. As well as it was expected from employees providing additional services to customers, in form of consulting.

5.2.1 ICT infrastructure

Company B makes use of an ERP system to monitor the flow of spare parts. The information on the order status is shared with the customer as well. Additionally, the number of customer status requests and customer satisfaction is monitored, in order to assess the usage of the service. Furthermore, the introduction of an ERP system simplified customer handling, with making use of mobile application platform. Regarding ICT infrastructure, company used consumption monitoring, dash boarding in form of requests and page visits. Furthermore, GPS technologies were used, to track. Predictive Analytics were not implemented.

5.2.2 Customer/supplier interface capabilities

Regarding to customer/supplier interface, company B performs standardized interface category (Luis Araujo, 1999). As it is being expected from a car selling firm, there is no specific connection between user and producer contexts. Although, they are having contact through an ERP system.

5.2.3 Employees' expertise

As a new service was introduced it was expected from employees to getting used to the new added tasks to their daily working time. Since it was new for technical workers, firstly workshops had to be implemented in order to show how to use a specific program, and also training programs for older employees. However, Company B did not pay enough attention to the employees. Technical workers had to accept the change and the new tasks coming with that.

5.2.4 Cultural readiness

With regard to the cultural readiness following was identified, that there was not enough commitment of top management as well as no capable evangelist. Top management did not invest enough time into the change process, because they decided that employees will simply accept the change.

5.2.5 Resistance to change

As a consequence, that top management did not pay enough attention to the change process, the employees' resistance to change increased. Technical workers were not motivated nor convinced enough to update the repair status regularly. Which is why customers did not make use of the service offering.

Concluding, company B used four out of five characteristics for ICT infrastructure, allowing them having a favorable infrastructure for performing this specific service. Financial resources were sufficient for providing the new service as well. Even though spending enough attention to technical and financial matters, company B suffered a profitability gap due to not recognizing that sufficient training of technical workers is required to ensure the desired outcome. With regard to supplier interface capabilities variable was seen as being less important by the company B. Lastly, the interviewee was asked to share the challenges faced after the service implementation, and it was mentioned that managers performed poorly, as they did not prepare technical workers for their new tasks. It was demanded

from employees having additional tasks without adequate consultation and training. Due to the fact that managers did not regard the human resource aspect as important, the service was not operating at its desired level. The interviewee mentioned that financial resources, cultural readiness as well as employees' expertise are defined as important variables for the company B. This resulted in an increased resistance to change, hence having a negative effect on servitization implementation.

5.3 Company C

Company C operates in color manufacturing industry. As an innovative service a mobile application was introduced. Allowing users to change the color of different surfaces. The company executed a customer questionnaire, hence it was observed that most of them mix their own color for an apartment surface, thus they came up with an idea of introducing a new color designer application. With its help, clients can design sample projects offered in the app, but also upload own photos and design own projects, edit and color, save projects, export, publish. Therefore, the app is saving customer's time but as well as employees' time.

5.3.1 ICT infrastructure

Company is making use of predictive analytics, dash boarding, GPS technologies, consumption monitoring and mobile platform applications. Thus, they have five out of five predicted categories, which is being defined as having a favorable ICT infrastructure.

5.3.2 Customer/supplier interface capabilities

With regard to supplier interface capabilities, the company has standardized (Luis Araujo, 1999) but somewhat specified interface category. Meaning pre-made colors are being offered in the app, but clients can also mix and make their own color. Therefore, giving directions on what color exactly to produce.

5.3.3 Employees' expertise

Professional trainings of workers were performed in order to find out new formulas of mixing colors in order to achieve a precise customer wish. Moreover, there was a need to work closely with the IT department as well as regularly meetings.

5.3.4 Cultural readiness

There was provided enough commitment of top management team, as well as supportive organization culture. Management team offered specific training programs for older employees, also there were formed mixed-age teams, old-young tandems, mentoring retaining.

5.3.5 Resistance to change

There was no recognized resistance to change from employees' side, since everything was planned beforehand and went according to the plan.

