

Product-Service Systems across Life Cycle

Process Identification for Customer Service in the field of the After Sales Service as a Basis for “Lean After Sales Service”

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Abstract

Original Equipment Manufacturers have recognized that offering After Sales Services enables high revenues. Above this, the offer of After Sales Services combined with primary products is an appropriate instrument to improve customer satisfaction and loyalty. But due to the noticeable increasing competitive pressure in the After Sales Service, a possible solution is the implementation of Lean principles to optimize the customer service-processes. These processes all pursue the target to satisfy the customer's needs. But due to the variety of these processes and difficult, changeable conditions in customer service (varying workload, required material and tools, changing working environment ...), there is no valid framework concerning the general conditions and objectives of customer service-processes or no holistic approach for process structuration in these processes. But the framework identification of general conditions as well as a holistic process structuration in customer service is the necessary basis for the implementation of Lean principles. Within this paper (based on a research project funded by the German Research Foundation), the development of a methodical approach to identify general conditions, customer service-objectives and to create a holistic process structuration will be described, which should help the OEMs offering customer services to identify and structure these processes. By the use of this methodical approach, OEMs will be enabled to create a structured process landscape. In the future, this process landscape provides an initial point to implement Lean principles, such as Continuous Improvement or Waste Reduction, in customer service.

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1. Introduction

Original Equipment Manufacturers (OEM) attach importance to customer orientation and, with this, to customer service in order to differentiate themselves from competitors. The exclusive offering of primary products is no longer a unique selling point. [1] Products are becoming increasingly interchangeable and similar in both quality and price. Therefore, companies bring the offering of After Sales Services into focus in order to achieve a competitive advantage so that almost 60 % of the manufacturing companies are offering After Sales Services. [2] This is mainly based on the fact that services that complement the primary product are responsible for 75 - 80 % of the company profit [3].

The Figure 1 illustrates the differences between the product sale and the After Sales Service. It becomes evident that the After Sales Service can provide several advantages. For instance, the After Sales Service is very independent of the economic situation, offers high margins and the business is stable in times of crisis. Moreover, there is a high potential for revenue growth, intense contact / exchange with customers and innovations. [4]

Besides the advantages from the After Sales Service, there are several difficulties, for example high variance and complexity in processes and rising customer expectations towards the service offering and its quality. [5] Not only more and more offered services increase the complexity in After Sales Service but also the complexity and variant diversity of primary products contribute to After Sales Service

complexity. [3] Therefore, this paper deals with the high variance and complexity in the After Sales Service and a possible approach to face these difficulties by identifying and structuring these processes is presented.

	Sales	After Sales Service
Independency of economic situation	Very high	Low
Margin	Low	High
Behavior in times of crisis	Profit and sales collapse	Stable
Forecast horizon	Short product life cycles	Long service intervals
Contact to customer	Singular customer contact	Intensive, long lasting contact
Gathering customers needs	Limited	Good, due to intensive contact with the customer
Growth and innovation potential	Often already limited	High

Fig. 1. Comparison between Sales and Service [4]

This paper is organized in five sections. The focus of the research is described in section 1. The second section describes the After Sales Service. Based on these two sections, the need of improvement is explained in section 3 and a methodical approach is given in section 4. Section 5 covers the final conclusion.

2. Customer Service in the context of After Sales Service

The After Sales Service can be typically divided into three organizational segments; the Spare Parts Service, the Customer Service and the Accessories Business (see Figure 2). [7] The field of Spare Parts Service covers the disposition, pricing, sales, logistics as well as the demand forecast of these parts. It ensures the availability of spare parts during the complete life cycle of the product by using spare parts management strategies. [8] The Accessories Business comprises parts and products to satisfy additional customer’s desires (e.g. license products or technical equipment). [9]



Fig. 2. Trisection of the After Sales Service [7]

The focus of this paper is the Customer Service and its tasks and operations. In this context, maintenance, repair and

overhaul of the products are part of the Customer Service. [10]. Customers do not only expect a just in time-spare parts delivery. The expectations of customers have changed in such manner so that they want to have a central contact person for any questions or problems. This contact person has to be available at any time, gives information and can help as well as take care of customer-specific problems. [11] But further extra Customer Services, such as commissioning or installation of equipment and machinery [12], as well as employee training are requested additionally by the customer [13].

