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Smart Services in Manufacturing Companies

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Abstract

The increasing digitisation of products and processes is triggering far-reaching changes in business models and the associated organisational systems, networks, consumption patterns and ways of working. This paves the way for a new type of highly IT-based services, the so-called "smart services", which will offer various new possibilities for manufacturing industries. Due to their high complexity, systematic approaches their development are required and some first promising research can be found in the area of service engineering, in particular the activities that deal with the development of product-service systems.

Keywords: New Service Development;Service Engineering; Servitization; Smart Services.

1. Introduction

In contrast to the product-based business, services were for a long time not particularly in the focus of manufacturing companies, much more this was considered to be subordinate and of little importance [1]. However this way of thinking in the companies changed within the last decade. Since services were also in demand during business-critical years by the customers at a constantly high level (e.g. in the scope of spare parts services, maintenance and repair), the constantly generated service turnover stabilised the companies [2].

With an increasing focus on the service business, the question of new, customer-oriented services gains in importance. Moreover, information and communication technology has become an integral part of manufacturing industries. In particular, the increasing digitisation of products and processes is triggering far-reaching changes in business models and the associated organisational systems, networks, consumption patterns and ways of working. This paves the way for a new type of highly IT-based services, the so-called "smart services" [3][4] like advanced status and diagnostics applications, new control and automation solutions as well as profiling and behaviour tracking. They are making use of the growing volume of data that is being captured every day and they are combined in innovative ways in order to create on-demand, personalized solutions for customers. Moreover, product performance and customer behaviours will get visible as never before.

Interesting options are opened up by the integration of the internet – whereas nowadays this undoubtedly plays a large role for vast parts of the economy, for a long time it was scarcely important for the service business in manufacturing industries [5]. Especially for internationally active companies, the internet however offers interesting options to deliver comprehensive services at distant locations or to at least support this.

Smart services will offer various new possibilities for manufacturing industries. But how can companies create this type of services? How to handle a joint development of products, software and services? Due to its high complexity, systematic approaches are required and some first promising research can be found in the area of service engineering [6], in particular the activities that deal with the development of product-service systems. But there are still a lot of technical challenges (e.g. connecting devices), methodological challenges (e.g. highly integrated development processes) and organisational challenges (e.g. efficient forms of cooperation and collaboration) that should be addressed by research.

2. Empirical findings

Due to the increasing importance of the service business, the questions arises in manufacturing companies what kind of new services can be successfully offered to customers and which role the

internet could play. In order to pursue the question of which influence information and communication technology currently really has on the services in the production of machines and equipment, the following selected results of a company survey on this topic will be introduced. The survey was aimed both at smaller and medium sized companies as well as large companies. The management as well as the service departments were primarily addressed by the study. In all, 87 German companies participated.

The results of the examination show that the majority of the German manufacturing companies already have experience with internet-based services in their own company. Thus 86 percent of the questioned companies stated that they have already introduced internet-based services or want to realise an introduction within the next three years. It is also interesting to find out which specific services for the production of machines and equipment can be found with the support of the internet. Figure 1 shows which internet-based services have already been realised by the questioned companies or are planned for the next three years.

