

Chapter 2

Servitization: Service Infusion in Manufacturing

Extending a company's offer beyond manufacturing has become an effective way of increasing profits and staying ahead of competitors. It is difficult to pinpoint the emergence of servitization. Many researchers in the field, such as Vandermerwe and Rada (1989), claim that servitization is occurring on a global scale, and manufacturing organizations are unable to avoid the transition toward extending their offering.

2.1 Servitization: Transition Toward Services

The idea of servitization is easier to grasp when service is defined in the first place. Grönroos (2008, p. 52) defines service as follows: “a process consisting of a series of more or less intangible activities that normally, but not necessarily always, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solution to customer problems.” This widely accepted definition is quite broad and generally focuses on interaction perspective. Servitization is about transition from the physical world to intangibles. For this reason, it must be distinguished from products. According to Van Looy et al. (2003), the features of services include the following items:

- Customer participation, which refers to interaction between supply and demand, value co-production.
- Simultaneity of supply and consumption occurring.
- Perishability of the operation once process is complete and stock lacking.
- Intangibility—nonphysical nature of the service.
- Heterogeneity—customer participation may induce variability and reduce control.
- Nontransferable ownership.

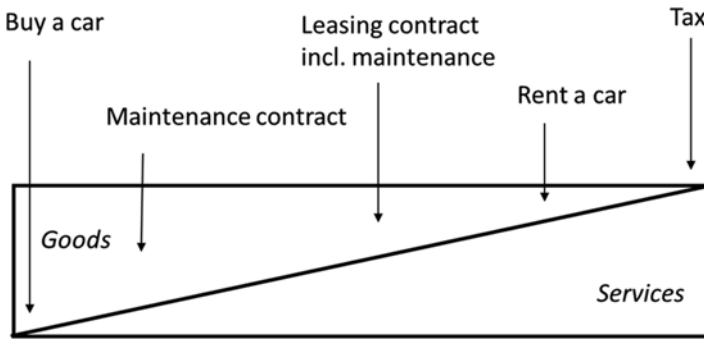


Fig. 2.1 Products are a “bundle” of goods and services. Servitization refers to the transformation toward the *right side* of the picture

According to Neely et al. (2011), there can be different types of services that are offered as the extension to a tangible product, such as:

- System services combining tailored product offerings into customer solutions.
- Design and development services supporting the operational performance of the product utilization.
- Maintenance and support to extend product life cycle.
- Retail and distribution services to improve the accessibility.
- Commissioning and installation services to complete implementation and operationalization.

The spectrum from pure physical products, the goods, to pure intangible services is quite wide ranging. In many cases both elements are involved to a certain extent. Servitization is about moving in this spectrum toward the service end (Edvardsson et al. 2005; Gebauer 2008; Gebauer and Friedli 2005). Ren and Gregory (2007) defined servitization as “a change process wherein manufacturing companies embrace service orientation and/or develop more and better services, with the aim to satisfy customer’s needs, achieve competitive advantage and enhance firm performance.” Another practical definition is given by Ward and Graves (2005): “increasing the range of services offered by a manufacturer.”

Figure 2.1 illustrates the spectrum from goods to services and examples of transportation-related solutions for markets. On the goods side, buying a car could be an example of an investment. Maintenance contracts or warranty services could add an intangible part. A leasing contract would add the finance service element and reduce the ownership aspect. Car rental would present short-term commitment and bring the focus onto actual operations. A taxi cab could be presented as a pure service example in this case. The spectrum is not discrete by nature but smoothly continuous. Due to the dual nature and coexistence of the elements, a product-service system (PSS) or product-service bundle concept is used.

Table 2.1 shows the differences between physical products and intangible services from different perspectives. The focus is very different in terms of delivery. Life cycle management of assets brings the operational cost aspects to the forefront

Table 2.1 Products and services—characteristics

	Products	Services
Scope of delivery	Physical delivery	Physical delivery
		Maintenance
		Support
Scope of life cycle	Delivery	Delivery
		Operations
		Reverse logistics
Financial transactions	On delivery	Per use
Number of supply chain transactions	Few	Frequently
Cost accounting focus	Capital cost of investment	Capital cost
		Operational costs
		Expected life cycle
		Interest rates
Number of supply chain end points	Few delivery addresses	Large number of actual sites of use
End point types	Customer delivery to next level in supply chain	End users
Demand pattern	Fluctuations based on investments	Stable based on actual use
Supply chain efficiency focus	Delivery	Response to end-customer requests
Unit of analysis	Customers	Installed base

Source: Neely et al. (2011)

compared to investment costs and capital expenses. Managing installed base and actual operation transactions instead of delivering the physical machinery is another transition that can be perceived.