The importance of this part of the After Sales Service is also becoming evident by the high margins. [3] But in future, customers will expect even more service and support processes from the OEMs with higher quality and lower costs. [5] Moreover, in After Sales Service, analogous to primary product sales, the quality of the offered services will assimilate. This is based on the rising customer expectations that OEMs try to meet. [14] In consequence, in future there will be a higher competitive pressure [15] so that OEMs have to strengthen efforts in Customer Services to maintain customer loyalty, to create unique selling points and to satisfy the individual customer needs as well as expectations. [16]

Therefore, OEMs will shift from a product-orientation in their organizations to a service-orientation, particularly OEMs that are offering technological mature products with no opportunity of differentiating in the market. [17] Moreover, the complexity in Customer Service will grow because of a continuously increasing number of Customer Service offerings that is necessary to ensure the market position and share. [18]

3. Need for improvement in Customer Service processes

At the time of writing, the research project “Systematic adaption of lean production system principles to After Sales Service for customer focusing and waste reduction” (funded by the German Research Foundation “DO 755/26-1”) is in the initial phase. In the first two work packages of the research project, an environmental analysis of the general conditions in After Sales Service as well as the structuring of the Customer Service processes takes place. With this, characteristics and appropriate specific values that are typical for the different processes and for the general conditions in Customer Service of the After Sales Service shall be identified.

This analysis is necessary due to the complex and highly variable processes in Customer Service. Due to the high complexity and variance, OEMs have to face the problem of insufficient process standardization and customization. [14] That means that there is a lack of process standardization so that OEMs and their employees are not able to refer to process standards or structured processes. [19]

A further difficulty in Customer Services is the high number of various work contents, varying lead times and fluctuating customer demand. [20] These problems result in non-added-value-processes. For instance, 45 % of the maintenance processes do not add value for the customer. This huge percentage of processes can be traced to missing

process standards, work planning and insufficient leadership. [21]

The described lack of transparency, standardization and process orientation is the main reason for waiting times, waste and human mistakes that lead to rework in Customer Service processes [22], [23], whereas for instance in production divisions this waste and mistakes are mainly eliminated. [24]

Hence, all production processes can be focused on the customer needs and demands. To realize this customer orientation in production, the implementation of a Lean Production System is a suitable approach. For this purpose, principles like “Continuous Improvement Process”, “Avoidance of Waste”, “One piece flow” or “Standardization” have to be integrated in the organization or respectively in production division. For this purpose, the guideline “Lean Production Systems” provides a methodological guideline including principles, methods and tools whereby methods and tools represent the concrete realization. Consequently, methods and tools serve to achieve the objectives that are specified by the management for the production. [25]

If OEMs adjust their processes to the customer and realize a holistic process standardization in Customer Service, it is also possible to implement a Lean Service Systems analogous to the production. [20]



Fig. 3. Need for improvement in Customer Service processes

The first step for the development of a Lean Service System, as mentioned before, is the development of methodological approach for process identification and structuring in Customer Service. The presented approach can be used by OEMs to analyze, optimize and adjust their Customer Service processes. Benefit of this methodological approach is the identification and reduction of waste in Customer Service processes as well as the focus on the customer need. By doing this, a valid initial point can be generated to implement an OEM-specific Lean Service System.

4. Methodological approach for Process Identification in Customer Service

This section contains the description of the methodological approach which allows OEMs that are offering After Sales Services to analyze and optimize their Customer Service-processes. The added value of this methodological approach is the assessment of general conditions in Customer Service as well as the identification of objectives in the field of Customer Services. These objectives can be divided into internal and external objectives whereas internal objectives are defined by the OEM-Management and external objectives are required by the customers. Hereafter, the analysis of the Customer Service processes has to be executed. On this basis, OEM-specific standardization, optimization and adjustment are possible.

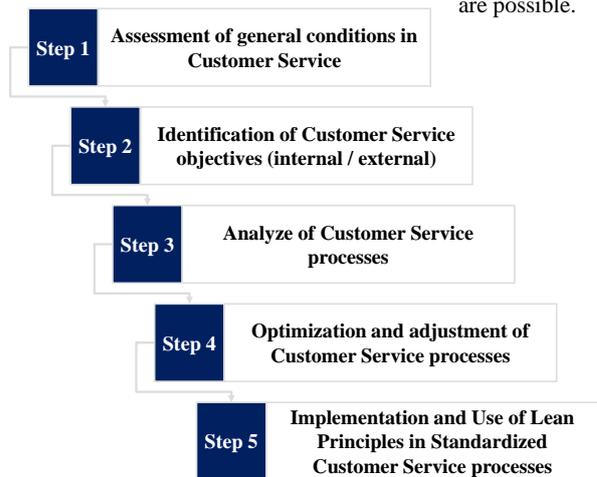


Fig. 4. Methodological approach for Process Identification in Customer Service

It is worth pointing out that there is no general way in using the methodological approach. It has to be performed OEM-individually because of the huge differences between the Customer Service processes and objectives of the respective OEM.

