

CHARACTERIZING AND COMPARING SERVICE INNOVATION IN MANUFACTURING FIRMS AND SERVICE ORGANIZATIONS

Oskar REXFELT, Lars ALMEFELT, Johan Lars MALMQVIST
Chalmers University of Technology, Sweden

ABSTRACT

One of the major trends within manufacturing industries is initiatives to expand service and aftermarket businesses. Goods and services are integrated in total solutions, and the customers pay for delivered functions rather than hardware. However, many traditional manufacturing firms have found it difficult to make decisions about what service to develop and launch. Challenges include assessing the quality of the service, customer value, and personnel and equipment requirements. Service organizations have more experience in assessing such qualities and it may be possible to transfer their approaches to manufacturing firms. This study compares processes and methods for service innovation at a manufacturing firm with those at three service organizations. Similarities and differences are identified. A framework is then constructed that proposes a basic typology of service innovations. The framework enables a firm to analyze its service innovation situation and proposes suitable methods dependent on the characteristics. The framework is applied to the situation of the studied manufacturing firm and strategic pathways for this firm are discussed.

Keywords: product-service systems, service design, innovation

Contact:

Prof. Dr. Ing. Johan Lars Malmqvist
Chalmers University of Technology
Product and Production Development
Gothenburg
SE-41296
Sweden
johan.malmqvist@chalmers.se

1 INTRODUCTION

One of the major trends within manufacturing industries is initiatives to expand service and aftermarket businesses (Windahl & Lakemond, 2007). Goods and services are integrated in total solutions, and the customers pay for delivered functions rather than hardware. The area is sometimes referred to as “Product-Service Systems” (PSS). Two major drivers underlie this trend. One is that a combination of goods and services can provide better opportunities for meeting customer needs, as compared to goods only. Another is that this kind of solutions has a strong potential for developing more environmentally sustainable solutions (Tukker & Tischner, 2006): Since the payment for a PSS solution is coupled to the delivery of a function, it is in the interest of the selling companies to produce the function with minimal resource consumption. Services can also enable “co-consumption”, i.e. that several customers can use the same item and thus increase its degree of use. However, there is no consensus in industry or academia on how to successfully develop services. The service area is perceived as unexplored by research (Spat & Fähnrich, 2008) and there are still different perceptions of what a service is (Tang & Zhou, 2009). (In the following, we will use the term “service” to refer to both pure service and to product-service system, reflecting that that some of the companies in the study deliver pure services.)

Service expansion requires new innovation strategies and structures in the firm, along with practical development methods for guiding new service ideas through the innovation system of the company. However, the development of services is characterized by certain challenges, which are not present when developing goods, e.g.:

- The (partially) immaterial nature of services makes them difficult to describe and understand, both for customers and developers (Alonso-Rasgado *et al.*, 2004).
- The (partially) immaterial and heterogeneous nature of a service makes it difficult to predict the value of the service for the customer (Moritz, 2005).
- It is difficult to successfully involve customers in the service development process (Matting *et al.*, 2004).

Earlier research (cf. Bettencourt, 2010) has further identified information that is essential for service development decision-making, including descriptions of:

- The service task, including a problem analysis.
- Current customer satisfaction.
- Customer needs, including ratings of their importance.
- Areas with significant gaps between current and desired customer satisfaction state.
- Service concepts, positioned with respect to customer needs and potential.
- Profitability analyses.
- Development needs for refining a service concept into an operational service.
- Resources needed to deliver the service.
- Assessments of the service from all stakeholders.
- Plans for how to realize the service.
- The connections between the service and the firm’s strategy and business.