Concluding, company C has managed in providing a successful service offering for customers. Therefore, a profitability was recognized, since customers were interested in choosing the suitable color for the apartment surface, by applying the new app from home directly. Thus, there was no need to go extra to the store and choosing the right color. By the end of the interview, the participant was asked to define the importance of each variable. Answering that the combination of the human resource techniques as well as a favorable ICT infrastructure. Establishing, cultural readiness and ICT infrastructure being important variables. Furthermore, financial resources were having a great influence on applying ICT infrastructure, as well as providing special training programs, which resulted in having to resistance to change. With regard to supplier interface

capabilities variable, was seen as being less important by the company C.

5.4 Company D

Company D makes use of Multi-Level Marketing, in order to sell their products directly to the customers. An innovative service was made, namely the introduction of new ERP systems, as well as a new mobile app. All partners have access via the mobile app to their personal information and bonuses. Specifically, partners are clients who are selling bought company's products further. Allowing company saving costs on distributing. The new application should simplify the information flow to partners. Hence, allowing comfortable environment for partners, and direct access to the shop. Moreover, they can check on whatever occasion their specific bonus information. Partners can form active lines by recruiting new partners, and benefit in terms of monetary matters from their sales. The new app allows to monitor and manage their active lines, too.

5.4.1 ICT infrastructure

Due to the company's specificity, a dedicated ICT infrastructure was required. A service provider from USA was contracted to provide this IT solution, since no another is familiar with this kind of IT infrastructure in Germany. In order to overcome difficulties, a company is making use of all five categories proposed, namely predictive analytics, dash boarding technologies, consumption monitoring, and mobile platforms, GPS technologies allowing customers to track.

5.4.2 Customer/supplier interface capabilities

Since company is a cosmetic/food supplement producer, constant innovations and market analysis are demanded. Earlier they did not realize that having a better relationship to suppliers can provide benefits. Thus, now they are having translation supplier interface (Luis Araujo, 1999), allowing suppliers to propose innovative solutions to products' ingredients, as all products are being produced in-house. Therefore, company provides regularly meetings with suppliers in the main office. As well as they are being active on social media platforms, to support communication with customers.

5.4.3 Employees' expertise

Additional service was offered in form of showing manufacturing part to customers and partners, in order to get more transparency. Therefore, it was required from employees to get more insight into the manufacturing process of each product and the metaphor behind it. Moreover, with the introduction of a new ERP system, as well as a new mobile app, several workshops were implemented, and still are planned in the future, with employees and partners. Employees need to get to know with a new ERP system as soon as possible, because they are going to transfer completely to the new system. However, currently the company is facing a lot of challenges. Recently, many qualified people left the organization as well as who had leading positions, people quit because of the stress and pressure. Leaving other employees behind the project deadline. As a consequence, employees, who weren't part of the group from the beginning need to get even deeper knowledge into other business fields. Therefore, top management needed to provide further professional training.

5.4.4 Cultural readiness

Commitment of top management was firstly seen as supportive, organizing informing employees and dividing responsible tasks, but one head of department and few employees left the organization who were responsible for resolving bucks in the system. Therefore, now the department is unorganized, which are employees are also mentioning.

5.4.5 Resistance to change

Resistance to change was observed at the operational level. Employees were given additional tasks without adequate preparation, like workshops or trainings. The top management missed out on consulting the relevant employees timely as well. This has led to the project group not being prepared enough to cope with the new workload. Additionally, four project group members, one from the top management and three specialized employees, quit working for Company D, which has led to employees being drawn into the project group from other departments. A huge amount of work is needed to be done by the newly introduced staff. Therefore, people are showing resistance in being less productive as well as having self-doubting, because they fear they will not be able to develop additional required skills. As a consequence, the company is behind the project deadline, and the new system is not working well. Resulting in employees' motivation fall.

A huge amount of financial resources is demanded in order to apply the new service; therefore, a precise planning was required. As well as an extra IT service provider from USA was contracted to implement the task. Thus, the company offered a new vacancy for students, in order to test the new system before its launch. Therefore, no additional profitability was recognized, since the new system did not yet launch. However, the mobile application launched but it still has bucks and sometimes partners can see false information on their account page. Lastly, the interviewee was asked to define the importance of each variable. Resulting, techniques human resource management were strongly demanded, in order to fix the situation happened and motivate employees for the future work. But as well as financial resources variable was defined as having a great importance, since the new ERP system and a mobile app are very expensive. Furthermore, professional retraining courses needed to be financed also. With regard to supplier interface capabilities variable, was seen as being less important by the company D. However, they are currently making use of translation supplier interface.