Many manufacturing companies have realized that the gradual enriching of their offering is at least a promising, if not a necessary, development path. The shift toward servitization is in itself nothing unique or recent. However, the scale and speed of the servitization has been increasing considerably. Although servitization is generally referred to as a Western phenomenon (Baines 2013), many less industrialized countries are following. According to Neely et al. (2011), even China, a country traditionally dependent on manufacturing as the main driver of economic growth, has now noticed a sharp increase in GDP generated from services.

Neely et al. (2011) also look at servitization in different countries by examining the percentage of manufacturing companies that have shifted to offering services between the years 2007 and 2011. Figure 2.2 presents their findings and it shows that the degree of servitization has increased in most of the featured countries. In the data the USA and Finland are the leading countries followed by European countries and Singapore and Malaysia in Asia.

Transformation is emerging in consumer business and the business to business side is adapting the models. Some interesting benchmark in business models is

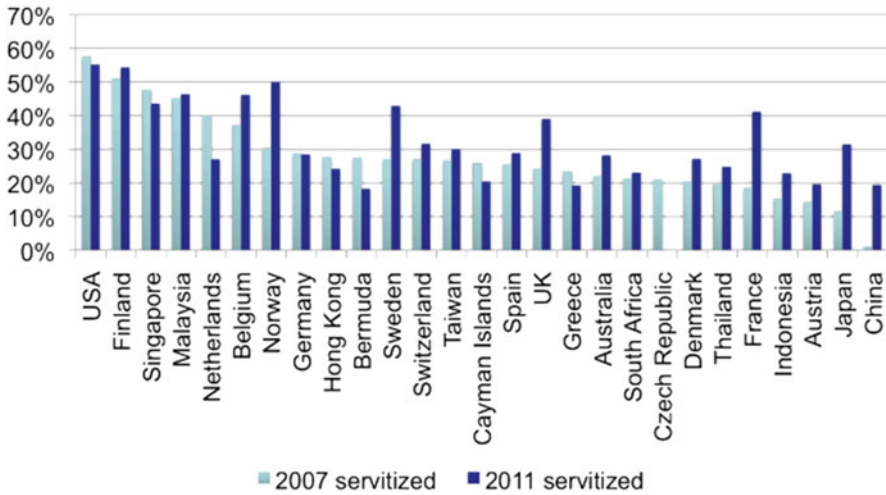


Fig. 2.2 Percentage of manufacturing companies that have shifted to offering services in the years 2007–2011. Adapted from Neely et al. (2011)

proposed by Botsman (2010), who suggests a transition from how a car is seen as an owned product toward something bought as a service, as illustrated by the examples of Zipcar—a company acquired by the Avis Budget Group. The ownership of an asset-related servitization phenomenon itself would be similar to how the music industry has seen a transition from physical products (CDs) to intangible electronic files (iTunes) and ultimately subscription service (Spotify). There is a gap between what technologies enable and what companies are actually doing in the field of organization and managing supply chains in industrial services.

What industry is about to see is that transformation is also taking place in the business to business environment. Consumer businesses are teaching the masses the benefits of technology-enabled services. The process of transformation is enabled by information and communication technologies and real-time access to data. Supply chain structures and key performance indicators are affected by these changes. For these reasons industrial service models are shaping future supply chain architectures.

2.2 Definition of the Concept

Vandermerwe and Rada (1989) provided the first definition of servitization and sparked a stream of research in the field. The authors perceive servitization as “market packages or bundles of customer-focused combinations of goods, services, support, self-service and knowledge.” Baines et al. (2009) define servitization as “adding value by adding services to products.” According to Baines et al. (2009),

the main drive toward servitization is that the integrated product-service offering is an excellent means of building a long-term competitive advantage. The authors also provide a concise overview of the most significant definitions of servitization over the period between the years 1998 and 2007. While the core meaning has remained unchanged, the idea has been described in terms of a “trend,” “integrated bundle,” “strategy,” and “change process.” Therefore, it can be stated that the definitions of servitization differ in their scope. Baines et al. (2009) conclude that servitization is “the innovation of an organizations capabilities and processes to better create mutual value through a shift from selling products to selling product-service systems (PSS).”

