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**Giving ideas a chance – systematic
development of services in manufacturing
industry**

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Giving ideas a chance - systematic development of services in manufacturing industry

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Abstract

The purpose of this paper is to propose a service development process that is adapted to manufacturing companies and to discuss its implication for companies with a focus on product development and product sales. This paper looks at new service development (NSD) literature and argues for design principles to develop a NSD process in a manufacturing context. Further, a generic NSD framework for manufacturing companies and a five-stage service development process framework is presented in detail. Managers need to be aware of the interrelationship that exists between NSD and NPD. A number of managerial implications are proposed and discussed. This paper emphasizes the importance of NSD lifecycle management, something that has not previously been extensively studied or addressed. In

addition, to explicitly discuss NSD in a business model context in manufacturing is novel.

Keywords: Manufacturing industry, services, service development process, innovation, service development

JEL: L60, L84, M31

Abstract (in Deutsch)

Das Ziel dieser Arbeit ist es, einen Serviceentwicklungsprozess anzuregen, der auf produzierende Unternehmen angepasst ist, und seine Auswirkungen auf Unternehmen mit einem Schwerpunkt Produktentwicklung und Vertrieb zu diskutieren. Dieser Beitrag befasst sich mit Literatur neuer Serviceentwicklung (*New Service Development, NSD*) und plädiert für Gestaltungsprinzipien, um einen NSD-Prozess in einem Fertigungskontext zu entwickeln. Ferner wird ein generischer NSD-Rahmen für Fertigungsunternehmen und ein fünfstufiger Serviceentwicklungsprozess im Detail vorgestellt. Führungskräfte müssen sich über die Wechselbeziehung bewusst sein, die zwischen NSD und NPD (*New Product Development*) existiert. Eine Reihe von Auswirkungen werden vorgeschlagen und diskutiert. Diese Arbeit unterstreicht die Bedeutung des NSD-Lebenszyklusmanagements, etwas, das bisher nicht ausführlich untersucht oder behandelt wurde. Zusätzlich ist die ausdrückliche Diskussion des NSD im Kontext eines Geschäftsmodells in Fertigung neu.

Giving ideas a chance - systematic development of services in manufacturing industry

1 Motivation

Increasingly, across industries, manufacturing firms are extending their products with services. This trend is affecting the way goods are produced and serviced are offered and physical objects are being seamlessly integrated into the information network. 'Industry 4.0', the high-tech strategy of the German government, emphasizes this idea of consistent digitization and linking of all produced inputs in an economy - goods and services.

This paper identifies the need for a service development process for manufacturing companies.

2 What are the deficiencies in service development in manufacturing industry?

There are a variety of problems that still makes work hard in terms of service development in manufacturing firms.

Service ideas are often not transparent, documented and re-adoptable. Service ideas occur in all parts of an organization. However, managers are uncertain, if marketing or R&D has to develop service ideas. Many firms have (discrete) innovation processes in place, but do not offer the opportunity to collect and document service ideas systematically - from all parts of the organization. However, decision-making about transforming service ideas into service offers is an on-going process that needs constant exchange of assertions and presentations and can be considered as an organizational learning process (Stevens, 2005). In particular, information collected from customers is often not recorded and reviewed, which results in worse service decision making (Carbonell, 2009). Customers, personnel and

managers have, often, (dazzling) ideas, maybe not always at the right time or the right place. Systematically coordinated and transparent procedures may support the successful development of new services. The service development process must be precisely defined and also accompanying criteria on which conscious decisions are made upon.

Organizational responsibility is often ambiguous. The responsibility of new service in organization is often not clear. Is it marketing or R&D? R&D sees itself (often) as the driver of technical innovation and not as a contact point for services. Sales and marketing see themselves as core to service. Service becomes an instrument to customer loyalty and marketing initiatives. Many firms lack innovation departments that focus on services.