According to four different interviews, all participants referred especially to beforehand planning as well as application of human resource techniques as being influential. The hypothetical model showed to be very practice oriented, since the defined variables which are involved into formation of the service offering strategy; although, one variable appeared being less important as the rest, namely supplier interface capabilities. Following companies did not show close customer supplier relationship, in terms of information sharing and flexibility of order. Especially, cultural readiness was frequently mentioned in the four interviews. Poor planning and not enough attention paid from top management, has led to an increased resistance to change, having a negative influence on servitization implementation. Importance of each variable can be summarized in the Figure 3 based on the interviews performed.

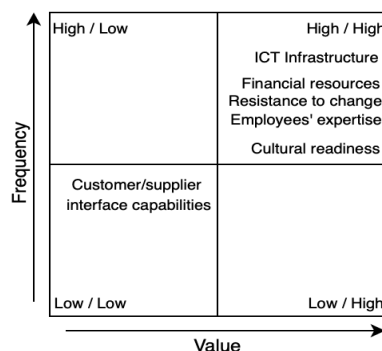


Figure 3. Importance matrix (Source own illustration)

6. CONCLUSION

The following paragraphs provide a summary of the findings.

This study aimed at answering the research question: “*What are the critical factors that have an influence on the implementation of servitization in manufacturing companies?*”. Companies that begin to offer additional service activities have an initial idea to increase profitability and being more competitive on the market. Literature analysis shows, that there is a positive yet non-linear relationship between service offerings and profitability. However, firstly a period of a decline is observed before the positive relationship between the scale of services and profitability according to Ivanka Visnjic Kastalli’s (2013). At the beginning of implementation of servitization, challenges may arise resulting in a lower financial performance than the previous status quo (Gebauer et al., 2008). Field research has shown that three out of the four interviewed manufacturers have experienced a profitability gap.

Especially miscommunication between top management and employees and the lack of attention towards the organizational change a manufacturer has to perform, when transforming to a product-service structure, has led to two out of four interviewed companies to endure cuts in profitability. As projects may last for longer periods, it is necessary to ensure that each group member is committed and willing to perform the change. The case of Company D has shown that otherwise it may lead to employees being frustrated and demotivated, which can significantly delay the finalization of the project. However, as the example of Company A shows that internal preparations may still not be sufficient for a service to function as desired. External factors, like a sophisticated understanding of customer consumption behavior is needed to design a service adequately. Hence, additional capabilities need to be developed by manufacturers with this regard. A recommended form could be to involve customers in earlier stages of the service design phase (Chesbrough, 2003).

Company C has been the only company, which did not suffer a profitability gap. It has been the only company which performed sufficient preparations in terms both: ensuring that the ICT infrastructure matches to the requirements as well as offering sufficient guidance to the employees involved into the project. Workshops, trainings and frequent meetings has been key to get sufficient commitment of the project group. Beforehand planning and the commitment of top management ensured that tasks were clearly defined and communicated to each project member, which mitigated resistance to change.

Concluding, some manufacturers are still not prepared to offer additional services yet. Literature review revealed six prominent factors having an influence on successful implementation of a servitization strategy: ICT-infrastructure, customer/supplier interface capabilities, employees’ expertise, cultural readiness, resistance to change and financial resources. After conducting four interviews with company representatives, the most dominant factors in practice appeared to be: cultural readiness, resistance to change and employees’ expertise. As soon as difficulties with organizational design appear, these cannot be easily solved. Additionally, it was found that cultural readiness and resistance to change are interrelated. Organizational readiness appears to be positively related to resistance to change, as interviewees mentioned that the resistance to change was often caused by not paying enough attention on human resources. Although ICT-infrastructure was mentioned frequently as being important as well, all interviewees stated that their ICT-infrastructure was sufficiently developed to fit the purpose. Hence, ICT-infrastructure seem to be well understood by manufacturers, and enough attention is paid to it being

adequately developed. The main issue manufacturers should be addressing is the organizational change, which a servitization process brings with

