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Industrial Services as a Source of Product and Service Innovations - An Approach with Strategic Implications

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Abstract

Industrial companies are increasingly relying on services to stand out from the crowd. Alongside direct strategic and economic advantages, these industrial services can also provide impulses for the further development of material products and services. However, so far it is still unclear which interdependencies exist between the range of services offered and the innovation activities of industrial companies. This article analyzes these causes and effects and then recommends how services should be designed in order to stimulate the desired effects. A literature analysis is conducted and several explorative interviews with industrial enterprises are evaluated to identify the possible interdependencies. A conceptual framework helps to derive examples of recommendations for generic competitive strategies.

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1 Introduction

In the past industrial companies tended to focus strongly on material innovations. However, it has since become widely accepted that a more comprehensive understanding of innovation, one which takes innovations in services into account alongside material product innovations can have far-reaching consequences for boosting competitiveness (see Dreher et al. 2005; Kirner et al. 2009). Services offered in addition to the core product, such as maintenance, repairs, training or engineering services, for example, aim to both bind customers and increase sales (see e.g. Boyt/Harvey 1997, Wise/Baumgartner 1999).

Apart from the strategic and economic significance of services, additional effects can be found in practice such as, for example, additional information feedback from customer contacts due to services (see Lay et al. 2007). Beside these practical experiences, this phenomenon is described in research, too (see e.g. Goffin/New 2001; Hobday et al. 2005). Such feedback can in turn provide incentives to improve or modify material products and services. An information cycle can be created due to the contact between the company's employees and the product and/or customers which can deliver impulses for new ideas in both innovation fields of industrial companies.

This leads to the speculation that offering industrial services can also function as an information channel for the further development of products and services. The aim of this paper is to analyze these observed interdependencies and to investigate the following questions:

- (1) Which influencing factors stimulate or hinder the flow of information between providing services and innovation activities and which service types hold information potentials for improvements?
- (2) How can the impact mechanisms of information flows and information potentials be systematized and described in a conceptual framework?
- (3) How can these impact mechanisms be used to develop strategies by industrial companies who want to increase their innovative performance by means of a range of services?

In order to answer these key questions, this article starts by approaching the problem from two perspectives. On the one hand, the literature on this topic is briefly presented to take into account earlier work which may be able to make a contribution to this issue. On the other hand, several explorative interviews are evaluated which were conducted with representatives of industrial companies from different sectors. Considering both perspectives offers the advantage of being able to corroborate already existing approaches and/or perhaps gain new insights. The information from the literature and the

interviews is then pooled and possible causal relationships are derived between offering industrial services and the innovation activities of industrial companies. Finally, a conceptual framework is constructed which systematizes these impact mechanisms and in this way can offer a better understanding of this interactive innovation process. In addition, examples of different recommendations for actions are developed for three generic competitive strategies.

2 Industrial services as a source of innovation

2.1 State of research

In order to be able to classify the relevance of services as triggers of new products and services based on the literature, a short review is made of existing work in this field. The literature analysis focuses on those papers which deal with the information channel of services or service contacts to customers and assess its relevance as a source of inspiration for innovations.

Several articles have been written over the past few years concerning the identification or evaluation of industrial services as an information channel for triggering product innovations. Hobday et al. (2005), for instance, assume that the expansion of services demanded by customers automatically implies that closer contacts to customers will result. If these services are provided, a broader information basis results for the manufacturer which involves accelerated learning processes due to feedback loops and provides insights into potentials for product development. An information cycle is formed as a result which would be interrupted if external service providers were used (see Hobday et al. 2005).

The authors of another paper also assume that industrial services can make a decisive contribution to product development as a source of information (see Goffin/New 2001). They conducted a literature review in combination with five case studies. However, they state that industrial companies hardly use this channel as a source of inspiration for innovations. A formalized process supporting the flow of information between service workers and product developers is actually very rare. In addition, the majority of industrial companies organize the provision of services and the development of products separately, which halts the flow of information to a large extent.