Baines et al. (2009) define product-service system as “an integrated combination of products and services that deliver value in use.” Although those two streams of research have been developing separately, Baines et al. (2009) claim that nowadays PSS can be considered as a subset of servitization research. Baines et al. (2009) propose a summary of the most important definitions of servitization (Fig. 2.2). Baines et al. (2009) examine the main features of servitization. The authors outline the following:

- Strong customer centricity
- A multi-vendor approach to delivery of the solutions tailored to individual customers
- A shift from product-oriented services toward user process-oriented services
- A transition in the nature of customer’s interactions—from transaction based to relationship based

There are various factors motivating the decision on servitization. The three main goals as identified by Baines et al. (2009) include financial, strategic (creating the competitive edge), and marketing. According to the authors, financial drivers translate into higher profit margins and stability of income, while strategic drivers are all about creating a competitive advantage. According to Baines et al. (2009), competitive advantage can be gained by using services to differentiate manufacturing offerings as well as provide crucial competitive opportunities.

2.3 Commodization and Decommodization

Commodization and decommodization are concepts related to the servitization process. According to Matthyssens and Vandenbempt (2008), commodization is defined as a “dynamic process that erodes the competitive differentiation potential and consequently deteriorates the financial position of any organization” (p. 317). The authors claim that commodization frequently occurs through standardization, customer experience, and competitive imitation, which, in turn, lead to a profit squeeze. Profit squeeze can be described as deteriorating financial performance. Moreover, the authors claim that commodization is often considered a deliberate customer tactic that is targeted at increasing bargaining power by undermining or

Table 2.2 Strategies to counteract commodization

Value proposition base	Differentiation base
Product leadership	Product innovation and superior product qualities
Customer linking	Service innovation and customer bonding
Cost leadership	Operational excellence and fair value solutions

Adapted from Matthyssens and Vandenbempt (2008)

eliminating differences between offerings competing in the marketplace. Commodization can be considered a key challenge of business markets and, more importantly, it is also a main drive of servitization.

Decommodization is the reverse process which may take place when the commodization process leads companies to a profit squeeze, which is rather an unwanted situation. Therefore, certain strategies can be adopted in order to counteract commodization and target the mastering of certain niches. Matthyssens and Vandenbempt (2008) outline three main strategies based on different value propositions (Table 2.2)—(1) product leadership as a differentiator, (2) customer linkage as process integration media, and (3) cost leadership as a differentiation strategy focusing on efficient delivery of service.

2.4 Manufacturing and Service Organizations

In order to fully grasp the nature of servitization, it is also crucial to understand the generic division of organizations into manufacturing and service. The main characteristics of manufacturing and service organizations are summarized in Table 2.3, based on the research conducted by Reid and Sanders (2005).

Servitization implies a shift extending the offering beyond tangible products, which on the one hand enables organizations to achieve higher profit margins, while on the other posing additional challenges.

Servitization in manufacturing companies has been studied by several authors, mainly by using a case study approach. Some of the reported cases include:

1. Thales flight simulator systems and training of airline pilots (Davies 2004)
2. The Rolls-Royce “Power by the Hour” maintenance concept for the jet engines (Howells 2000)
3. Xerox copy machines with guaranteed unit cost per copy (Mont 2002)

A common component in all these examples seems to be bundling the maintenance component with the physical product and simultaneously putting the focus on life cycle costs and operational expenses. Organizational changes are needed and new types of contracts to clarify the responsibilities of each partner in imaginable situations. In addition to trust and contracts, technology is used to keep a close to real-time view on actual asset utilization.

