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Arbeitswirtschaft und
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An Applied Research Perspective on Service Science

Working Paper

June/2009

Abstract

The increasing complexity of many services requires a systemic perspective on service-oriented forms of value creation. These trends form the basis for establishing a service science understood as a new academic subject; however, there is still no consensus as to what its subject of research would be. Against the background of this discussion, we present an application-oriented understanding of service science. Based on the results of an empirical study we show that service research is called upon to develop cross-sectoral solutions for service-specific problems in firms. This results in new challenges when it comes to interaction between fundamental and application-oriented service research.

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1 Why Service Science?

Imagine you are at an international chemists' conference discussing how the minimal unit of scientific study – let's say an atom – can be defined and described. Probably, nobody will think of asking such a question. Yet it is quite possible to hear the following question at an international service conference: what is a service? This question is bound to come up at least during the coffee break, when discussion becomes more frank.

Why is this the case? Has service research only just thought of defining its object of research? No, but the technological, economic and social changes of recent years mean that the academic topic of "services" now appears in a different light; these days, when we speak of services, we often mean something quite different from what would have been the case 10 or 20 years ago. Be that as it may, we face the challenge of describing new phenomena with an outdated concept set.

In 1992, Sayer and Walker published a widely respected book which focuses on social changes against the background of changes in the division of labour. The book also explains the transition from a manufacturing to a service society from this perspective: "What is called the transition to a service economy is best characterized as a widening and deepening of the social and technical divisions of labour, part of a more general process of industrial evolution and capitalist development" (Sayer & Walker, 1992, p. 56).

It is certainly true that there are many products and services today that are difficult to allocate to a particular sector of the economy. In some respects, even agriculture functions like a service economy operated on an industrial scale. Additional phenomena can now be observed in the context of services that can only partly be explained using classical conceptions of the division of labour and capital investment.

In the case of internet-based business models, for instance, there are forms of value creation where the customer actively contributes to the provision of the service rather than merely being a service consumer. For example, the success of the online mail-order company Amazon and similar suppliers is based to a considerable extent on customers making information available to other customers about their own consumer behaviour (recommender systems). The individual user profiles build up a kind of systemic intelligence that is more than the sum of its parts.

The online encyclopaedia Wikipedia is based exclusively on the work or information input of its users and is financed through donations. These type of decentralised business models can increasingly be observed in other commercial sectors and will become even more common in the future. Today, we obtain our electricity from large companies, paying for the amount we consume. However, tomorrow we may well be using decentralised forms of energy production where we will be producers of energy as well as consumers.

What is new is that information, knowledge, energy, money etc. often flow in different directions at the same time. We are increasingly involved in complex value creation *systems* characterised by non-linear information, knowledge and finance streams. The challenge facing service research is to describe such service systems, to analyse them and to shape the labour and value creation processes in these systems.

Modern information technology plays a central role here. Information technology makes new forms of cooperation and communication in value creation systems possible (Jetter, Satzger & Neus, 2009). On the other hand, information technology makes it possible for the personal interaction between customer and service provider (front stage = service experience) to be tightly knit with back-office processes (backstage = service automation) underlying it (Glushko, 2008).

Such a systemic perspective on services and service-oriented forms of value creation forms the basis for reflection on the setting up of a *service science* as a new academic subject. Such a subject faces the challenge of dealing with both the theoretical principles of service systems and questions regarding their management and engineering (Spohrer et al., 2007).

Our article opens with a short overview of the current debate on service science, with particular reference to the experience of establishing “work sciences” as an academic subject in Germany. The following section presents an application-oriented concept of a service science. The central point here is to solve service-specific problems within companies that arise from the factors of “immateriality”, “process orientation” and “customer integration”. Following this, we present the results of a recent survey in the German plant construction industry. Two points arise from this. First, service-specific problems apply across sectors. Secondly, the results of the study provide important departure points for a systemic understanding of application-oriented service research. These produce specific challenges for service research that are outlined in the following section. The conclusion discusses the potential for a service science against the background of changing academic understanding.