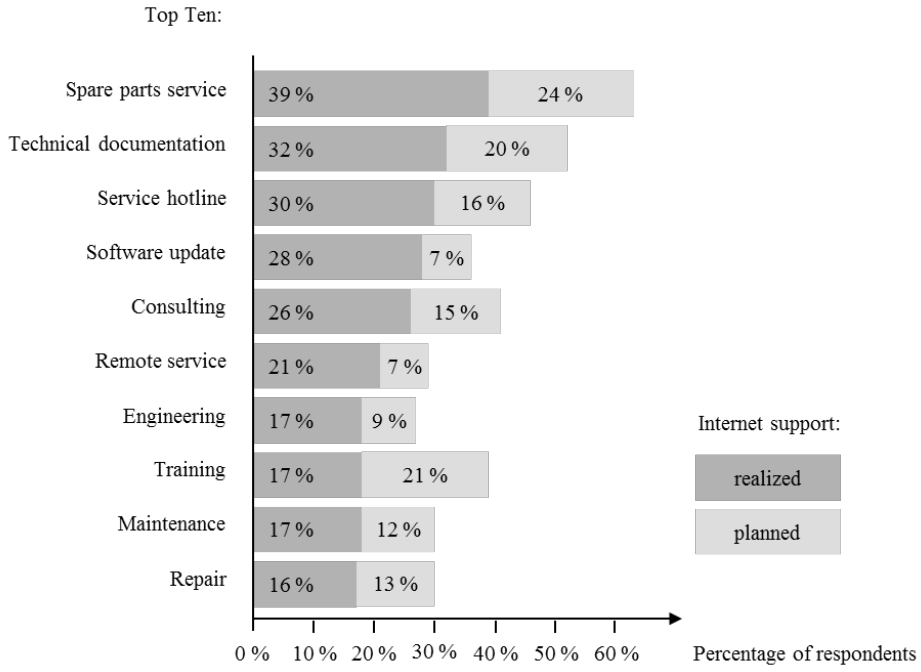

Fig. 1. Available and planned services with internet support

Above all, commonly offered services like the spare parts service or technical documentation increasingly supported through the internet. Additionally, services which are technology or IT supported anyway, like for example service hotlines, software updates or remote services, are already offered at many companies in an internet-based manner. From figure 1, it can be seen from services planned for the next three years that a high growth dynamic is to be expected in view of the development and introduction of internet-based services in the questioned companies.

A further question of the survey is concerned with the motivation of the company to invest in internet-based services. Figure 2 summarises the answers of the questioned companies.

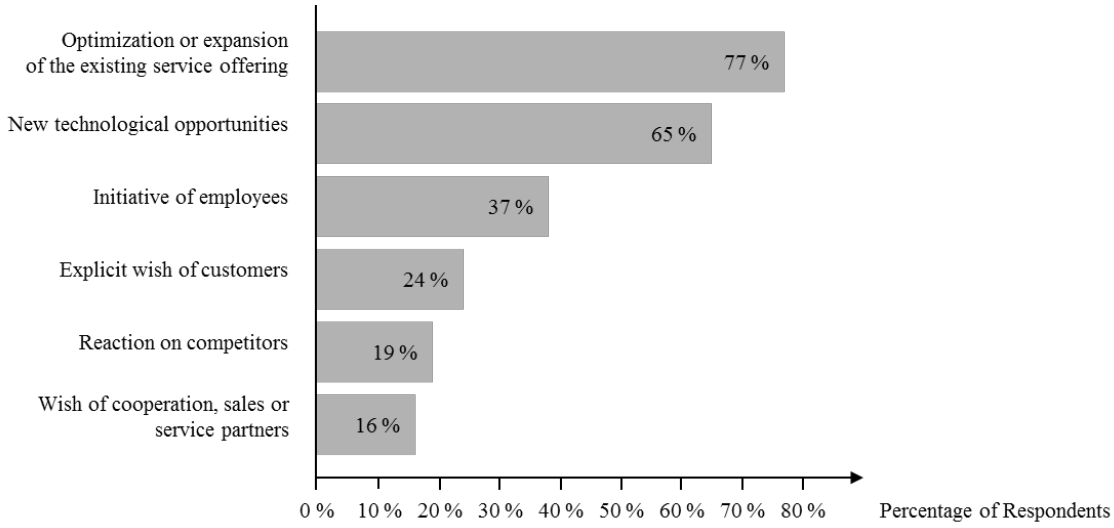

Fig. 2. Motivations for offering internet-based services

It has been shown that the questioned companies are introducing internet-based services, above all for the conscious supplementing or optimising of the existing service portfolio and for the exhaustion of new technological possibilities. The introduction of internet-based services, on the special wishes of the customers, by the service and sales partners or as a reaction to a comparable competitive offering, is of low importance in the comparison of this. Thus it can be determined that internet-based services are introduced above all due to conscious, internal efforts of the company and not so much as a reaction to outside influences.