Saccani et al. (2006) likewise point to the already mentioned information feedback which is created when offering industrial services. Integrated management in companies which specifically tackles the task of further processing this feedback would stimulate both the development of new products and the improvement of existing ones. The

authors further analyzed the role of services in industrial companies. While 57% of all companies primarily view industrial services as a way of distinguishing themselves from competitors and 27% were first and foremost pursuing increased sales, only 16% placed the biggest emphasis on the feedback from services in order to be able to improve products or processes. It can also be concluded from this that industrial companies hardly use the information arising from service contacts or neglect its existing potential.

Furthermore, several authors verified that the experiences garnered from using a product or maintaining or repairing it can be an important source of information for developing or improving products. And yet, in practice, this information was either not collected at all, or not used to develop products (see Markeset/Kumar 2003; Molenaar et al. 2002; Petkova et al. 1999; Thompson 1999). Similarly, Bitrain and Pedrosa (1998) see customer wishes and complaints as a useful source of information which ought to be used as feedback.

Finally, it should be noted that, over the last decade, very few articles have examined industrial services regarding their potential to be a trigger for innovations. The various articles agree that services could be an important source of information for industrial companies in product development. However, the information cycle resulting from this seems to be hardly used in practice or is not being recognized as such. On the one hand, both Goffin and New (2001), and Hobday et al. (2005) point to organizational reasons which interrupt the flow of information. On the other hand, Sacconi et al. 2006 believe this information flow is already being neglected at a strategic level, while yet other authors point to the inadequate implementation and utilization of instruments promoting information in companies (see Markeset/Kumar 2003; Molenaar et al. 2002). The large variety of reasons help to explain the low priority assigned to services as an information channel in practice.

2.2 Results from the explorative interviews

To add a second perspective to the possible contribution of industrial services as a trigger for innovative products or services, nine interviews were evaluated. Table 1 gives an overview of the companies with sector, number of employees, share of sales due to industrial services and the function of the conversational partner in the company. All interviews were conducted with industrial enterprises which are located in Germany.

The interviews evaluated in this paper are part of a bigger interview line including sixteen interviews. Nine interviews were conducted with industrial companies whereas the other seven interviews were held with service companies. The results of these sixteen

interviews were already published by Lay et al. 2009. Because the author of this paper has access to the protocols of all interviews, they were evaluated a second time for this paper but regarding the evaluation from a different point of view. Lay et al. 2009 focused on the differences between service and manufacturing companies. Furthermore, they observed the different organizational structures for developing and providing services. In addition, they analyzed the influences of various organizational structures on the capability to generate product or service innovations (see Lay et al. 2009).

In contrast to this, this paper is focusing on industrial companies only. Moreover, the nine interviews were evaluated in consideration of two major points. The first aim was to find out, if different kinds of industrial services hold different potentials of information for developing new services or products. Second, this evaluation is analyzing the influencing factors, which stimulate or hinder the flow of information between providing services and innovation activities. Summing up, these points comply with the first key question listed in the introduction of this paper. Such a clear problem definition helps to avoid an unmanageable volume of information resulting from an evaluation of interviews (see Eisenhardt 1989).

The interviews were semi-standardized containing an interview guideline which served on the one hand as orientation for the interviewers for covering every aspect but allows regarding individual expertise of the interviewees on the other hand, too (see Perry 1998). The nine interviews were conducted from the end of September 2008 to the middle of October 2008. The function of each conversational partner is shown in Table 1. Each conversation took one to two hours and all interviews were done by telephone or face-to-face. Afterwards the interviews were transferred to protocols, which were sent back later to each interviewee for revision. Concerning this paper, the revised protocols were evaluated by means of a content analysis. This method allows shifting the focus away from written protocols to a systematic structure concerning the research question reducing volume of information and bundling information (see Perry 1998).