2 The Debate about Service Science

In recent years there has been a considerable increase in discussion regarding the prospects and potential for a service science. There are now numerous international conferences on this topic and an increasing number of academic publications are also dealing with service science. Finally, new networks have developed which have made it their aim to promote the idea of service science as an independent academic discipline (<http://forums.thesrii.org/srii>).

In this respect, it is important to note two points.

- Firstly, it is not clear whether the subject of “services” will facilitate the formation of an independent area of scientific study. Differences in the organisation of education systems in different countries make it more difficult to create a new academic subject. Additionally, it is not straightforward to translate the term “science” into other languages. Unlike the German word “Wissenschaft”, “science” suggests the approaches of mathematics and the natural sciences.
- Secondly, it is striking that companies themselves have taken the initiative in regard to this topic and advocate the establishment of an academic subject specifically relating to services. IBM has taken a particularly trailblazing role in this respect internationally. It has been developing the idea of a service science internationally for a number of years, and it now has one of the largest groups of academics in the world in the area of services. Besides IBM, other companies are striving to create a stronger political and commercial base for the subject of services. In Germany, for instance, SAP, Siemens or even Roland Berger have participated in various service initiatives.

However, the fact that industry is becoming a driving force behind academic topics suggests that companies today are faced with a range of service-specific problems that can still hardly be analysed or solved using the existing theories, models and tools of service research. This, in turn, reflects profound processes of industrial transformation. At the heart of these processes of change lies a new understanding of economic value creation, which no longer relates merely to the transformation of material resources into physical products. It is more strongly focused on the intangible value that customers derive from the process of using services (value in use).

In the course of this economic transformation, a transformation is also occurring in service research. After all, given the extent to which products become platforms for services, and to which many services are produced and rationalised like products through the employment of new technologies, the question

arises as to where to draw the line between production research, technology research and service research. The topic of service science raises this very question, but it is not yet clear whether a satisfactory answer can be found in the foreseeable future.

However, it can already be observed today that a number of courses and curricula involving service science are coming into being. This underlines the dynamic force generated by the topic of service science in an academic context. At the same time, as many continue to argue over the meaning and goal of a service science, the first graduates will shortly be completing existing service science courses.

In Germany, it is possible to draw on a certain degree of experience when establishing a new interdisciplinary subject. As early as 1953, the Society for Work Science Research (www.gfa-online.de) was set up with the goal of integrating various existing subjects such as engineering sciences, business studies and work psychology around the research topic of "work". Work sciences are now an established subject; although it confers no academic degrees, it offers its own training and professional development courses, organises its own conferences and has its own specialist journals.

In 1964 Hilf wrote an introduction to work sciences that reflected the historical development of the emergence of the new subject of "work science". He describes five dimensions that justify the creation of a new academic subject. These are shown in the following table:

Requirements for establishing an independent academic subject ...	Work Sciences	Service Science
Its own object of study	Human work	?
Its own problem	Productivity	?
Its own norm	Productivity during a life-time	?
Its own method	The work study	?
A unified body of theory	Systematically constructed theory of work	?

Table 1: Dimensions that justify the establishment of an independent academic subject. Source: based on Hilf, 1964.

There is still no general consensus as to what would be put in this table for a service science. The object of study is presumably the service – or is it the service system? What understanding of services is this based on? The subject's own problem could be service performance, but from what perspective should this be considered? And how can service performance be measured? A specific norm and a specific academic method for the subject are not yet discernible. There is also no definition of the content on which a unified theory of service science would have to be based.

3 An Applied Service Research Perspective

These issues are mainly academic. From the perspective of application-oriented research, the debate about whether service science becomes established as an independent academic subject in the foreseeable future is an important but not the key question. Instead, much more interest is focused on how service research can contribute to resolving service-specific questions and problems within the value creation process of companies.