The results of the survey make it clear that a large number of manufacturing companies already has collected first experience with the development and introduction of internet-based services resp. smart services. Astonishing in this context is that only a small share of the companies has formulated a binding strategy for their service business. Therefore merely 25 percent of the questioned companies stated that they have an explicit strategy for internet-based services resp. smart services, with smaller and medium sized companies this share is even clearly lower (17 percent). It appears as though many companies are lacking a superstructure which prescribes the strategic direction of impact of the services.

On the other hand, the objectives for the offering of smart services are much more clear for manufacturing companies. Here in the survey above all customer oriented goals are named, thus the customer's benefit and also the customer loyalty are increased through smart services. The goals, which are rather aimed at the internal company areas (e.g. lowering of costs, optimisation of processes) are in contrast of little importance.

3. Challenges

Companies which are concerned with the development and introduction of smart services are confronted with a number of challenges since both strategic as well as organisational and information-technical aspects are to be taken into consideration. This additionally means that for solving problems mostly also differing addressors must be included in the development and introduction of the services, beginning with the service department, through the IT department, sales and marketing, from the company development through management – the interests and intents of many stakeholders are correspondingly to be taken into consideration.

For the development – and later operation – of smart services this means that interdisciplinary teams make sense, above all consisting of representatives from service and IT as well as if necessary further company functions. Additionally, attention must be paid to ensure that the new services are compatible with the company's basic IT architecture and the existing organisation of the company. Moreover, the affected employees must be trained in order to have sufficient basic skills when dealing with the internet.

Often the successful development of smart services is opposed by the inexperience of the company in general or at least the inexperience of the participating employees. It is therefore a great challenge to carry out the "correct" activities in an efficient manner. For this purpose, the use of structured development processes and methods is recommended, as they for example are known from the product and software development.

A further challenge pertains to the determination of customer demands. In order to ensure that smart services are not developed past the needs and expectations of the customers, it is of great importance to ensure early that corresponding customer demands are collected or – in so far as possible – customers are at least integrated partially in the development of smart services.

As a possibility of taking into consideration the presented challenges in a suitable manner, the following framework for the development of smart services will be introduced. It has been created in the T-REX project funded by the European Union.

4. Development of smart services

The development of smart services poses has some requirements on companies. They must take into consideration both technical tasks (e.g. connection to the internet) as well as organisational and personnel aspects (e.g. design of the service processes and training of service employees). This results in a complexity which is very often underestimated by the company [7]. In order to efficiently and successfully carry out the development work, it is useful to follow a clearly structured process from the beginning on. In doing so, we also speak about so-called reference models, that is a defined determination of development tasks and their sequence.

In principle, through a clear structuring of the development it should be avoided that the individual working steps are coincidental, that double work has being done and that former errors have been repeated. Furthermore, a defined development process for smart services increases the transparency of the tasks and responsibilities [6]. Figure 3 shows in an exemplary manner of a service development process.