Firms are still (service) customer-phobic. Customers are (often) not the main source for new service ideas but competitors. Everyone seems to know what customers expect, but nobody really asks on a systematic and regular basis. However, service revenue requires market-oriented service development based on customer needs. For example, workshops with selected customers are an important source of ideas for developing new services. Carbonell's study confirms that the use of information from customers involved in new service development can lead to new or better services and may increase market performance (Carbonell, 2009), mainly by shaping expectations and design of the new service idea. Closely working with customers during service innovation can provide a better understanding of challenges and needs of customers and may ultimately lead to new opportunities.

Firms lack of tools along the lifecycle. There is a lack of software-supported tools and templates that support service development along the lifecycle across the firm. Traditional models, methods and tools are not sufficient for systematic, interactive and cooperative service development.

A (clear-cut) service development strategy is often missing. The adoption and definition of a service strategy is key to success (i.e. how to differentiate themselves from their competitors by means of

service offering) and is the missing link - linking customer's context, resources and capabilities.

3 Methodology

Over the past five years, we have investigated how manufacturing firms plan, design and deliver services. We conducted 22 in-depth interviews with industrial goods companies operating in a variety of product markets, including medical detection and diagnostics, process and filling technology, automobile manufacturers and suppliers, and electronics manufacturing. We went on to carry out a large-scale study with 503 participating managers. After thorough analysis, six further extended interviews with executives complemented and validated our insights.

Already 41 per cent of manufacturing firms in Germany, Austria and Switzerland generate more than one quarter of their overall revenue with service offerings (Strassl & Schicker, 2012; Schicker & Strassl, 2014). One major reason for the increasing importance of industrial services is, on the one hand, the fact that service makes 80 per cent of all product life cycle costs. The orientation as innovation leader is not sufficient anymore in order to compete in markets successfully. Service is the central success factor in order to be successful in high wage countries and against low cost companies. The establishment of service structures, expertise and skills of employees, and the experience of services process makes imitation much more difficult than the imitation of product features.

During the course of analysis it became clear that the choice of an adequate service strategy, the effective management of the service portfolio and the systematic development of the service offering leads not only to higher service professionalism, but these firms are more profitable than their competitors.

Based on study findings in the literature and from our own primary data, we developed a reference framework for service development. Two (main) assumptions led our tests.

First, **firms already have services, which are at different stages of their lifecycle.** Services, such as spare parts, may exist for a long time. Other services, such as remote monitoring for a recently developed machine, may just be before the worldwide rollout. Yet again, another service idea has been discussed in the firm for a long time but not even developed yet.

Second, **firms have a heterogeneous set of service offering.** Some services may be applied by a human, independently of a machine, such consulting services. Other services are hybrid services in the sense that they require technical infrastructure that forms the prerequisite for a service offering, such as remote monitoring (hybrid means in this context a combination of a technical and a human element). Again other services are primarily technical, such as an upgrade of a machine where modules are sold to bring a machine to state-of-the-art.

4 Design Principles

In the following, we define design principles, which describe fundamental ideas about the practice of good service development for manufacturing firms. How firms apply these principles determines how successful a service offering may be.

4.1 Service business model autonomy

Service offerings with product-related services supporting customers focus on the value proposition of the customer and allow interactive value co-creation (Oliva & Kallenberg, 2003; Gebauer, 2006; Böhmman et al., 2014). A service offer (out of the possible set of service offers) can, therefore, be taken into account to be an autonomous business model that describes the (at best an unique) value that a company delivers for their customers, how it delivers the value proposition and how it generates revenue.

Alexander Osterwalder defines a business model as „[...] a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of

the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams.” (Osterwalder et al., 2010, p. 10)

The following table illustrates the structure of a service business model, adapted from Osterwalder.