7. DISCUSSION: THEORETICAL AND MANAGERIAL IMPLICATIONS

The results of this study show that there is a relationship between the given variables and servitization implementation. Due to the fact that each service offering is different and its complexity is increasing, manufacturers usually do not know how to overcome a short-term decline in the profitability (Visnjic et al., 2014). Moreover, manufacturing companies are facing increased competitive pressure, there is a need to differentiate themselves. As the market is changing, nowadays customers are expecting to receive additional services to their products. Servitization with its significant abilities can be a solution to enhance profitability growth and the opportunity in order to stay competitive. However, only if the strategy is being successfully adapted. With the new strategy, companies are facing new responsibilities: more advanced qualifications from employees are demanded, a new organizational culture should be implemented. Due to these factors employees’ resistance to change might appear.

Resulting human resources techniques being an important tool throughout the strategy formation, should be developed in order to prepare employees for the change in the organization. Following methods might encourage employees to accept and understand the change: Education and communication, as soon as people are persuaded, they will help in the implementation of the change themselves (Kotter et al., 1979). Another important technique is participation and involvement. People who participate in the implementation, will think as being part of the decision-making process, thus feeling important for the organization. Supporting employees with training programs, workshops and regularly meetings for feedback discussion throughout the change process can help overcoming the anxiety in developing new skills.

With regard to the following research, in order to prevent complications in the servitization implementation, managers should pay attention to the variables in the hypothetical model, which can have a potential to overcome the challenges.

8. LIMITATIONS AND FUTURE RESEARCH OPPORTUNITIES

This research paper might contain some limitations as having too small sample size, in order to test the hypothesis even further, due to the reason of short period of time, and other contacted German industries were refused in the collaboration. As well as existing literature offers limited insight into the future in a servitization context. Since the respondent companies introduced different service offerings, the result might be imprecise as different services may require other necessary conditions.

Due to lack of studies, which have provided analyses of the processes and practices for successful implementation of servitization, the model can be used for the further research. The chosen variables might prevent complications in the servitization strategy implementation in the future, since manufacturing companies may not know what kind of environment is favorable for the further strategy development. Another important aspect for the future research, to make a bigger study and to compare different industries, in order to find out whether the results may differ much.

9. ACKNOWLEDGEMENT

The author would like to thank Dr. A.M. Ariane von Raesfeld Meijer, also Hanna Hanna and Dr. R.P.A. Raymond Loohuis for the support and assistance in all belongings related to finalize successfully the current research project.