According to Lusch, Vargo and Wessels (2008), a service-oriented understanding of value creation basically involves three components. Firstly, services are deemed a process rather than a result or the product of generating a service. Secondly, the focus is on dynamic resources that make the service generation process possible. This principally refers to intangible resources such as knowledge and information rather than fixed parameters or tangible production factors. Thirdly, value creation is seen to be a collaborative process that is mainly based on the interaction between the provider and customer. In line with this conception, the key elements underlying the idea of a "service science" are process orientation, intangibility and customer integration.

Against this background, service science aims to analyse questions and problems in the value creation process that derive from the characteristics specified above. It does not matter whether these problems arise in industry or in the service sector, because this very distinction is becoming less relevant. However, it is of fundamental importance that the analysis of value creation processes is not limited to core business processes; it must take into account the relationship between the company and its environment. This leads to a *systemic* perspective on services.

Processes may be systemically analysed and organised by means of established cross-sectional subjects that are already being worked on by neighbouring disciplines such as business studies or the social sciences, but where a service-specific perspective is not as yet employed. The contribution of a service science to resolving problems might involve using such interdisciplinary topics to implement selected methods and approaches taken from neighbouring disciplines and combining them in novel ways, while also adapting them to allow the treatment of questions and problems in the value creation process specifically related to services (cf. Fig. 1).

For example, the resolution of productivity problems requires a comprehensive approach that takes into account the contributions made to value creation by customer-related processes, rather than merely concentrating on improving efficiency in the operational domain. An application-oriented service

science will then examine to what extent theoretical models and analytical tools and approaches to improving productivity can be taken over from neighbouring academic disciplines (e.g. production research) and adapted to focus on services.

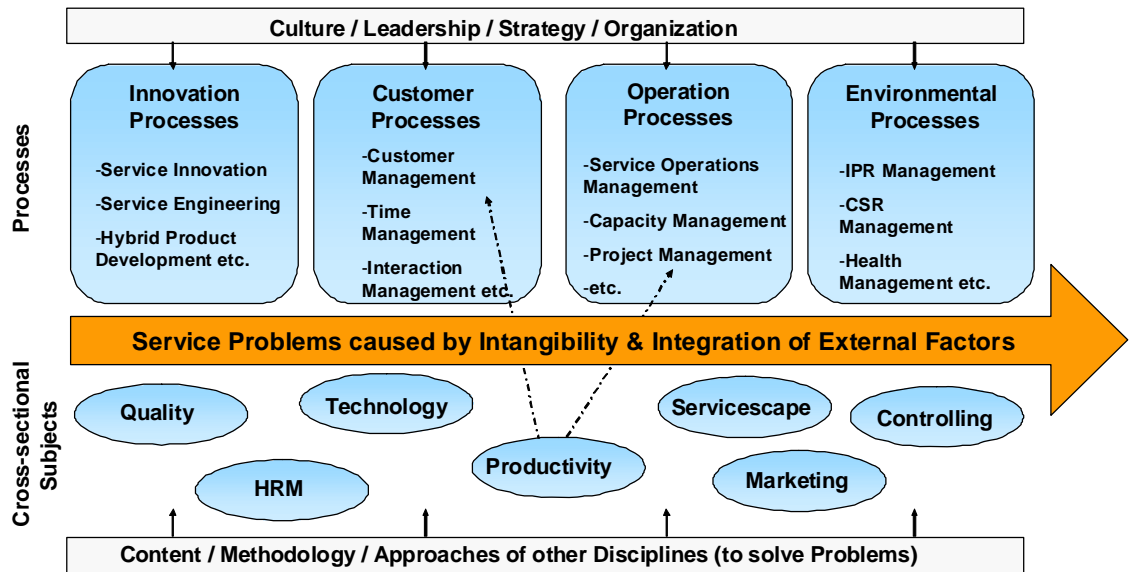


Fig. 1: "Service Science" as a perspective on the resolution of service-specific questions and problems. Source: original illustration

4 Dealing with Services in Manufacturing

It is one of the most important insights of application-oriented service research that service-specific problems are not directly linked to specific economic sectors. Moreover, these problems arise in many cases in the context of manufacturing companies, but they often fail to perceive their problems as service-related. On the one hand, the structures, processes and commercial culture of such companies are very strongly still characterised by an industrial logic. On the other hand, in this sector above all, the employment of new technologies (e.g. remote services) offers considerable opportunities for creating new types of service.