We have in an earlier project (MASIT – Methods for Innovative Service Creation (Almefelt *et al.*, 2009; Rexfelt *et al.*, 2011) developed a toolbox for service development that aimed to address these issues. The MASIT methodology proved effective for generating innovative service concepts, but it was also found that decision-making was a challenge. Thus we concluded that it is difficult to gain acceptance for new service ideas, especially in firms which have traditionally manufactured hardware. In this study, we investigate what manufacturing firms can learn from how service organizations conduct service development, in particular concerning what processes, decision-making procedure and assessment criteria that are applied. The aim is to identify and characterize typical service innovation situations and to recommend suitable approaches for these situations. Specifically, we aim to address the following research questions:

1. What processes are applied for service innovation in manufacturing firms and service organizations, respectively? What are the similarities and differences?
2. What service innovation challenges do manufacturing firms and service organizations identify?
3. What assessment criteria are important for predicting the success of a service proposal? Which criteria are the most challenging to estimate? How do they differ in manufacturing and service

businesses?

4. What service innovation sub-categories can be identified and what are suitable approaches for each of them?

The remainder of this paper is structured as follows: We describe our research approach in section 2. Findings are accounted for in section 3, followed by a presentation of a proposed framework for service innovation characterization and discussion (sections 4 and 5). A list of conclusions wraps up the paper (section 6).

2 RESEARCH APPROACH

The research design was a comparative analysis of approaches for service development in a large manufacturing firm (“Truck manufacturer”) and three service organizations (“Hospital”, “Public transport” and “Amusement park”), all in Sweden. The truck manufacturer has its background in hardware manufacturing and sales but aims to radically increase the fraction of its revenue that comes from services. The service organizations represent different businesses and have different business models and were therefore assumed to collectively feature a rich repertoire of service development and delivery approaches enabling a fruitful comparison.

The research was conducted using a qualitative approach, suitable for the explorative aims of the paper. The data was mainly collected through interviews. Eight semi-structured interviews with nine representatives for four companies were performed. The companies and the interviewee roles are indicated in Figure 1. The interview duration was typically 90 minutes. The interview guide included two main parts. The first part comprised about 25 relatively open-ended questions on attitudes to service and their companies’ practices for service development. The second part comprised 14 quantitative questions where the respondents were asked to rate 14 different factors that need assessment during service development. The selection of factors was based on Bettencourt’s (2010) list. The factors, such as “effects for the customer”, “volume of sales” etc were to be judged both regarding the level of accuracy needed when assessing them and how easy/difficult they are to assess. The analysis of the interview data was complemented by review of selected corporate documents describing service development processes and methods for assessing service quality (e.g. customer surveys).

The data analysis and synthesis included coding of responses with respect to the overall research questions and construction of a framework for categorization of the service innovation characteristics of the studied organizations.

3 FINDINGS

The findings presented in this section aim at increasing understanding about current industrial practices for service development and associated decision-making. A specific aim is to better understand what manufacturing firms can learn from service organizations and their approaches for service development. The structure for presenting the findings basically reflects research questions 1-3 that were presented earlier.

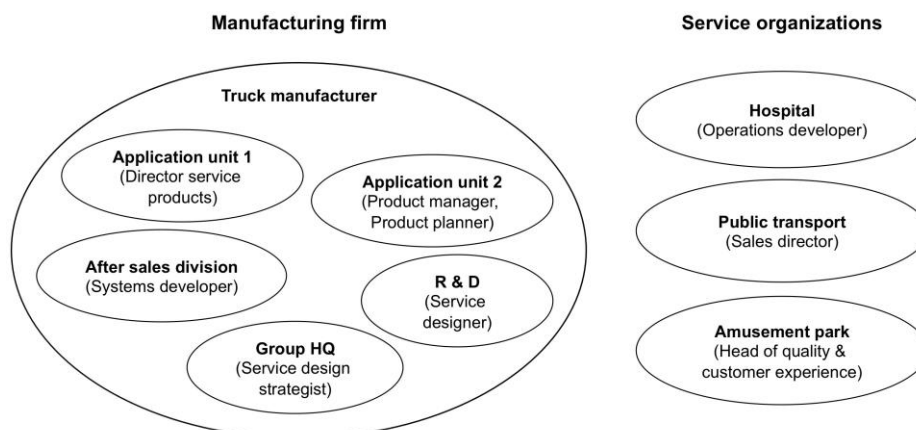


Figure 1. Studied organizations and interviewee roles.