Table 2.3 The main characteristics of manufacturing and service organizations

Manufacturing organizations	Service organizations
Product	
Tangible	Intangible
Storing and warehousing	
Possible	Not possible
Contact with customer	
Relatively low	Relatively high
Response time	
Relatively long	Relatively short
Requires	
Capital	Labor

Adapted from Reid and Sanders (2005)

2.5 New Service Development

According to Edvardsson (1997), there are three crucial service components: concepts, process, and systems. In service design or development, each of the aspects needs to be covered. The service concept is about packaging the offering to customers and standardization of the offering for service providing. The process factors refer to actual execution of the service transactions: both what is visible for the customer and what is not. The service component of the system is about the resources needed to conduct the process (Table 2.4).

The process of new service development may vary, depending on the company. Information about market demand may be collected systematically from advanced users, or companies may benchmark similar solutions from competitors or other industries. Kindström and Kowalkowski (2009) propose a four-stage framework for new service development. The stages proposed by the authors are summarized in Table 2.5.

2.5.1 Service Blueprinting

One possible approach to model service interaction from the process management point of view is to use the service blueprinting technique (Bitner et al. 2008). Service blueprinting is an approach reminding of the swimming lane diagram used in business process reengineering. The process flows from the top left corner toward the top right. Instead of having the resources and actors in columns, the layers are divided based on what the customer sees and what is not perceived directly. The idea of service blueprinting is focused upon the processes occurring in an organization while it interacts with its customers. Zeithaml et al. (2006) propose the following elements of service blueprinting:

- Physical elements needed to complete transactions.
- Customer actions in the service encounter.

Table 2.4 Service components

Component	Description
Service concept	What customer need and how to satisfy those needs (service offer)
Service process	Chain of local and central activities to produce the service
	Front office processes—those encountered by the customer
	Back office processes—internal, no interaction with customers
Service system	Resources required for service process and the service to be provided (company's organizational structure, physical and technical resources, customers, and employees)

Adapted from Edvardsson (1997)

Table 2.5 New service development (NSD) stages

Stage	Description
Market sensing	Occurring within a company, based on a dialogue with customers and any other actors such as systems integrators, consultants, and contractors
Development	Combining NSD and NPD efforts, more cross-functional and intraorganizational than NPD; processes are customer intensive
Sales	Tangible actions for commercializing and scaling up the new services. The main challenge of this phase is to help customers appreciate the distinctiveness and benefits of the new offering. Employees responsible for selling of the new offering should have sufficient knowledge. The organization must ensure the delivery of superior service
Delivery	Elementary different from the delivery of products. Services are created in an interaction with the customer during the process of delivery. Most services are people intensive and rich with interactions, which is why they often create new cost centers. Therefore, the delivery of services often requires specific service infrastructure

Adapted from Kindström and Kowalkowski (2009)

- Onstage contact employee actions, visible to the customer.
- Backstage contact employee actions which may be completed synchronously or asynchronously and are not visible to the full extent to the customer.
- Supporting processes help the main process and could also include information systems and other external key process elements.

Other notable concepts in this model include:

1. Line of interaction, which takes place between customer actions and onstage contact employee
2. Line of visibility, which takes place between onstage contact employee and backstage operations

In the context of service-dominant logic, service blueprinting as a method should be further enriched with mapping the customer's role in value cocreation. Service blueprinting is a visual method that allows seeing the overall idea of a situation. Figure 2.3 presents an example of a service blueprint for placing an order for repair

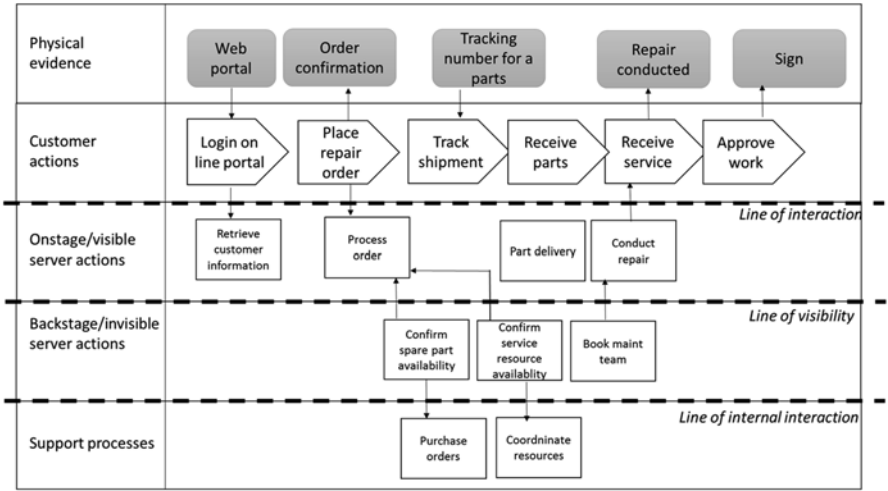


Fig. 2.3 An example of a service blueprint—ordering and receiving repair service for machinery