10. REFERENCES

- Ślusarczyk, B. (2018). INDUSTRY 4.0-ARE WE READY? *Polish Journal of Management Studies*.
- Anderson, E., Fornell, C. & R. Rust (1997). Customer Satisfaction, Productivity and Profitability - Differences between Goods and Services. *Marketing Science* 16 (2), 129-145.
- Andrea Alghisi, N. S. (2015). Internal and external alignment in the servitization journey – overcoming the challenges. *Production Planning & Control: The Management of Operations*, 1219-1232.
- Baines, T. L. (2007). State-of-the-art in product service systems *Journal Engineering Manufacture*, 1-10.
- Bowen, D. S. (1989). A framework for analysing customer service orientations in manufacturing. *Academy of Management Review*, 75–95.
- Brax, S. (2005). A Manufacturer Becoming Service Provider Challenges and a Paradox. *Managing Service Quality*, 142-155.
- Brettel, M. F. (2014). How virtualization, decentralization and network building change the manufacturing landscape: An industry 4.0 perspective. *International Journal of Mechanical, Industrial Science and Engineering*, 37-44.
- Chesbrough, H. W. (2003). The New Imperative for Creating and Profiting from Technology. *Harvard Business School Press*.
- Chutima Hanpachern, G. A. (1998). An Extension of the Theory of Margin: A Framework for Assessing Readiness for Change. *Human Resource Development Quarterly*, 339-350.
- Coreynen, W. M. (2017). Boosting servitization through digitization: Pathways and dynamic resource configurations for manufacturers. *Industrial Marketing Management*, 41-53.
- Daniel Kindström, C. K. (2013). Enabling service innovation: A dynamic capabilities approach. *Journal of Business Research*, 66(8), 1063–1073.
- Fang, E. & -B. (2008). Effect of Service Transition Strategies on Firm Value. *Journal of Marketing*, 1-14.
- Gotsch, M. & . (2014). The Impact of Servitization on Key Competences and Qualification Profiles in the Machine Building Industry. In G. (. Lay, ; *Fraunhofer-Institut für System- und Innovationsforschung -ISI, Karlsruhe: Servitization in Industry* (S. 315-330). Springer International Publishing.
- Heiko Gebauer, C. B.-S. (2008). Service strategies in product manufacturing companies. *Business Strategy Series*, 12-20.
- Heiko Gebauer, E. F. (2005). Overcoming the Service Paradox in Manufacturing Companies. *European Management Journal*, 14-26.
- Ivanka Visnjic Kastalli, B. V. (2013). Servitization: Disentangling the Impact of Service Business Model Innovation on Manufacturing Firm Performance. *Journal of Operations Management*, 169-180.
- J. Hernandez Pardo, R. & . (2012). Sustainable Product Service Systems in Small and Medium Enterprises (SMEs): Opportunities in the Leather Manufacturing Industry. *Sustainability*, 175-192.
- John P. Kotter, L. A. (2008). Choosing Strategies for Change. *Schlesinger harvard business review. Schlesinger Harvard Business Review*, 1-11.
- Kohtamäki, M. B. (2018). *Practices and Tools for Servitization: Managing Service Transition*. Springer International Publishing AG.
- Kowalkowski, C. & . (2017). Service growth in product firms: Past, present, and future. *Industrial Marketing Management*, 82-88.
- Luis Araujo, A. D.-E. (1999). Managing Interfaces with Suppliers. *Industrial Marketing Management*, 497–506.
- Martinez, V. B. (2010). Challenges in transforming manufacturing organisations into product-service providers. *Journal of Manufacturing Technology Management*, 449 – 469.
- Maslow, A. H. (1954). *Motivation and Personality*. New York: Harper & Row, Publishers, Inc.
- Matthias Gotsch, C. H. (2014). *The Impact of Servitization on Key Competences and Qualification Profiles in the Machine Building Industry*. Switzerland: Springer International Publishing .
- Michael E. Porter, H. & . (2014). How Smart, Connected Products Are Transforming Competition. *Harvard Business Review*, 92, 64-88.
- Neely, A. (2008). Exploring the financial consequences of the Servitization of manufacturing. *Operations Management Research*, 103–118.
- Neely, A. (2007). The Servitization of Manufacturing - An Analysis of Global Trends. In: *Proceedings of 14th International Annual Conference of the European Operations Management Association, Bilkent University, TUBITAK, Ankara, Turkey*.
- Nitin Seth, S. D. (2005). Service quality models: a review. *International Journal of Quality & Reliability Management*, 913-949.
- Rabetino, K. & . (2017). Strategy map of servitization. *International Journal of Production Economics*, 144-156.
- Rainfurth, C. (2003). Dienstleistungsarbeit im produzierenden Maschinenbau. *Karlsruhe: Fraunhofer Verlag*.
- Reinartz, W. & W. Ulaga, (2008). How to sell Services more profitably. *Harvard Business Review* 86 (5), 90-6, 129.
- Shiba, S. G. (1993). A New American TQM: Four Practical Revolutions in Management. *Productivity Press and the Center for Quality Management, Cambridge, MA*.
- Storbacka, K. (2011). A solution business model: Capabilities and management practices for integrated solutions. *Industrial Marketing Management*, 699-711.
- Ulaga, W. & . (2011). Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully. *Journal of Marketing*.

- Veit Dinges, F. U. (2015). *The Future of Servitization: Technologies that will make a difference. Cambridge Service Alliance.*
- Visnjic, I. & B. van Looy (2011). Can a Product Manufacturer become a successful Service Provider? In Pursuit of a Business Model that Fosters Complementarity between Product and Service Activities Perspectives. In: *Proceedings of the Academy of Management Conference, San Antonio, August 2011, USA.*
- Wu L, Y. X. (2006). Supply chain clusters: a key to China's cost advantage. *Supply Chain Manag Rev*, 46-51.
- Yao, A. &. (2005). Development of a mobile manufacturing system with PDA and PLC. *The International Journal of Advanced Manufacturing Technology*, 723-729.