3.1 Processes for service development

First let us consider descriptions of processes for service development in the studied organizations, while specifically considering initiation, description and anchoring of service ideas. The focus here is on the early phases of service innovation. Furthermore, an objective is to point out similarities and differences among the different types of organizations in respect of service development (Table 1).

Truck manufacturer

For hardware, the truck manufacturer has a formalized product development process in place, and it is well rooted in daily business. In addition, in line with the strategy to increase the service business, the company has recently developed a process framework for service development. However, this process is not yet fully implemented. In the company, there are many possible channels to *initiate* new services or service improvements. Thus, new services may emerge from customer needs, competitors' solutions, technologies from other companies within the group that the truck manufacturer belongs to, internal product development, and feedback from the after sales organization. In short, new services are initiated by both market pull and technology push, and may be both copied or novel. In many cases, the services have existed for a long time, and are subject to evolution rather than revolution. In line with the diverse channels for initiation, the means for *describing* new service ideas also vary. Thus, a flora of representations ranging from text documents to storyboards is used (see Table 1). New service ideas are *anchored* in strategic decision meetings, which are held on regular basis and specifically dedicated to evaluate product proposals and make decisions. However, convincing arguments are necessary to legitimate new ideas:

“To bring about a development project, one has to provide evidence of profitability, usually in the form of a business case.”

Hospital

The hospital and associated administration has a thorough and formalized approach for decision-making involving many stakeholders such as hospital management and political councils. Typically, decisions concern the balancing of resources versus healthcare demand. However, when it comes to processes for actual service development, the hospital is less well supported. Rather, when occurring, novel services emerge from knowledge development within a particular medical discipline. In addition, services and above all new approaches for service delivery may result from optimization of patient flows (value chains), which is done on regular basis. In line with this, services may be represented using flow diagrams and analyses. Moreover, when it comes to anchoring of new services, opinions and values of the political councils are crucial.

Public transport

Development work within the organization for public transport is primarily incremental, and focus is set on increasing the efficiency of existing system solutions and infrastructure. The development work is essentially done through single projects. Large projects are managed by steering committees with many stakeholders, while smaller ones are less formalized and locally managed. The attitude can be characterized as reactive, and new services are typically initiated as a reaction on defects and incidents. Incidents and solution proposals are usually represented using a textual document.

Amusement park

The amusement park combines general project methods with engagement of external entrepreneurs and suppliers. The interviewee characterizes the development process as “semi-systematic” – which is justified by the following statement:

“With too little structure, individuals can dominate, but too much structure can kill creativity.”

New services are above all driven by expectations on new spectacular amusements, but may also be initiated as a result of feedback from customers. In addition, services may be introduced in order to optimize the usefulness and perception of the amusement park in full. During their development, services (amusements including their context) are typically represented using flow descriptions. New services are anchored in a steering committee, and associated work is supported by a target plan.

Inter-organizational comparison

As seen in Table 1, the truck manufacturer has a formalized process approach for service development, and there is a multitude of channels for initiation of services. In the more general sense,

Table 1. Comparison of the service development processes of the studied organizations.