Small and medium-sized companies right up to large companies with more than 2,000 employees were included so that effects can be captured between innovation and how the services are organized. Because the companies participating in the interviews are also affiliated to different sectors, it is also possible to discover whether there are differences between individual customer groups (see Lay et al. 2009). Nevertheless, it must be pointed out that nine interviews cannot claim to be exhaustive but can only offer starting points or impulses for further considerations and implications.

| Industry Sector | Staff | Share of Turnover Services | Conversational Partner |
|------------------------------------|-------|----------------------------|---|
| Mechanical engineering | 50 | 20% | Chief executive officer |
| Mechanical engineering | 90 | not specified | Head of a location of the company |
| Mechanical engineering | 110 | 4% | Chief executive officer |
| Mechanical engineering | 290 | 5% | Deputy head of construction and machanics |
| Mechanical engineering | 350 | 5% | Head of service department |
| Plant engineering and construction | 1.000 | not specified | Member of staff of service department |
| Electronic packaging systems | 1.300 | 20% | Head of service department |
| Mechatronics | 2.300 | not specified | Product manager of services |
| Mechanical engineering | 2.300 | 10% | Head of strategy management |

Table 1: Overview of the companies participating in the interviews ordered by the number of employees

The overriding result from the interviews is that all the questioned companies universally corroborated that the contact to customers through services represents an important channel for gathering information and provides impulses for developing new products. This backed up the basic evidence obtained from the literature analysis. In the same way, industrial services are thought to have a remarkably high information potential for improving and adapting services.

It was also clear from the interviews that the quality of information is assessed differently depending on the service. This would mean that not every service offers the same potential. The information potentials vary greatly, especially regarding a differentiation of the impulses for new products and new services. For instance, almost all the companies mentioned that a distinction should be made in this regard between pre-sales services and after-sales services.

High information potential for the further development of products is attributed especially to engineering services, planning, project planning or tests which are offered in the pre-sale phase. For instance, several companies reported that a high flow of information is guaranteed if these product-related services and product development are integrated organizationally. Outsourcing development services would interrupt this flow meaning that valuable impulses for development would be lost. These interview partners emphasized that allocating contracts to a development services provider was therefore not an alternative for their companies.

While some services are obviously being systematically used in the pre-sale phase as a source of information for product innovations, pre-sale services do not seem to be as helpful for developing service innovations. Some participants did indicate that information for new services comes from planning services or engineering services, but that this is not as important for developing services. Only one company mentioned that services are used during the planning phase to gather information for offering new services in the pre-sale phase. It should be noted, however, that providing and developing pre-sales services is handled by the same persons in this company. In contrast to this, other pre-sales services such as financing, project management or personnel qualifications, which are likewise part of the companies' service portfolios, were not mentioned by any of the interviewees as a trigger for either product or service innovations.

After-sales services, on the other hand, seem to have much higher relevance as an information channel for service innovations. The majority of companies reported that after-sales services represent a very important source of information for service innovations due to the direct contact to the customers. Moreover, this channel was almost exclusively the sole source of service innovations for several of the companies interviewed. This was especially the case for those companies which simultaneously used customer services to develop services. The interviewees agreed that a small number of interfaces between customer services and innovation activities bring obvious benefits for using information. One interview partner made it quite clear that assigning an external service partner to carry out the customer service for this company would have the decisive drawback of stopping the flow of information from the customer.

With regard to the possibility of being able to be used as an information channel for product innovations, however, a very diverse picture results for after-sales services. Especially for the services conducted on the product during its use such as maintenance, repairs or retrofits, the majority of companies recognize the importance of this information channel for product improvements. However, because customer services and product development are usually organized separately, there are many interfaces in industrial companies at which information can get lost. The interview partners from seven companies stated they had wanted to improve the flow of information in the past with the help of different measures. Despite this, the attempts to implement a systematic process for passing on information between customer service and product development usually failed. The reasons for this situation were seen mainly in employees' individual objectives not matching the company's objective. In the same way, the qualifications of employees are not geared towards information feedback assignments. Systematic information transfer therefore seems to depend very heavily on the acceptance by workers. Only two of the companies questioned reported that customer records or repair reports were systematically evaluated with regard to potentials for improving the

product. One interview partner explicitly pointed out that his/her own company benefits if rivals manage services and product development separately. This particular company pursued an integrated organization and reported extremely high impulses from its service business for product development. In contrast to this, services which are not performed on the product such as training, hotlines, process or project management were not regarded as an information channel for new products by any of the companies interviewed.