Pillar	Building Block	Key Questions
What	Value Proposition	<ul style="list-style-type: none"> • Which of the customer's problems is solved by the service? • Which requirements do customers pose to the firm and how can the service satisfy it? • What value does the service deliver to the customer, how does it differentiate from competitors? • How can the benefit be quantified?
Who	Customer Segments	<ul style="list-style-type: none"> • For whom does the service create value? • Who are the most important customers?
	Customer Relationships	<ul style="list-style-type: none"> • Which type of relationship does each of the customer segments expect to establish and maintain? Which ones exist? • How are they integrated with the rest of product and/or services?
	Distribution Channel	<ul style="list-style-type: none"> • Through which distribution channels does the firm reach customers with service activities? • How are customers integrated in the distribution channels?
How	Activities	<ul style="list-style-type: none"> • What capabilities do the value proposition require? • The distribution channels? • The customer relationships? • The revenue model? • Which role does the customer play in each of the activities?
	Resources	<ul style="list-style-type: none"> • What resource configuration does the value proposition require? • The distribution channels? • The customer relationships? • The revenue model? • Which resources are available?

Pillar	Building Block	Key Questions
	Partnerships	<ul style="list-style-type: none"> • Who are the partners that are necessary to execute the value proposition? • Which capabilities and resources are required from partners?
How much	Cost Structure	<ul style="list-style-type: none"> • Which costs are inherent in the service? • How can these costs be quantified? • What are the impacts to the success?
	Revenue Model	<ul style="list-style-type: none"> • For what value are customers really willing to pay? • For what do they currently pay? How? • How much does the service contribute to overall revenues?

Table 1: Autonomous Service Business Model

An autonomous service business model can be portrayed by focused single achievement independence and, at the end, held (individually) accountable for its performance. Since most firms develop and deliver more than one service offer simultaneously, the consideration of a service offer to be an autonomous business model permits the firm to determine accountable actions and to balance internal capabilities and resources, an issue that is often underestimated by managers (Edvardsson et al., 2010).

4.2 Customer integration

The value of a service offering is co-created together with customers. This concept is referred to as service-dominant logic and was created by Stephen Vargo and Robert Lusch (Vargo & Lusch, 2004), a term coined as opposed to goods-dominant logic. This co-creation of value requires linked activities provided to customers with a positive outcome (Vargo & Lusch, 2004; Edvardsson et al., 2010) and cannot be separated from customers.

The idea that value is co-created during delivery (secretly) presumes the integration of customers during the development process. The main question during service development is how to create value, both for customers and service provider firm during service delivery. The success of a value proposition depends on its ability to understand the (future) customer co-creation act. Since customers are a resource in

value networks, the integration of customers during service development seems attractive.

Firms that integrate customers can capture knowledge that is essential for developing services from/with customers. Bo Edvardsson and his team (Edvardsson et al., 2010) distinguish (at least) two types of knowledge: *use knowledge* refers to actual situations of knowledge, difficulties, ideas, opportunities, behaviours, and emotions. *Technology knowledge* refers to underlying resources used to realize the actual or future service.

Capturing knowledge from customers during service development is possible from different customer roles, e.g. service personnel, senior management, which can be integrated in the development process, both for the improvement of already existing (be it successful or not successful, what ever this means for a service) as well as for radically new services (Edvardsson et al., 2010; Carbonell et al., 2009).

4.3 Service development agility

Service development requires a framework that allows systematic development, as the development of products does. However, Dörner et al. point out that development process for new services rarely proceeds systematically (Dörner et al, 2011). To remain competitive, firms have to respond to changes flexible and timely. Only adjusting the development process for products may result in an unused service development process. This calls for a service development framework that requires a different approach than the development of products. Kindström et al. argue that if a development process is too structured and formalized, it will inhibit (rich and courageous) exploration efforts. It must rather balance the need for structure with explorative encouragement (Kindström et al., 2009). Gremyr (even) found that services are not developed systematically, even if there was a process in place (Gremyr et al., 2010).

Software development has struggled with a similar problem for many years, until the idea of iterative and incremental development turned

up and facilitated adaptive and evolutionary development. The concept of agile software development was born.