11. APPENDIX

Companies	Factors	Summary of the results
<p>Company A (Florist/ packaging producer)</p> <p>Service offering: A new webpage with a direct chat and allowing customers to customize own orders</p>	<p>ICT Infrastructure</p> <ul style="list-style-type: none"> - Dash boarding - GPS technologies - Consumption monitoring - Mobile platforms <p>Customer/supplier interface capabilities</p> <ul style="list-style-type: none"> - Standardize interface category - Customer communication through social media platforms <p>Employees' expertise</p> <ul style="list-style-type: none"> - Workshops were provided <p>Cultural readiness</p> <ul style="list-style-type: none"> - Enough commitment of top management <p>Resistance to change</p> <ul style="list-style-type: none"> - Was not observed <p>Financial resources</p> <ul style="list-style-type: none"> - Were efficiently used to provide a new feature for the webpage 	<ul style="list-style-type: none"> - No additional revenue was gained; - The company did not provide a market analysis; - Internal preparations were not enough for a service to function as desired; - External factors needed to be considered.
<p>Company B (Car dealer)</p> <p>Service offering: customers can request status updates online on their car repair</p>	<p>ICT Infrastructure</p> <ul style="list-style-type: none"> - Dash boarding - GPS technologies - Consumption monitoring - Mobile platforms <p>Customer/supplier interface capabilities</p> <ul style="list-style-type: none"> - Standardize interface category <p>Employees' expertise</p> <ul style="list-style-type: none"> - Workshop was provided <p>Cultural readiness</p> <ul style="list-style-type: none"> - Not sufficient amount of top management commitment <p>Resistance to change</p> <ul style="list-style-type: none"> - Was observed <p>Financial resources</p> <ul style="list-style-type: none"> - Were efficiently used to provide a new feature for the webpage 	<ul style="list-style-type: none"> - A profitability gap; - Top management did not pay enough attention to the change process; - Employees required more workshops; - The introduction of a mobile platform application was required more to invest more time for employees.
<p>Company C (Chemistry producer)</p> <p>Service offering: a mobile application, with a possibility for users to change the color of different surfaces</p>	<p>ICT Infrastructure</p> <ul style="list-style-type: none"> - Dash boarding - GPS technologies - Consumption monitoring - Mobile platforms <p>Customer/supplier interface capabilities</p> <ul style="list-style-type: none"> - Standardize / specified interface category <p>Employees' expertise</p> <ul style="list-style-type: none"> - Workshops was provided <p>Cultural readiness</p> <ul style="list-style-type: none"> - Sufficient amount of top management commitment <p>Resistance to change</p> <ul style="list-style-type: none"> - Was not observed <p>Financial resources</p> <ul style="list-style-type: none"> - Were efficiently used to provide a new feature for the webpage 	<ul style="list-style-type: none"> - A successful implementation; - No issues were observed; - Company performed sufficient preparations in terms both: ensuring that the ICT infrastructure matches to the requirements as well as offering sufficient guidance to the employees involved into the project.

<p>Company D (cosmetic / food supplement producer)</p> <p>Service offering: a new ERP system as well as a new mobile application</p>	<p>ICT Infrastructure</p> <ul style="list-style-type: none"> - Dash boarding - GPS technologies - Consumption monitoring - Mobile platforms - Predictive analytics <p>Customer/supplier interface capabilities</p> <ul style="list-style-type: none"> - Translation interface category <p>Employees' expertise</p> <ul style="list-style-type: none"> - Workshops was provided <p>Cultural readiness</p> <ul style="list-style-type: none"> - Not sufficient amount of top management commitment <p>Resistance to change</p> <ul style="list-style-type: none"> - Was observed <p>Financial resources</p> <ul style="list-style-type: none"> - Still in budget for the development 	<ul style="list-style-type: none"> - Employees are overwhelmed with extra tasks that they are forced to implement. Due to the fact that many employees quit, who were part of the project for the new ERP system implementation.
--	--	---