2.3 Similarities and differences between literature and interviews

Comparing the results from literature analyses and interviews reveals similarities but also differences between them. For instance, it was able to be confirmed with the help of the interviews that companies do assign high importance to industrial services as a trigger for developing new products. It also became clear from both the interviews and the presented articles that this channel of information is often well-known but is being only insufficiently used for various reasons (see Markeset/Kumar 2003; Molenaar et al. 2002; Petkova et al. 1999; Thompson 1999).

Similar to the literature analysis, it followed from the interviews that the form of providing the service decisively influences the flow of information. The authors of two of the presented articles were also able to conclude (compare Goffin/New (2001); Hobday et al. (2005)) that the information cycle is interrupted, for example, if services are provided externally.

Alongside these two points which helped to confirm certain speculations, new insights were also gained from the interviews. Two main points should be mentioned here. On the one hand, first insights could be obtained into the connection between services as a source of information and the development of new services in industrial companies. The interviews revealed that services have totally different impacts on developing service innovations than on developing new products. After-sales services seem to possess particularly high information potentials for new services. In contrast to this, pre-sales services seem to play a subordinate role as an information channel for new services.

On the other hand, a differentiation was able to be made with regard to the information quality of individual services and their effects on product or service innovations. Different combinations of service type and organizational structure appear to decisively influence the flow of information as well. This combination seems to augment the complexity of the interdependencies.

3 Systematizing the effects of industrial services on product and service innovations

Both the literature analysis and the evaluation of the interviews showed that, as an information channel for industrial product and service innovations, the provision of industrial services represents a complex construct with the most diverse interdependencies. Despite this, it is possible to identify patterns which allow the impacts between services and the further development of products and services to be systematized.

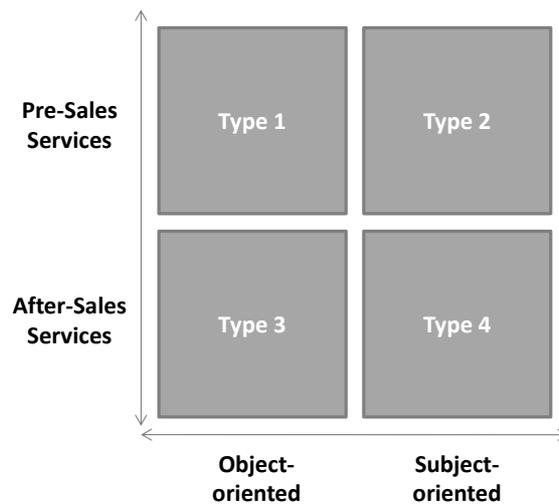


Figure 3-1: Systematization of industrial services with regard to their information qualities and potentials as a channel for product or service innovations

Based on the previous analyses, first of all it can be ascertained that offering services merely provides the potential for innovations and should only be regarded as a source of information. Offering services does not therefore automatically result in higher innovation, but harbors information with the potential to improve products or services. In contrast to this, the further development of products and services is reliant on impulses. For such an impulse which has been sparked by a service contact to the customer to reach product or service development, some form of information transfer has to be ensured. This information flow can occur indirect, transferring the knowledge from person to person (for example via customer records or repair reports), or direct, for instance by collecting knowledge over time due to service offers. To categorize the impacts of services on industrial innovation activities, a distinction is therefore made between the type of service as potential information and direct and indirect information flow for information transfer.

As was emphasized several times in different interviews, services can be divided into pre-sales and after-sales services with regard to their relevance as an information

channel for innovation impulses. It also became clear that information from services pertaining to the product should be evaluated differently to information garnered from talks with customers. On this basis, a four-field matrix can be derived (see Figure 3-1), which classifies industrial services with regard to their quality as an information source for further developing products and services. The y-axis addresses the life cycle of the machine or plant and distinguishes pre-sales from after-sales services (classification following Forschner 1988). The x-axis differentiates services by the external factor. As a consequence, a distinction is made between services on the product (object-related) and customer services (subject-related) (classification according to Haupt 1999).