The idea of agile service development, therefore, may enable a firm to adapt to (un-)expected changes rapidly during this process. In this sense, the term 'agile' has been introduced as "the ability of a sensitive [organization] that exhibits flexibility to accommodate expected or unexpected changes rapidly, following the shortest time span, using economical, simple and quality instruments in a dynamic environment and applying updated prior knowledge and experience to learn from the internal and external environment". (Qumer et al., 2008) Agile service development may lead to higher customer satisfaction and lower budget overruns.

4.4 Team integration

Team integration expresses the way in which decentralized and heterogeneous organizational members participate during the service development process.

4.5 Product-service process interdependency

Service development process and product development process are interdependent. Many manufacturing firms offer bundles of products and services. This implies that product and service development processes are interdependent and cannot be performed in isolation from each other.

5 NSD Framework

In this paper, we present a NSD framework with five stages that considers a service business model approach. These five stages are *market sensing, assessment, design, development, and delivery*.

The *NSD process wheel* visualizes all service business model building blocks (Fig. 1). It allows illustrating visually the extent to which the development of a service progresses. The NSD process wheel is split

into business model building blocks. The development progress is visualized from the core to the outside boundary by the stages

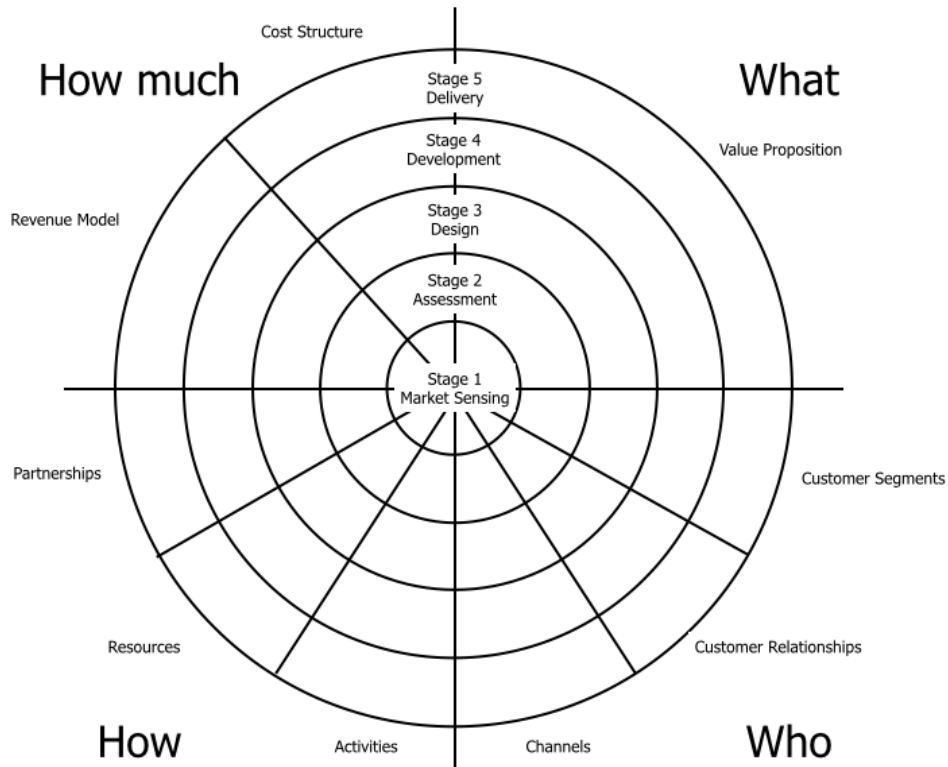


Fig. 1: NSD Process Wheel

In the following, each stage of the NSD framework is considered in detail.

5.1 Market sensing

During market sensing, personnel learn continuously about markets and customers (Day, 2002) through active or passive customer interaction. They understand needs, behaviours, and preferences (Carbonell, 2009; de Bretani, 1989). Other sources to sense markets are system integrators or consultants. Market sensing is particularly challenging, where customers expect services for free or as part of a product (Auguste, 2006; Reinartz, 2008). However, no service idea

should get lost during market sensing, wherever the idea stems from, how strange or impossible to deliver it may be. In essence, all service ideas should get a chance, at least. The key question during market sensing is to collect new service ideas and to consider whether the new service idea is interesting.