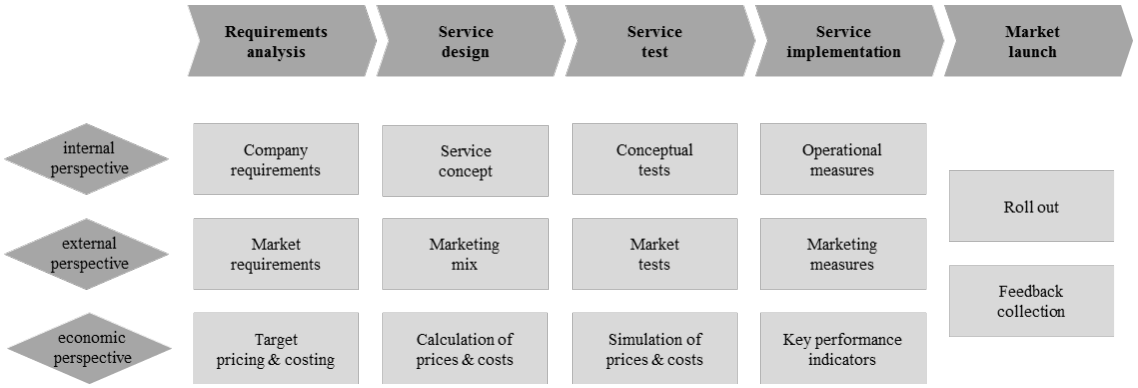

Figure 3: T-REX framework for the development of smart services

The starting point should be a clear business model. Suitable ideas must be collected (e.g. through an available idea management in the company, through idea workshops or through customer inquiries) and then they should undergo a first check to see if a new service offering is also profitable. Important assessment criteria are the fitting of the strategy, feasibility, cost effectiveness, benefit for customers, market potential and marketability. In particular, it is recommended to integrate a strong market and customer perspective in this phase.

After the decision for a new smart service, a *requirement analysis* should be carried out. In doing so, wishes from the customer as well as the affected employees should be included. As suitable methods for example questionnaires, interviews and workshops come are available. The goal is on the one hand to gain a clear image of what the new service should do in detail in order to be successful. On the other hand, it is important to identify critical factors which definitively must be avoided in order to prevent a failure of the service.

In the phase *service design*, the new smart service is described in detail. In the framework described in figure 3, this is mainly part of the "service concept" activity. Here, the results ("output") of the new

service are determined, ideally in the form of binding “service levels”, that is clear service guarantees (e.g. in view of the reachability and availability of the service). A definition of the service process (“throughput”) follows, that is a portrayal of how the new service must elapse so that the desired results can be reached. Subsequently the resources (“input”) are planned, which on the one hand effects the employee capacity for the service and on the other hand the required infrastructure and equipment.

In the phase of the *service test*, the so far developed concept of the new smart service intensively undergoes tests. In principle suitable for this are the worked out service processes and the underlying IT infrastructure. However among other things also acceptance tests are conceivable in which the basic acceptance of the focused target group is checked for the new smart service.

The test phase is followed by the *service implementation*, that is the previously performed conceptional work is implemented in the company. This affects above all the realisation of the IT concept, the implementation of organisational measures (e.g. the regulation of responsibilities, the creation of working instructions) as well as the implementation of personnel measures (e.g. the manning of newly created positions, training of the employees) and marketing measures (e.g. sales material).

After a successful implementation of the new service its *market introduction* follows. This phase mainly consists of the roll out of the service. Additionally, this phase serves to monitor the start up and control the success. If necessary, here also on the basis of customer and employee feedback (e.g. through questionnaires and evaluations of complaints) last adjustment measures are to be carried out. With the conclusion of the market introduction, the development process has ended and the new smart service can be handed over to operations.

So far, there are no software tools for the service development like Computer Aided Design (CAD) and Computer Aided Software Engineering (CASE) for product or software development. At least, some of these tasks can however be perceived by process modelling tools, that is special software for the portrayal of (service) processes. In doing so it becomes possible to model the process with its detailed activities and information flows. In particular, the process becomes transparent for all participants and both organisational as well as IT interfaces can be better recognised and designed.

5. Case study: paperless repair process at Festool

Festool GmbH is located in Esslingen (Germany) and offers tools for wood-working, painting and automotive. Whether sawing, routing, sanding, planing or dust extraction – Festool has the ideal power tool for every wood application. Compatible system accessories for detail solutions increase cost effectiveness, quality and efficiency. Festool also offers a complete range of equipment for painters: coarse, intermediate, fine sanding and polishing - top quality for every application. For automotive, their aim is to accompany car paintshops and vehicle manufacturers on the way to perfect surface quality. Festool offers individually adapted electric and air tools with matching accessories, mobile and stationary dust extraction systems and workplace equipment. For a perfectly functioning system the service for the products must also be excellent. That is why customers can rely on the services and warranty of Festool at any time. Beneficial, quick and uncomplicated – simply with the myFestool Services registration.