service by using an online portal. The physical and intangible service components of the delivery are intercoupled in this example and information is supplied throughout the process.

2.5.2 Service Innovation and Business Models

Service innovation and development of new business models are related with each other. The introduction of a new service product very often means a new business model in terms of pricing or service delivery. According to Kindström and Kowalkowski (2014), innovation seen from the service perspective means “a recombination of resources that creates new benefits for any actor—customer, developer, or others—in the business network” (p. 97). The authors claim that profitable manufacturers must be able to “capture an equitable share of the value created” (p. 97) (Fig. 2.4).

Osterwalder and Pigneur (2010) created a highly visual tool for generating business models—a business model canvas. Figure 2.5 presents a comparison of the elements of the generic business model canvas as proposed by Osterwalder and Pigneur (2010) (right-hand side) and the business model for service innovation as proposed by Kindström and Kowalkowski (2014) (left-hand side).

Kindström and Kowalkowski (2014) have proposed a systematic approach for development and analysis of business model for service innovation. Table 2.6 summarizes the elements of the model. The key elements are (1) offering, (2) revenue model, (3) deployment process, (4) sales, (5) delivery, and (6) customer relationships. The value network element is the supply chain delivering the services.

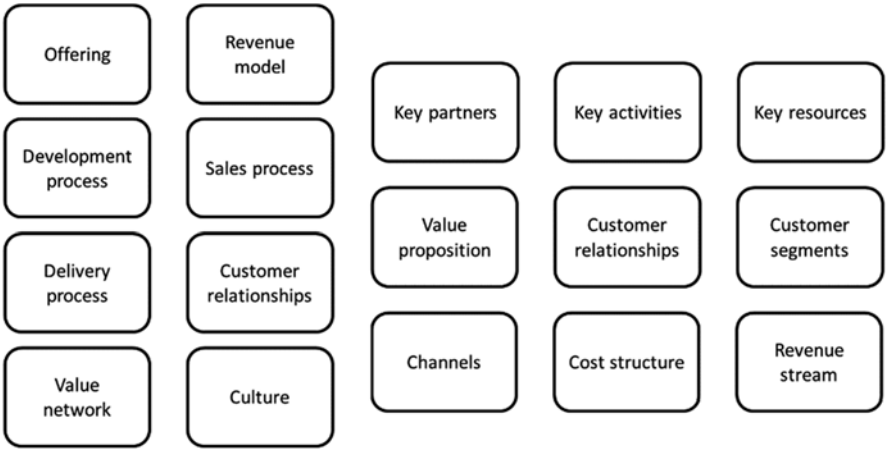


Fig. 2.4 A comparison of generic elements of business model canvas (adapted from Osterwalder and Pigneur 2010) and the business model for service innovation (adapted from Kindström and Kowalkowski 2014)