A service value proposition creates value for customers through a mix of elements. As for customers, it may be important to reduce their machine availability, to reduce their costs for parts, to operate environmentally-sound with water, electric power, or raw materials and supplies. Others may profit with the new service value proposition by reducing the material requirements, better usability, flexible and gentle refitting. Yet other customers are interested in improving their product quality, hygiene or equipment. Again others aim to improve and to manage production processes and therefore have particular interest in data, methods and tools as part of a service offer.

During market sensing, companies consider their benefits in a qualitative way. They think about the impact of the service idea and whether it enables to sell further products and/or services. Other service ideas may impact their customer relationship and loyalty. Many customers are interested in more simplified processes, faster reaction, or simpler methods. Others aim to understand, if a service idea indicates market potential in terms of technology progress, innovation or possible customer demand.

However, without profitable customers, no company can survive for long. During market sensing, it seems valuable to already understand, if there are customers (and which ones) that have demand for the service idea. Asking if these potential customers are willing to pay (and how much, of course) for the service offer may be important but challenging. Well, there is still the open question: what, if customers are not willing to pay, why should the service idea still be turned into an offering?

Every service idea calls for a number of activities and resources, once in operation. For a service support offering, this may be customer contact, problem identification, data analysis, problem solving and

documentation. It is certainly worthwhile to think about consequences about necessary activities and resource during market sensing.

Stage	Aspects
1 - Market Sensing	<ul style="list-style-type: none"> • Reference to product or product part • Customer value for service idea importance (e.g. machine availability increased, operating supplies reduced) • Company value of service idea (e.g. positive impact on image, cross-selling, customer loyalty) • Known customers that are willing to pay for service offer • Operating procedures of service idea (e.g. support = receive contact, identify problem, analyse data, solve problem, document, etc.) • Resources needed for service operations
2 - Assessment	<ul style="list-style-type: none"> • Task of company for the service during service and what happens at customers site • Parts and components for which service offer is relevant for a period of time • Service offer relevant for machines, parts, plants or sites • Number of potential sales • Strategic value for company, risks and barriers • Customer co-creation and value from customer perspective • Different requirements for different customer segments • Sales channel of service offer • Direct beneficiary of service offer • Decision maker/Budget holder for service • Long-term relationship through service offer • Product manager for service offer • Required expertise, resources and activities for service offer • Development activities, resources and effort • Revenue streams and cost during service operations • Cross-selling potential • Cost saving potential

Stage	Aspects
3 - Design	<ul style="list-style-type: none"> • Customer value with performance indicators transparent • Competitors and differentiations (quality, time, flexibility, sustainability, cost ...) and priorities • Promotion plan, key message and communication channel of service offer • Target customers (region, industry, size, shift model, production type, maintenance strategy) • Sales process (activities, product/service sales) • Pilot testing • Process for service delivery • Development project (plan, project organisation, time schedule, budget, documents) • Development costs • Pricing and billing model (time, material, value) • Terms and conditions • Sales plan, cost plan, profit plan • Cross-selling potentials • Cost saving potentials
4 - Development	<ul style="list-style-type: none"> • Customer value with KPI - validation (from pilot test) • Pilot testing • Implementation of process for service delivery • Review of development stage • Development cost (internal, extern, material) • Pricing and billing • Terms and conditions • Sales plan, cost plan, profit plan • Cross-selling potentials • Cost saving potentials
5 - Delivery	<ul style="list-style-type: none"> • Portfolio management (profitability, return, stage of life cycle, customer acceptance risk, importance for customers and its competitiveness, customer loyalty, cross selling potential, service piracy)

Table 2: Aspects during service development process

5.2 Assessment

During assessment firms assess service ideas and evaluate, if a particular service idea makes sense. This sense making consists of activities in which information is sorted, filtered and simplified into coherent patterns (Day, 2002). With these mental models of

(coherent) patterns of a service idea a firm is able to move into one direction. The key questions during assessment are whether more meaning can be given to the initial service idea and whether the service idea should be designed.