The service business has always had high importance for Festool. The customers are offered traditional product related services like repair, spare parts availability and guarantees. On the other hand, through innovative services, like e.g. “test for 30 days”, the “new device with theft” or the application consultation, an added value for the customers is created.

Part of the strategic purposes of Festool is to increase the customer’s uses, to positively and sustainably influence the customer satisfaction and thus to contribute to customer loyalty. A proof that this successfully works out is the high number of customers who remain true to the company permanently. Since Festool is sold through specialised trade, in the sales process there is no contact to the final customers or to the users. In order to develop and intensify this contact, they need suitable communication channels.

In the past years, at Festool the internet has increasingly come into focus for the further development of the service business. An important step was the development of an own customer platform in the internet [8]. For the communication with customers, the brand Festool has internationally 19 customer portals, for example www.festool.de (see figure 4). As a component of the customer portals, with the closed area “myFestool” a platform has been created on which in addition to informative contents successive internet-based services for the customers can be developed. The international paperless repair service was realised as the first of these services (see figure 4).

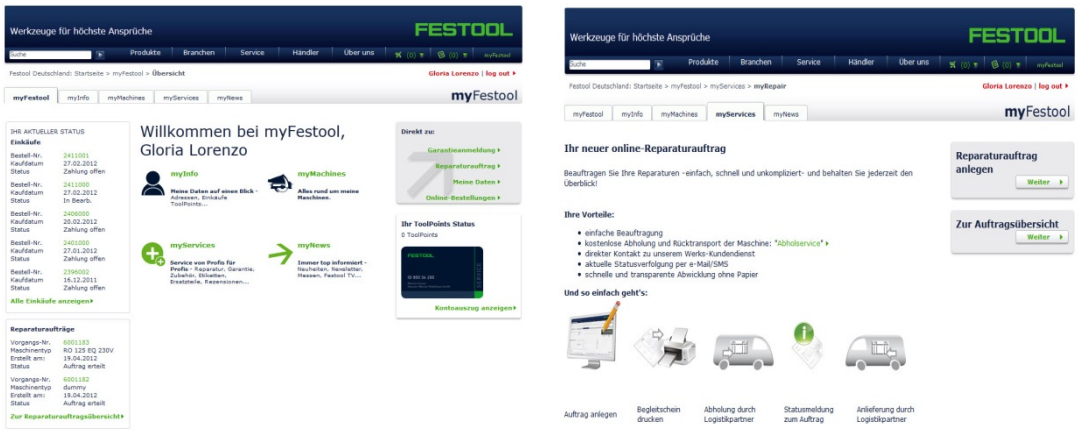

Figure 4: myFestool

myFestool is conceived in such a manner that various smart services can be docked on. Currently customer services like an online guarantee registration, detailed overviews of their own machines, an online shop and continuous services are offered. The services offer a high added value for the customers since the transparency in the process is strongly increased and for the customer it is made possible that they have a consistent overview of all commissioned services. Additionally, all relevant documents on the respective order, like e.g. supply note, cost estimate and bill is made available in a clear manner. The customer portal myFestool has standardised interfaces with the webshop, an SAP system, a CRM system as well as third party systems like e.g. that of logistics companies.

6. Perspectives

Smart services offer companies which produce machines and equipment an interesting possibility to develop their service business. The advantages are being able to connect with almost every point on the earth through the medium of the internet without additional interruptions. Above all, internationally active companies offer additional services to their customers which could not be achieved previously. For example, now small and medium sized companies which do not have the resources for a comprehensive world-wide presence can now deliver services to their customers like online ordering of spare parts, online documentation, online training sessions or internet supported remote services.

The challenges which are to be overcome with the development of smart services may however not be underestimated. A service is then perceived as excellent by the customers if the details add up, and even small irregularities in the service process, in customer communication or in information technology can lead to the displeasure of the customer. As shown, it is recommended that a structured procedure with the development of services should be established in order to secure an efficient, customer oriented process and to avoid possible weak points. Also if this at first glance may appear to be complex, it is an additional expense which pays off in the end.

Acknowledgements

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