- Service type 1: Object-oriented pre-sale services already start in the pre-sale phase, refer to the material product and cover, for example, project planning, feasibility studies, technical advice or engineering services. This type of service harbors very high quality information for the development, modification or improvement of the material product. In companies, in which these potentials are already being tapped, providing the services and developing the product is frequently organized by the same group of people. Information transfer occurs direct because individuals accumulate knowledge from their experiences with providing the service and this leads to the development of an idea over time. It is possible that object-oriented pre-sale services can also provide impulses for the further development of services to some extent. However, for this to take place, it seems to be necessary that the provision and development of services are organized together.
- Service type 2: Services such as financing, transport, project management or business consultations belong to the category of subject-oriented pre-sale services. Based on the interviews, however, so far there are no recognizable connections between providing services and impulses for product and service innovations. Accordingly, the information potential of this type of service seems to play a subordinate role.
- Service type 3: Object-oriented after-sale services are conducted during the product's useful life and cover, for example, repairs, maintenance, modernizations and disposal. This service type has the most complex impacts as an information channel for industrial innovations. There seem to be high information potentials for both product and service innovations here. A conspicuous pattern is that integrated organization seems to lead to a high flow of information between provision and development. If services are provided by product developers, this frequently leads to product improvements or adaptations. If, however, these services are provided by an independent service department within the company, this leads to ideas for new or modified services. Companies featuring

this service type in their range of services also often use systems to support indirect information such as customer records or repair reports.

- Service type 4: The subject-oriented after-sale services, such as training and seminars, for example, and hotline or online support are also applied while the machine or plant is being operated. This service type appears to offer only weak information potentials for the development of new products because there is hardly any direct contact to the product. On the contrary, however, the direct contact with customers obviously allows information to be obtained for the further development of services. The use of indirect information transfers via records or reports tends to be neglected by companies with these services. Organizing services to be rendered and developed by the same group of people seems to generate advantages for stimulating the direct flow of information.

The four types of services reflect a first systematization of the existing information potential to serve as a channel of information for the further development of products and services. To systematize the information flow, as mentioned above, it is possible to distinguish between direct (no interface between customer and/or product and employee) and indirect (one or more interfaces between customer and/or product and employee) information transfer:

- Direct information transfer occurs by accumulating the knowledge of individual workers as well as information transfer between company employees. Depending on the organizational structure, a stronger or weaker flow of information is formed between employees. It emerged from both the interviews and literature that outsourcing services substantially restricts the information flow. If, on the other hand, services are conducted by the company's own employees, this stimulates the flow of information. It was also clear from the interviews that integrated forms where services and development are grouped together are associated with higher information flows than if these are organized separately. Companies which used interdisciplinary teams to develop new products or services were also those to most frequently report impulses for innovations from the range of services. By bringing together persons from different company departments, these project teams also affect both fields of innovation at the same time.
- This is contrasted with indirect information transfer to further develop products or services such as repair reports, for example, customer records or regular meetings between the members of a team and the team leader. Seven of the nine companies interviewed stated that they used this kind of information transfer. Despite this, only two of these companies actually reported satisfactory application of these instruments. The other companies point to large acceptance

problems among their own staff. Simply introducing a kind of information system for transferring knowledge from person to person, therefore, does not seem to automatically result in the desired success.

4 Deriving recommendations for action

The question for industrial companies is how to design their service business to obtain the highest possible information feedback. The complexity of the causal relationships shown excludes the possibility of there being any ideal service design for the highest possible information flow which can be generally applied to every industrial company. In fact it is probably much more likely that a variety of different designs exist and that each strategy needs to be individually tailored to a company's specific situation.