The combination of products and services thus makes it possible to create hybrid products, which are characterised by the fact that the customer benefit of the service is greater than the individual values of the product and service. In an empirical study the Fraunhofer Institute for Industrial Engineering analysed the potential for hybrid products and hybrid forms of value creation in the German plant construction and machine building industry (Bienzeisler & Kunkis, 2008). The results of this study also provide indications as to the key points of departure for application-oriented service research when it comes to developing solutions for service-specific problems.

As part of the investigation, we noted that the greatest commercial potential was seen for services that are closely involved in the customer's value creation process (see Fig. 2). Particularly high potential was attributed to services that increase the productivity of the customer's use of plant, for instance by optimising upstream and downstream work processes. Increasing the availability of plant for use will also come to play a more important role. In the case of build-to-order business models, the entire production process is organised as a service.

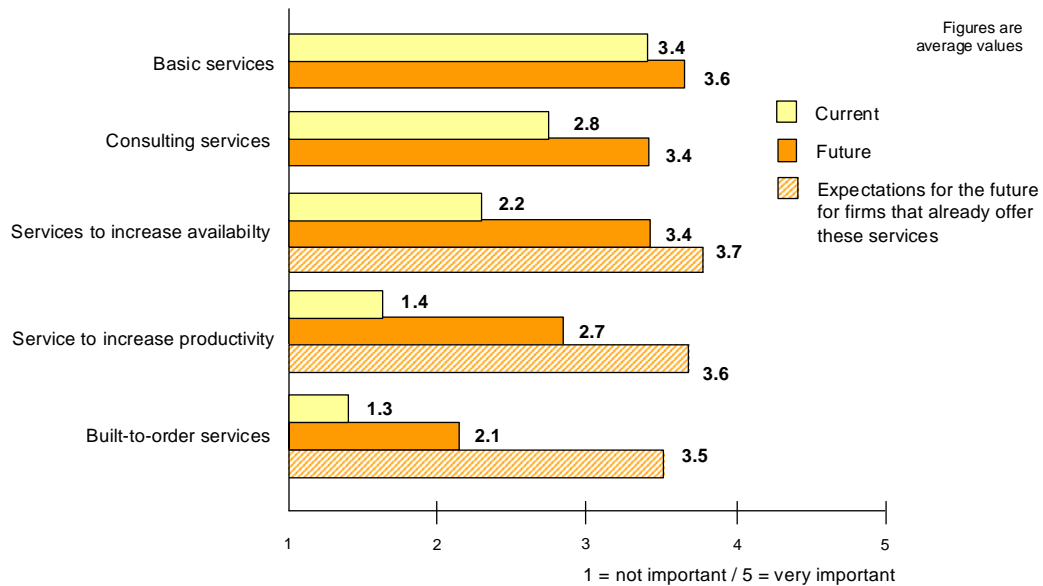


Fig. 2: Current and future commercial significance of various types of service in German plant construction and machine building (n=140). Source: Bienzeisler & Kunkis, 2008, p.27.

This is an indication of the emergence of a new paradigm in the plant construction and machine building industry. In future, services will no longer be provided as an extra item; they will lie at the centre of value creation activities. This trend is creating serious challenges for many firms, because they need to transform themselves into customer-oriented service organisations. In the course of the above-mentioned study, we were also able to conclude that firms where services already make up an above-average proportion of profit have characteristics that differ from other firms in various areas (cf. Fig. 3).

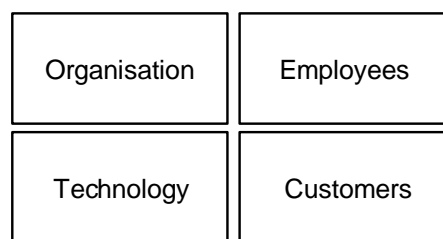


Fig. 3: Areas in which service-oriented firms differ from production-oriented firms. Source: Bienzeisler & Kunkis, 2008, p.31.