During assessment an owner of a service idea specifies activities, which will be necessary for operating the service, and ponders about the impact the service will have at customers sites. In particular, in a product-service-system it is vital to understand the scope to which the service idea affects what products, machines, or machine parts. From a sales point of view, it is interesting how (per customer site, machine, plant, etc.) and how often (once or more than once) the service idea may be sold. One firm verifies the service idea during customer interaction (e.g. workshops or interviews) and prioritizes according to which the service idea meets specific customer needs, such as quality, speed, flexibility, cost, or sustainability.

Some managers posed questions that go beyond (specific) customer needs: What strategic impact has the service idea? Can customers buy the service from competitors? Which risks and barriers can the service offering avoid? Which risks may be new with the service offering? Which requests from customers may come, if they are not satisfied with the new service offering (e.g. refusal of payment)? In this way, firms are able to gradually establish required measures.

The service value proposition creates value for customers and defines who benefits (directly) from the service offering. This may be the managing director, head of production, purchasing manager, head of maintenance or operator. During assessment managers asked who owns the budget (at the customer) and who decides upon purchasing the service.

Service providers discuss during assessment on how to bring the service to market. For example, managers discussed likely channels to reach customer best, such as new machine sales, through service sales, service engineers, web sales, partners, or a mix. This depends on the type of machine, production or site the service refers to. The customer relationship for a service influences the customer experience.

During sense making managers assessed a whole range: from *personal* to *automated*, from short- to long-term.

Every service requires a number of activities to create and to deliver it. These activities can be problem-solving activities or a software platform. Resources allow the firm creating and delivering a service. During assessment, managers and specialist specify and evaluate activities and resources (internal and/or external) in detail.

Having answered the question, if customers are willing to pay for the service, leads to plan the revenue streams from that service over the next years from one-time customers, recurring revenues, or current contracts. Creating and delivering a service incurs costs. Such costs are calculated after defining resources and activities. Cost structures consist of fix costs that remain constant despite the volume of service created and delivered, and variable costs that vary proportionally with the volume of the service delivered. De Bretani (de Bretani, 1989) found that cost saving potentials (economies of scale) are often not the focus of manufacturing firms, however, there may be other attributes of cost structures that firms enjoy as the output increases.

5.3 Design

During design elements are integrated into the service to meet customers needs. This may be product design (design of material components), facility design (configuration of environment), operations design (protection of infrastructure during service delivery) and service process design (interaction between supplier and customer) (Ramaswamy, 1996). The key question during the design is whether the service idea that was positively evaluated during assessment can now be designed.

In workshops, managers discussed the service value proposition - the reason why customers prefer one company to another - for a particular customer (segment) and asked questions like: Can customers improve their efficiency and effectiveness? Can customers produce faster through downtime reduction? Can customers improve their supplier reliability? Can customers react upon market changes

faster? Can customers reduce their costs through the service offer (e.g. spare parts, costs for material and supplies)? Can customers produce more sustainably?

Services may be innovative or new, others already exist in the market. During design managers look at the service in its entirety in the market and consider the competition (or segments) and design attributes that differentiate them from competitors. Some firms define target customer profiles and categorized them. Attributes can be the region/market of the firm, the size of the customer, the shift model of production, production type or maintenance strategy.

Raising awareness about the firm's service offer requires a promotion plan with a clear communication goal and a distinct message. During design managers define the sales process with roles and activities - from purchasing to delivery.

As activities and resources describe the important things a firm must do in order to make the service work, during design managers define activities and resources needed for the sales and delivery process. Having defined this, firms must define the development process with a plan, project organization, and development resources. As part of this, services should be pilot-tested early as part of customer interaction (Kindström, 2010). Managers identify necessary activities and pilot customers during design.