	Truck manufacturer	Hospital	Public transport	Amusement park
Development approach	Formalized process, (Incremental) innovation	Unclear process, Optimization	Unclear process, Optimization	Semi-systematic process, Customer focus
Initiation	Many channels: Technology push, Market pull, Copied solutions, Novel solutions	Analysis of own patient flows, Leaps forward in single medical disciplines	Reaction on defects and incidents within the existing system	Consideration of expectations on novelty, Feedback from customers
Description	Text, PowerPoint, Target plans, Requirements, Use cases, Storyboards, User interfaces, Flow diagrams, Business models	Flow diagrams, Statistics	Text, Statistics	Target plans, Storyboards
Anchoring	Strategic decision meetings in the company's internal committees	Formalized and complex, e.g. including political councils	Varying approach, Steering committees in larger projects	Strategic decision meeting, e.g. in steering committees

it can be stated that the truck manufacturer is a company that consciously deals with product development. Accordingly, there are processes, resources, and an organization in place to deal with product development. Therefore, it is also natural that there are resources available to develop and describe product ideas in different ways, as reflected in the table. In direct comparison, the hospital and the public transport company have weak processes and resources for development work in general. Nevertheless, they continuously mass-produce and deliver services. Therefore, they are also able to describe services using rich statistical data. The amusement park, finally, certainly has an innovation-oriented mindset, however not the implementation resources of the large company.

3.2 Challenges for service development

As stated in the introduction, earlier research has identified certain challenges associated with the development of services. For example, the immaterial nature of services makes them difficult to describe and understand (Alonso-Rasgado et al., 2004), and the customer value of the services may be difficult to predict (Moritz, 2005). This section will report on challenges in service development according to the views of the interviewees.

Truck manufacturer

The truck manufacturer has a strong heritage of developing and manufacturing “goods” rather than services. Consequently, culture, organization, and competence are oriented towards goods. Indeed, this fact constitutes an inherent challenge when it comes to service innovation. To start with, it is challenging to get people to *think* “service” instead of “hardware”. Moreover, it is challenging to get people to imagine other services than the traditional ones (such as regular maintenance of the vehicle). In other words, if the truck manufacturer aims at increasing their service business, there is a need to “think outside the box” when it comes to service types. In connection to this, there is a need to increase the understanding about the end customers. One of the interview respondents summarizes these phenomena by stating:

“Scouting is necessary in order to identify new areas to invest in.”

Another challenge within the truck manufacturer is to gain *acceptance* for novel services already proposed. There is a tendency to invest in services that are assessed easy to implement, rather than the ones with the largest potential. Thus, the existing culture constitutes a passive opposition against

implementing innovative services (services that do not exist anywhere else). An adjacent, sociocultural phenomenon is a passive opposition against decision-making and taking risks in particular. Consider the following quotation:

“I have seen these reactions so many times when an idea is being presented:

- You have to look more into this...

- Analyze this...

- Analyze this...

...

Finally one has a perfect business case on the table. However, since one can never be 100 % sure about the course of events, one does not say “yes”. Nobody dares saying “yes”. On the other hand, nobody says “no” either.”

In short, regarding the truck manufacturer challenges in service development include; to understand the nature of services, to create innovative services, and to dare taking risks.

Hospital

As stated by the interviewee, the hospital’s current service production and delivery very much reflect the perspective of resource efficiency. Thus, to a great extent, the healthcare services and the practice for their delivery reflect the hospital’s internal structure, available resources, and operations. Nevertheless, the interviewee aspires for a shift from resource efficiency towards flow efficiency, reflecting the customer’s (patient’s) process. Another notion, though also a challenge, is to better distinguish between actual needs and demands, and optimize the process for the actual needs. Last but not least, there is a challenging paradox deeply rooted in the hospital’s culture, and this paradox probably impedes innovation at system level:

“The healthcare culture makes it difficult to identify system problems. The dedication of the employed individuals compensates for possible system problems... The customers receive good healthcare anyway.”

Public transport

Similarly to the truck manufacturer, a cultural challenge within the public transport company is a passive opposition against decision-making and taking risks. The respondent also highlights the fact that the culture is reactive, and appeals for a much more proactive approach:

“... Stop collecting information. Take action and make decisions! Here a cultural change is necessary. It is comfortable to say that there are large risks. But, those who dare try and who dare fail: Those are the real heroes!”