The key features of service-oriented firms in these areas may be outlined as follows:

Organisation

Service-oriented companies are characterised by a situation where the service constitutes an independent organisational unit in the firm, being regarded as highly valuable and important within the firm. The contribution of the service to value creation is transparent and the service portfolio is clearly structured. In addition, new services are systematically developed, and these firms work more often with external service providers to develop and implement customer-oriented services than is the case for firms that are less service-oriented.

Staff

In the area of human resources, developing the service skills of employees plays a decisive role. In this respect, service-oriented firms invest more time and money in measures to increase the service skills of their staff. In addition, the employees of these firms are better placed to sell the services offered to the customer and achieve the prices desired. Finally, these firms organise regular contact between staff in the service areas and in product development.

Technology

In the area of technology, it is striking that service-oriented firms make greater use of new technologies (e.g. ICT) to support their service portfolio. These companies also check how new technologies make new services possible on a regular and systematic basis. Finally, service-oriented firms show a strong tendency to use new technologies to develop new services. In this case, new technologies become the driver for the development of new services (cf. Fig. 4).

Customers

As regards "customers", we were able to observe that service-oriented firms work together with customers more intensively to analyse customer problems and develop individual solutions. At the same time, these firms regularly collect data to measure customer satisfaction. The greater importance attributed to customers within the firm means that customers are more often prepared to pay the required prices for the services than is the case with less service-oriented firms.

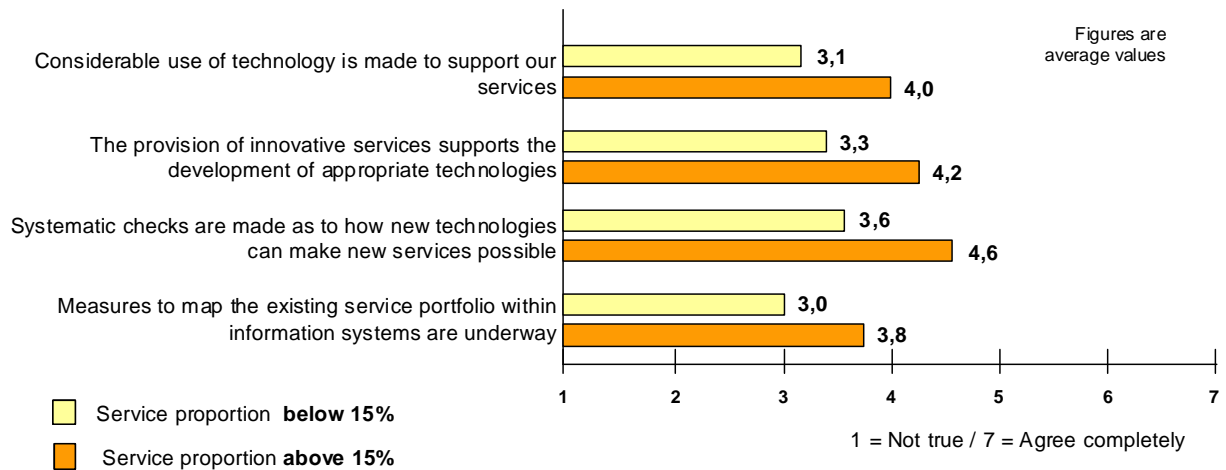


Fig. 4: Differences in “technology” between firms that derive an above or below average share of profits from services (n=140). Source: Bienzeisler & Kunkis, 2008, p. 34.

Current findings derived from our empirical study suggest that the potential for services in the plant construction and machine building industry does not depend so much in the addition of products and services as in *integrating* them. In the context of increased specialisation, integrated value creation chains and the use of modern information and telecommunications technology (ICT), new options arise for combining products with services.

To sum up, the crucial factor for company success is not the number of services offered, but the specific types of services on offer which require specific patterns of organisational design. Therefore, manufacturing companies seeking to increase their service profit margins have to reconsider their understanding of value creation and have to transform themselves into service organisations.