At the end of design, managers examine ways they generate revenue streams with. Here are some of them: *Usage fees* are the most widely understood revenue streams for service offers ((hourly rate * hours) plus material). *Volume fees* are generated by the use of a particular service with a fixed price multiplied with the volume. Along with defining the kind of revenue streams, managers discussed conditions of contract. As revenue represents the money a firm generates from customers, firms plan revenues, costs and profits. Some also consider cross-selling potential for the service and cost-saving potentials.

During sense making firms estimate the development cost for the service. Now at the end of design, managers detail development activities and related costs (for personnel and material) for the service.

5.4 Development

Development comprises a number of tasks and processes that aim to develop and implement the service design and bring it finally into live.

The key question during the development stage is whether the designed service can be development and at the end sold and delivered to customers.

In this step, for efficient and effective service development, it is required to align performance goals with pilot test results from the previous stage. As in previous stages of this framework, managers further identified customers/customer segments planned what value is created for them. Market implemented the promotion plan during development by defining sales and marketing activities. Sales managers defined targets by region, marketing, customers, etc.

During development firms initiate pilot studies with selected customers to provide (quantitative) proof that this (particular) service has (enough) potential to succeed on a full-scale basis. Pilot studies have the advantage to reduce later costs, as they are less expensive during development.

Implementing the service delivery process is key to developing a service. Two major issues are worth highlighting. In internationally-operating manufacturing firms, often R&D (at the headquarters) develop (basic, standard) services that are then localized for differing market needs. Cross-functional and cross-regional are a dominant coordination aspect during development. Due to the prevailing dominant goods logic and existing practices, practitioners find it important to align service development processes to product development processes, in terms of steps and terminology.

During development, in most cases, the biggest proportion of development costs incur. Close monitoring of development costs is

important for firms. Yet, sales managers validate pricing, billing and contract conditions for the service and estimate revenues and cost of operation.

5.5 Delivery

The delivery of services is in its very nature fundamentally different to the delivery of products, since services are created in an interaction with the customer during the delivery process (Grönroos, 2007), and are often highly localized. The key question during service delivery is if the service is successful in its operation in terms of performance and quality (de Bretani, 1989).

Service managers deploy portfolio management to manage services. A service portfolio supports the decision making process with regard to managing the service lifecycle (Kohlborn et al., 2009). The core of service portfolio management is the amount of services and their dependencies and it consists of services in all stages of their lifecycle. The aim of a service portfolio is to be strategically aligned, balanced and to maximize value (Cooper et al., 1999; Kohlborn et al., 2009). In workshops, managers found financial criteria (such as profit margin) to maximize value important, but also argued about the scope to which customer needs are aligned with current service offering, the willingness to pay for the service, or the (performance) impact of the service.

Table 3 illustrates the complete NSD framework.