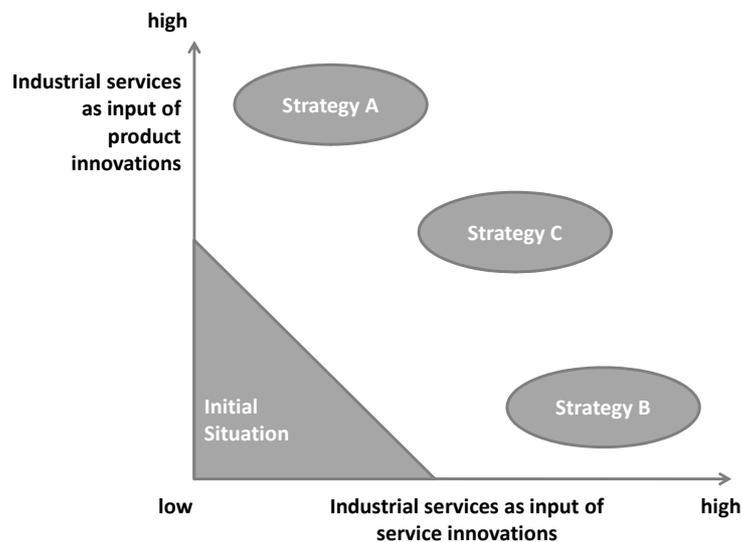


Figure 4-1: Illustration for the development of recommendations to support generic competitive strategies through services offered

Nevertheless, different example recommendations for activities can be deduced to support the competitive strategy of the company as a whole. Industrial companies are often under intense cost pressure and as a result try to pursue strategies which help them to stand out from the competition, for example, by offering a wide range of services or innovative products. Three generic competitive strategies can be derived from this:

- a) Competitive strategy A: Using new products and continuous product improvements to stand out from the competition.

- b) Competitive strategy B: Offering broad and innovative services to try and bind customers long term.
- c) Competitive strategy C: Companies avoid specialization and try to develop both innovative products and new services.

For companies not able to profit from the information flow between customer services and innovation activities, three separate routes can be derived for services based on the identified impact mechanisms and depending on the priority competitive strategy. The coordinates on Figure 4-1 show which flow of information should be stimulated by the services in order to support a specific competitive strategy. The following three recommendations describe how to design services so that the flow of information moves from the initial situation to the desired position on the graph.

- Recommended actions to support competitive strategy A: In order to be able to generate the highest possible amount of information for product improvements, the focus should be on object-oriented services (service types 1 & 3). Other advantages may be generated if the same persons are responsible for pre-sale services and product development (direct information flow). Records and repair reports compiled by customer services can also be delivered to product developers to ensure they learn systematically from repairs or servicing (indirect information flow).
- Recommended actions to support competitive strategy B: For developing new services, the focus should be on the range of after-sales services (service types 3 & 4). Supporting a direct information flow the development of services should be done by the same customer service staff who also provide the service. Customer records made during pre-sale services could be used to also take into account customer requests from the pre-sale phase (indirect information flow).
- Recommended actions to support competitive strategy C: When pursuing a mixed strategy, the focus should be on all services of the types 1, 3 & 4. To stimulate incentives for both new products and new services, it seems to be promising to use project teams. High information exchange can take place by using interdisciplinary teams (direct information flow). Indirect information flows probably play a subordinate role here.

It should be noted that the recommendations presented here are based on idealized competitive strategies and, for example, do not take either dynamics or resource limitations into account. Still, these three strategies can serve as a framework for designing services depending on the respective priority of a specific information flow.

5 Conclusions and outlook

To sum up, it can be concluded that, as an information channel, services can certainly supply impulses for the further development of industrial companies' products and services. All the persons interviewed were aware of this source of information, but the majority of companies do not make sufficient use of it for various reasons. Most companies had already taken different steps to improve the flow of information but these usually failed. Accordingly, the relevance of services as a trigger for product and service innovations seems to be well known in practice but despite this, there is still a lack of concrete measures and guidelines which could stimulate the flow of information and thus boost innovation activities.

It is also apparent that it is possible to systematize the complex causal relationships between information source and innovation activities. For example, different services harbor different information potentials which seem to be of different quality for the further development of products and service. The organizational structure and using systems for supporting indirect information transfer are factors which can stimulate or hinder the flow of information. The different causal relationships can be identified, described and classified with the help of the developed four-field matrix and the systematization of the types of services derived from this. It is shown how the conceptual framework can be applied in practice by formulating example recommendations for actions to support three generic competitive strategies. Nevertheless, this concept only represents the first step and can be understood as the starting-point for further differentiations or elaborations.

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