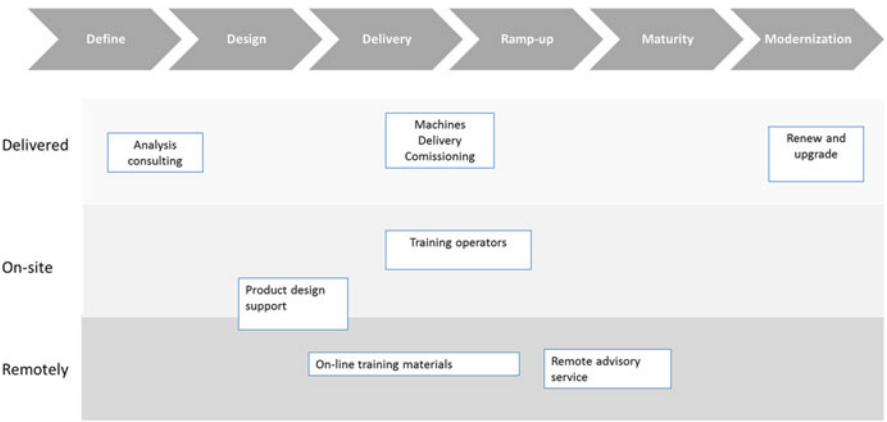


Fig. 2.5 System life cycle and service offerings

2.6 Product Life Cycle as Platform of Servitization

The life cycle of the product presents one approach to analyze possible service interactions with the customer. Maintenance services and extended warranties are typical initial steps toward the operation side. For machine operators, the life cycle analysis approach may be used as a reference model for development as well as an approach to use for total cost of ownership in decision-making.

Table 2.6 Business model for service innovations, adapted from Kindström and Kowalkowski (2014)

Component	Explanation
Offering	Understanding of what services to offer, as well as how to develop a complete portfolio of services is required as well as the agreement on the degree to which services would be standardized. Customer needing (Strandvik et al. 2012) must be aligned with supplier’s offering
Revenue model	Product and process data as the key input for revenue models. Pricing capability is essential in determining how to charge for services and how to change service models if needed
Development process	Service development, sales, and delivery as the processes critical to service innovation
Sales process	Need to align incentive system with strategic service objectives in order to promote the sales of services and change the behavior of product-centric sales force. Customer involvement is critical
Delivery process	Successful service delivery requires an existing field service network. The process is an continuous customer-supplier relationship based on commitment and trust
Customer relationships	Stability of customer interaction as a facilitator of the development of lasting customer relationships. For instance, customers provide valuable information that enable suppliers to provide better services and improved customer satisfaction
	Customer embeddedness as an essential capability and it refers to an organization’s ability to develop close
Value network	A distribution network is a meaningful resource in creating value as it not only provides service sales and delivery but also offers critical information about customers, service operations, and the market
Culture	Adding services might help organizations create internal awareness of the importance of services as well as the potential for adding more
	Creating a service culture requires a long-term orientation

2.6.1 Life Cycle for Machinery Delivery

The following example illustrates the business to business interactions in the case of acquiring and operating machinery (Fig. 2.6). The first phase is related to the definition of the customer needs and outlining a requirement specification. Analysis and consulting related to asset investment are conducted with the customer in this phase. Typical deliverables include reports, payback calculations, and simulation models. The next step in the process is design of the product as well as product configuration documents. Product specification and engineering services may take place in this phase. Also training for operators can be initiated in this phase. The actual physical delivery refers to logistics of the product and initiation of installation and commissioning work at the customer site. As machinery is becoming increasingly smart and integrated to the Internet, technology provides opportunities to utilize online delivery methods.

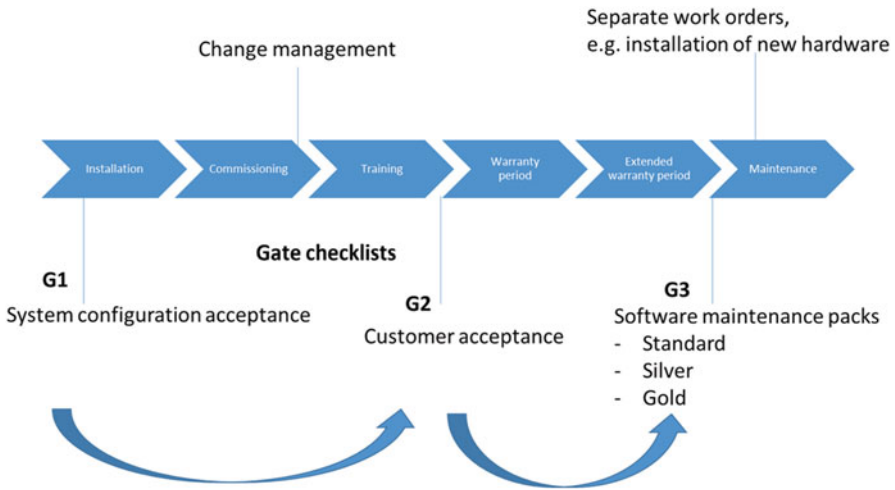


Fig. 2.6 Gate model in software delivery and transformation to maintenance

The training of operators may be conducted as an online service as well as presence education. Approval testing takes place and operations are phased to ramp up to expected volumes. In this stage, local support with physical presence is needed, and remote fleet management systems can be started to offer remote advisory service. Warranty is started and service level agreements are measured.