Moreover, a challenge specific for the public transport company refers to the rules for public procurement. Associated contracts make the operational situation static (during the contract’s validity), while what is perceived as service quality may change over time.

Amusement park

The amusement park was established in 1923 and is both a symbol and tourist attraction for the town where it is situated. At the same time, the visitors expect up-to-date amusements and yearly news. Consequently, an ever present challenge is to combine renewal with preservation. Another practical challenge is to manage the short lead times in projects for building new amusements.

Inter-organizational comparison

A general conclusion is that the challenges vary among the different organizations studied. Nevertheless, there are also challenges that the organizations have in common: In line with views in literature many of the respondents point out that it is more difficult to define quality of services in comparison to quality of hardware. In addition, to assure quality of services is also perceived to be a challenge since every service delivery in practice is unique, due to contextual factors such as individuals present, situation, and point of time.

3.3 Assessment of service proposals

In the interviews, the respondents were asked to identify the most important new service assessment criteria as applied by their organizations. The results are summarized in Table 2. Unsurprisingly, customer needs/utility/experience is important for all but other assessment criteria are somewhat

Table 2. Important assessment criteria.

Truck manufacturer	Hospital	Public transport	Amusement park
Customer desirability Technological feasibility Organizational feasibility Business viability	Customer (medical) needs Historic referral flow Future referral flow Healthcare queues	Customer utility Cost Environmental effects Safety & security Political aspects Risk	Customer experience Organizational feasibility Cost Environmental effects Undesired side effects

Table 3. Assessment difficulty.

Scale 1-10 (1 = very easy to assess accurately, 10 = very difficult to assess accurately)

Assessment criteria	Truck manufacturer (average)	Service organizations (average)
Service quality & reliability	7	5.3
Sales volume	7	5.3
Customer utility	6.8	7.3
Operational costs	6.4	4.3
Personnel needs	6.4	4
Profitability	6.2	6.7
Price	6	5.5
Equipment needs	6	3
Environmental effects	5.8	5.3
Human safety	5.8	6
Time to market	5.4	5.5
Novelty/unique selling point	5.2	6.3
Brand value effect	5	7

differing depending on company and business. For example, the public debate on healthcare in Sweden is strongly focused on the queues/waiting time for various treatments.

The respondents were further asked to rate a set of generic assessment criteria with regards to their difficulty to provide an accurate estimate of their values during the development process. These results are summarized in Table 3. In the table, the responses from all service organizations have been grouped in order to provide a comparison between the manufacturing and service industries. We notice that some assessment criteria were found to be both important and difficult to assess for both the manufacturing firm and the services organizations, including customer value and profitability. However, some assessment criteria were perceived as significantly more difficult to assess by the manufacturing firm, including service quality and reliability, operating costs, personnel and infrastructure needs. Particularly the manufacturing company found cost estimation difficult, at least regarding services for which they had no prior experience. This is not surprising, as cost estimation generally is easier if there are well-documented reference cases. However, decision makers may still expect service cost estimation accuracy to be comparable to physical products. The service organizations used their experience of service delivery to more accurately assess these criteria.

4 PROPOSAL FOR FRAMEWORK FOR CHARACTERIZING SERVICE INNOVATION

During the analysis of the interviews in this study, a framework for characterizing service innovation was developed. It characterizes service innovation based on two factors: *Magnitude of innovation* and *Novelty of innovation* (Figure 2). Magnitude is divided in three levels: Improve a service, create a service and enter a service segment, while novelty describes whether the innovation currently is on the market or not. In turn, the levels of magnitude and novelty generate six categories of service innovation, as seen in the blue fields in Figure 2.