Pillar	Building Block	Stage 1 - Market Sensing	Stage 2 - Assessment	Stage 3 - Design	Stage 4 - Development	Stage 5 - Delivery
<i>What</i>	Value Proposition	<ul style="list-style-type: none"> Describe fundamental service idea Give the service a unique name Define primary and secondary value criteria 	<ul style="list-style-type: none"> Detail service description Quantify value proposition Synchronize quantified value proposition with customers Validate benefits for customers and company Determine strategic impact of service for company 	<ul style="list-style-type: none"> Complete service description Define performance indicators to measure service performance and benefits for customers 	<ul style="list-style-type: none"> Validate customer value by means of pilot testing 	<ul style="list-style-type: none"> Deliver and assess service Decide upon change/end-of-life
	Customer Segments	<ul style="list-style-type: none"> Identify potential customers of service Identify relevant products of customers 	<ul style="list-style-type: none"> Analyse target market Analyse installed base Estimate possible service sales per time period Estimate maximum possible market penetration 	<ul style="list-style-type: none"> Complete target customer profiles 	<ul style="list-style-type: none"> Pilot service with selected target customers Use pilot results to revise service value proposition 	<ul style="list-style-type: none"> Deliver service to customer Collect, assess and use customer feedback
<i>Who</i>	Customer Relationships	<ul style="list-style-type: none"> not yet relevant or predictable 	<ul style="list-style-type: none"> Define service type (one-time job/long-term) Specify service processing (in person, automatically) 	<ul style="list-style-type: none"> Define cooperation with customers during pilot phase Develop promotion plan 	<ul style="list-style-type: none"> Implement promotion plan 	<ul style="list-style-type: none"> Optimise communication
	Distribution Channel	<ul style="list-style-type: none"> not yet relevant or predictable 	<ul style="list-style-type: none"> Determine place of service provision Identify relevant distribution/sales channels 	<ul style="list-style-type: none"> Define sales processes 	<ul style="list-style-type: none"> Develop sales planning Define sales target 	<ul style="list-style-type: none"> Adapt distribution model
<i>How</i>	Activities	<ul style="list-style-type: none"> Compile list of activities (rough estimates) for service operations 	<ul style="list-style-type: none"> Define development activities for service Determine responsible people for development Determine activities during service operations Define responsible 	<ul style="list-style-type: none"> Specify development project (plan, project organisation) Define process of service operations 	<ul style="list-style-type: none"> Complete development project Optimize process of service operations Implement process of service operations 	<ul style="list-style-type: none"> Deliver and assess service

Pillar	Building Block	Stage 1 - Market Sensing	Stage 2 - Assessment	Stage 3 - Design	Stage 4 - Development	Stage 5 - Delivery
<i>How much</i>			people for service operations			
	Resources	<ul style="list-style-type: none"> Estimate required resources for service operations 	<ul style="list-style-type: none"> Specify development resources Specify service operations resources 	<ul style="list-style-type: none"> Specify resources for development project 	<ul style="list-style-type: none"> Optimize resources for process of service operations 	<ul style="list-style-type: none"> Adapt resource model
	Partnerships	<ul style="list-style-type: none"> not yet relevant or predictable 	<ul style="list-style-type: none"> Determine internal expertise for development and operations of service Identify necessary internal and external partners 	<ul style="list-style-type: none"> Preselect internal teams and external partners for development Screen internal teams and external partners for service operations 	<ul style="list-style-type: none"> Integrate required partners for service operations into process of service operations 	<ul style="list-style-type: none"> Integrate external partner
	Cost Structure	<ul style="list-style-type: none"> not yet relevant or predictable 	<ul style="list-style-type: none"> Determine relevant time intervals for estimates Estimate development costs of service Estimate cost of operation for service Determine cost saving potentials 	<ul style="list-style-type: none"> Specify development cost for service Analyse profitability of service Test monetary planning (revenue, cost, profit) 	<ul style="list-style-type: none"> Identify final development costs Update monetary planning (revenue, costs, and profits) Test monetary planning (revenue, costs, and profits) 	<ul style="list-style-type: none"> Perform service controlling
	Revenue Model	<ul style="list-style-type: none"> Determine willingness to pay for service Identify alternative advantages for the firm, if customers are not willing to pay for service 	<ul style="list-style-type: none"> Determine customers' willingness to pay for service Analyse cross selling potentials of service 	<ul style="list-style-type: none"> Define pricing strategy for service Define billing mode for service 	<ul style="list-style-type: none"> Validate pricing of service Validate billing mode of service 	<ul style="list-style-type: none"> Perform market analysis Perform service controlling

Table 3: NSD Framework

6 Conclusion

In this paper, we argue that the whole life cycle must be equally in focus in order for manufacturing firms to become successful service offering suppliers. In our NSD framework, we include the idea that a new service development process must give every service idea a chance. However, this NSD framework should not be considered as a process model with disconnected phases but rather a skeleton with intersecting stages.

We believe that exploring related organizational and technological learning in a manufacturing setting is a promising future research strand.

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