The final stage of the life cycle is approaching maturity. The maturity phase refers to full-scale utilization of the system and support for operations and maintenance is active. In this phase, operational needs are mapped and the system can be upgraded to support current needs.

2.6.2 *Software Process Life Cycle*

Many products have a software part which is responsible for creating an important set of functions and features of the system. Software enables the smartness of products. From the delivery point of view, it also brings flexibility and reduces delivery time. Software is a medium to adapt the same physical system to cover the various needs coming from customers. Software engineering is used to tailor the product to suit the customer needs (Fig. 2.6).

The challenge is that software is developed in cycles and consists of modular structures. Completely new features are developed in the research and development. Tasks include testing new technologies, prototyping and conceptual development, and managing requirements and issues coming as feedback and bugs from the customer sites. The core of the software, the kernel components used in all installa-

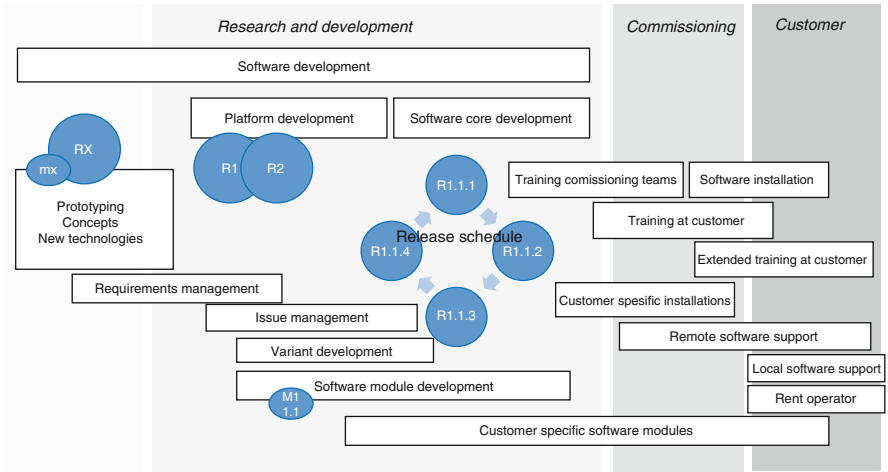


Fig. 2.7 Software life cycle and service offerings for a machine building company

tions, is produced by maintaining stability and backward compatibility. Smaller features and variants are developed based on requirements and issues. Organizations are keeping a standardized cycle to release software versions a few times per year. Hot fixes and patches are released in order to fix possible safety and security issues perceived.

The role of software organizations is multi-threaded by nature. On the one side, customer requirements are implemented as requested and general development of the software is performed. On the other side, installation and commissioning generates many tasks for software engineers to support the product-service delivery. Training support is needed and when an actual operator of the machinery gets started, the requirements are very often revised, which may result in a significant amount of rework. As the functionality of machinery is determined by the software, a continuous and frequent communication may take place for a long time after physical commissioning has been completed. A well-defined service level agreement and product packaging help in dialogue with the customer. It is important to know what is included in the deliveries, what is available as after-sales services, and what part needs to be agreed separately (Fig. 2.7).

2.7 The Servitization Paradox

The servitization process is complex and time consuming. Not all attempts are successful. Gebauer et al. (2005) define the service paradox as a situation when remarkable investments in service business expansion lead to increasing service offerings and higher costs while failing to gain the expected increased profitability.

In their research aimed at discovering the global trends in servitization, Neely et al. (2011) use longitudinal data from the years 2007, 2009, and 2011. The authors identify a widespread effort to servitize and highlight the importance of the servitization paradox based on numerous examples of unsuccessful servitization. The authors conclude that the success of servitization will be largely dependent upon building the right organizational capabilities and culture. Servitization offers many potential benefits for organizations. However, it is crucial to acknowledge the existence of the servitization or service paradox.

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