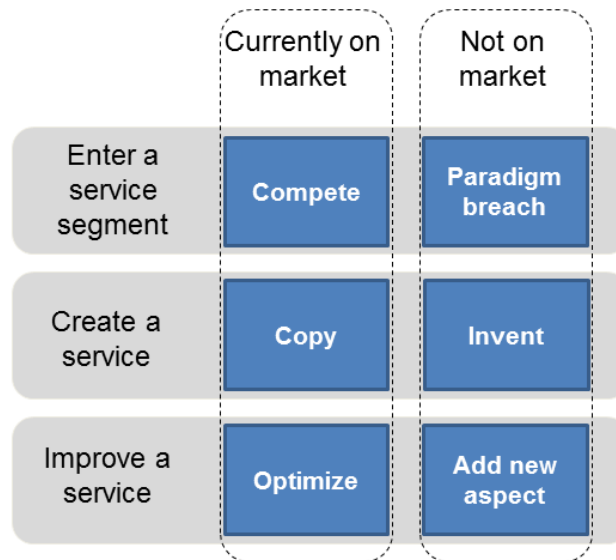


Figure 2. Framework for characterization of service innovation.

This framework can be used for a variety of purposes, such as:

- Explain, discuss and communicate categories of service innovation.
- Support for formulating service innovation strategies within a firm.
- Support for choosing methods for service innovation within a firm.
- Support for decision-making during service development within a firm.

In Figure 3, the framework has been complemented with arrows illustrating the preconditions that the different service innovation categories convey. Although the arrows are generalizations, the framework can now be used to describe the situations of the organizations in this study.

The manufacturing firm is looking to significantly expand their service portfolio. According to the interviews, they struggle to move towards more radical service innovation (up and right in Figure 3). They see the potential profit of doing so, but are often hindered by the risks this conveys. The difficulty to predict the success of a more radical service innovation, and the cost to implement it, causes precaution in the firm’s decision-making process.

The three service organizations in this study are generally developing service innovation in the “currently on market”-column. Predominantly, the amusement park, the hospital and the public transport organization are all *optimizing* their current services. The amusement park differs a bit from the other two however, in that they have a clear need to continuously come up with new and exciting amusements to please their customers. These amusements are sometimes copied from other amusement parks, but sometimes they are new on the market and co-developed with contractors.

In relation to assessment criteria for predicting service success, there is a noteworthy difference between the manufacturing firm and the three service organizations. As the manufacturing firm is looking to expand their service portfolio, they are often developing services that they have not offered before. That is rarely the case among the three service organizations, as they are generally already offering services similar to those that they develop. As an example, if the public transport organization introduces a new bus line, they already have a number of other bus lines as a point of departure for idea generation and predictions regarding the new line. Basically, the service organizations are in the same situation when developing services, as the manufacturing firm is when it is developing physical products. When the manufacturing firm is developing a new truck, its performance can be compared to the performance of older models, significantly reducing the efforts to predict its success.

5 DISCUSSION

The manufacturing firm is struggling to move towards more radical service innovation. This study indicates that two important factors for this are willingness to take risks and being customer-centered. The lack of willingness to take risks is a challenge that the interviewed organizations more or less have in common. This means that the manufacturing firm needs to find good examples elsewhere, and not in organizations dealing with optimization of mass-delivered services. Most likely, the manufacturing

firm has more to learn from *innovative* organizations in general, rather than *service* organizations in general.