5 Service Research Challenges

The challenges outlined above that face firms in the German plant construction and machine building industry also provide an indication of the future tasks of application-oriented service research. The central element among these tasks is the development and use of suitable approaches, methods and tools to support the transformation of firms into customer-oriented service organisations. This calls for a holistic and systemic approach that does justice to the full range of the topic "services".

The range of tasks extends from improving customer communication and increasing service skills among employees to the systematic use of new technologies in order to develop new services. The principle of supply and demand, however, also applies to research. On the supply side, service research needs to choose stronger interdisciplinary approaches. There are also problems on the demand side, though, that need to be overcome. Service research often seems to have difficulty in initiating research and consultancy projects with firms.

The main reason for this, as so often, lies in the use of outdated categories of thought – specifically, the division between "service" and "manufacturing". Companies that describe themselves as producing firms may generally have their own research departments and at times invest large sums in research and development (R & D), but service research does not generally find a place within these structures. Usually, it is difficult to find a home for service innovations within the formalised schemes and processes of product innovation.

To put this differently, the character and typical course of innovative projects in the service context is not really compatible with the R & D structures of manufacturing firms. What is more, in these firms service-specific innovation problems are generally interpreted as a lack of management competence rather than innovation problems. This may mean that a firm is organised as a serial producer when it should really be structured as a project organisation, because production has been organised individually for each customer for some time. This leads to problems with resources and coordination that are laid at the door of management.

Service research also has problems gaining access to firms that see themselves as part of the service sector. These access problems result from the fact that service firms possess limited resources and structures for systematic innovation management. Very few service firms have their own R & D departments. Standard innovation processes are also very rare. Many service firms are inno-

vative, but they lack awareness of the relationship between service innovation and “research”.

Applied service research therefore faces a dual challenge. It has to constantly make the case for its research contributions, and it faces R & D structures in firms that are not adapted to its research. There is also a lack of information about the process of service innovations. We still know too little about the necessary form of structures, processes and skills within firms if successful service innovation is to be possible (CREST, 2008). This is the task of fundamental service research. Consequently, a major contribution of such research lies in further investigating the complexity of service innovation and developing matching underlying theoretical concepts.

6 Conclusion

The idea of application-oriented research is based on analysing and applying knowledge derived from basic research so that it can be used to solve practical problems within companies. This has worked well for a long time in the area of service research. For instance, application-oriented service research has taken fundamental work in social science research as a basis for understanding the structure of social interactions between customers and employees (Chase, 2001). On the other hand, application-oriented service research has also turned to economic theory, e.g. for questions of marketing and the pricing of services (Zeithaml & Bitner, 2000).

All this fundamental work continues to be justified and will play an important role in the future so that application-oriented service research can make its contribution to solving service-specific problems within firms. However, there are now many indications that "services" as a research subject has become so much more complex that the classical division of tasks between fundamental research and application-oriented research is reaching its limits. The more strongly all value creation processes are shaped by a service logic, the more service problems require to be considered from various perspectives, and consequently based on various disciplines.

In his recent book "Technolution" on the development and diffusion of new technologies, the futurologist Matthias Horx (2008) has shown that new knowledge is no longer produced in the centre of academic subjects, but at their intersections. The sparks of new knowledge arise, for instance, where physics meets neuroscience or anthropology meets economics. This results in technological convergence and so-called "syn-sciences", meaning that the academic world in the 21st century is taking on a new form. Progress, then, will be more mental, systemic and intellectual than the scientific progress of the age of mechanical industry (Horx, 2008, 0. 136).

The complexity of many service systems today requires an interdisciplinary approach along the lines of such a systemic understanding of science. Service science could be such an approach, with the aim of developing the theoretical and conceptual tools to understand and shape complex service systems.

However, the concept of a service science will only be successful if the "service" as a subject of research is not reduced to a particular type of service or a particular service sector. Above all, the "human factor" and human "work" should not be lost from view. 20 years' experience of applied service research shows that innovation problems are often problems of communication be-

tween people. The importance of technology notwithstanding, human beings as the central source and the central users of innovations will be with us for some time to come.

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