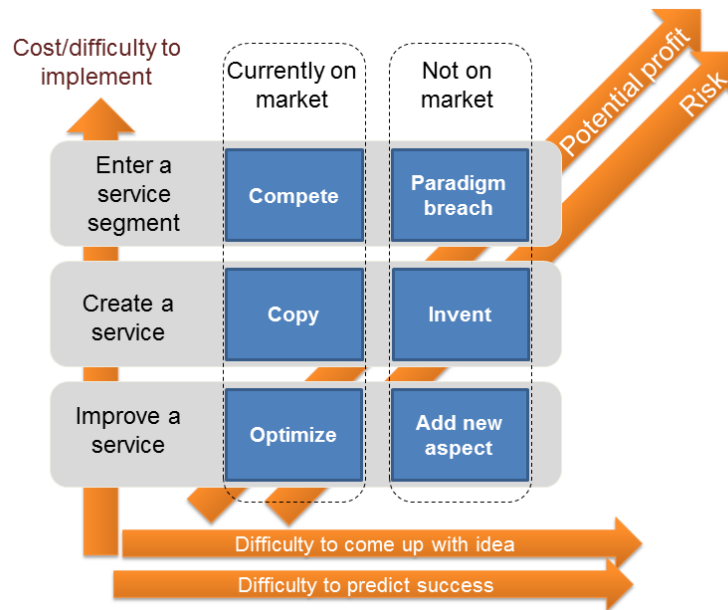


Figure 3. Framework for characterization of service innovation, including general preconditions for the categories.

The proposed framework for categorization of service innovation may also be of support, by helping choose suitable methods for predicting service success, as radical innovations need a different approach than do incremental ones. In turn, an improvement in predictions will reduce the need for risky decisions. Furthermore, by relating to the proposed framework, these decision-making processes could be made more transparent to the decision-makers, making them aware of challenges, potential profits and risks.

Moreover, to achieve a customer-centred service development process it is not enough to simply state “that the customer is important”. Factors that need to be in place to successfully reach a good understanding of the customer include competence and mindset. Regarding *competence* in customer-centred activities, the manufacturing firm is actually not behind the service organizations. The amusement park constitutes a possible exception since their methods for evaluating the visitors’ overall experiences are well developed and executed. *Mindset*, i.e. the willingness among all employees (including the management) to understand and help the customer, is extremely strong within the hospital. Here the manufacturing firm has potential to take influence. For example, very few employees within the hospital would set their personal prestige above the needs of their customers (the patients). This is however not self-evident within a large industrial company, where internal politics may be in the foreground, making the employees focus on their careers.

6 CONCLUSIONS

The studied service organizations are typically skilled in optimizing and adapting their existing services, but there is also an evident potential to improve their formal service development processes and methods. The manufacturing firm has a more elaborated process, including a richer set of methods for decision support and appropriate decision fora. Nevertheless, they found it difficult to advance truly innovative services (defined as a service that does not exist anywhere else) through the process. An adjacent challenge for the manufacturing firm is that implementation of innovative services requires a willingness to take risks.

For appropriate support for different types of service innovation, the service development process at the manufacturing firm should be structured on different levels depending on the novelty of the intended service. For improved or marginally new services, the simpler development models of the service organizations might be adapted. For more radical services, the manufacturing firm might have more to learn from innovative manufacturing firms rather than service organizations when designing the development process. The main distinction is not between hardware and service development but

rather between incremental and radical innovation. Customer focus, radical technology development and a willingness to take risks need to be promoted more strongly.

There was a considerable variety in what challenges the companies identified. The manufacturing firm and the public transport company identified some common challenges, e.g. the assessment of service quality and overcoming a risk-averse decision process. The main challenge experienced by the hospital was the ability to differ customer needs from demands, and the amusement park faced requirements on short building times.

Regarding assessment criteria for services under development, both the manufacturing firm and the services organizations experienced difficulties. Some criteria, such as customer value and profitability, were challenging to assess for all firms. Others were perceived as significantly more difficult to assess by the manufacturing firm, including service quality and reliability, operating costs, personnel and infrastructure needs. Moreover, there were discrepancies regarding both with what precision the criteria (such as "Time-to-market" and "Environmental effects") need to be estimated, as well as how difficult these criteria are to prognosticate. Overall the results indicate a lack of established, easy to use methods for predicting service success.

During the course of this study, a framework for characterizing service innovation has been elaborated. Here, service innovation categories include service improvement, new service creation and new market establishment; all requiring different approaches to the development process. The presented framework aims at supporting the characterization of and identification of suitable approaches for the service innovation task at hand. However, the framework needs further refinement and validation. Currently, the framework is being complemented by aligning existing development methods with the service innovation categories.

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