4.1. Assessment of general conditions in Customer Service

In the first step, general conditions of the Customer Service have to be identified. Possible examples for these general conditions are:

- Environmental influences
- Competitive influences
- Legal influences
- Ecological influences
- Economic influences
- Social influences
- ...

Because of the huge number of different influences, it is not possible to define general conditions that are valid for every OEM that is offering Customer Services. But in the context of the described research project, a survey will be carried out so that basic conditions can be concluded. On this basis, OEMs can get a brief overview of influences that can be relevant in context of the Customer Service. However, the respective OEM has to carry out the concrete identification by itself.

Each identified general conditions have to be evaluated and have to be adjusted, if necessary, to the OEM-specific situation. Possible questions for general conditions can be the necessity of Customer Services, if the offers in Customer Service are demanded, Customer Services without demand, or additional Customer Services that are offered by competitors.

The result of this step is a holistic overview of the general conditions in Customer Service with focus on the respective OEM. Moreover, the evaluation of the general conditions helps to concentrate on the relevant influences in the field of the Customer Service.

4.2. Identification of Customer Service objectives (internal / external)

Internal objectives of the Customer Service can be derived by the Management of the OEM. Here, the “Assessment of general conditions of Customer Service” can constitute an initial point for the development and definition of Customer Service objectives. Possible objectives in the After Sales Service are the enlargement of the Service portfolio (trainings, innovative upgrades, full-service agreements ...), increase of the customer loyalty, long-term relationship, differentiation from competitors, reduction of reaction time, reduction of process time, effective Service network, and reduction of failure costs, profit increase. [23], [24]

		Internal objectives (obj.)					
		Obj. 1	Obj. 2	Obj. 3	Obj. 4	...	Obj. n
External objectives (obj.)	Obj. 1	-	+	o	+	...	+
	Obj. 2	+	+	-	-	...	+
	Obj. 3	+	o	o	-	...	+
	Obj. 4	+	-	o	-	...	+
	Obj. 5	-	+	+	o	...	o
	o
Obj. n	+	o	+	+	-	o	

+: Positive influence; o: No influence; -: Conflict of objectives

- Identification and evaluation of appropriate objectives
- Solution of Conflict of objectives
- Definition of objective system

These internal objectives have to be chosen and adjusted to the concrete offered Customer Service. It is not possible to subsume general internal objectives for the field of Customer Service.

External objectives are demanded of the customer. The customer expects that its production is in top condition at all time so that there almost no downtimes that incur high costs. Customers demand fast service access, 24/7-services and contact persons, fast replacement and supply of defect parts, flexibility, high service quality, defect liability, fast reaction times and predictable costs. To sum it up, the customer requests fast problem solutions. [24], [18]

The external objectives can be identified by executing customer demand analysis. In this way, OEMs can assess the relevant and required external objectives.

Moreover, the consequent orientation towards the customer is a basic requirement for a successful Customer Service. Therefore, the possible conflicts between internal and external objectives (for instance, high profit in Customer Service vs. favorable price) have to be identified. Hereafter, an OEM-specific solution has to be found for the internal and external objective as well as the conflict of objectives.

4.3. Analyze of Customer Service processes

In order to improve the Customer Service, all processes have to be optimized. Due to the high complexity and variance in Customer Service processes, it is important that the OEM generates a complete overview of all Customer Service processes by identifying and analyzing all relevant processes. On this basis, the creation of a Big Picture or Process Landscape is necessary that includes all offered Customer Services as well as the support processes (for instance spare part supply, administrative tasks ...).

The following step is the detailed and structured analysis of the respective Customer Service process. Based on these tasks, the modeling of each Customer Service process can be carried out. Possible methods are Swim lane diagrams or Service Blueprints. [26] In this manner, it is possible to identify interactions and interdependencies between support processes and Customer Service processes.

This structural approach for identifying the processes in Customer Service provides the basis for the optimization and adjustment of the offered Customer Services. But it is also helpful to detect whether the OEM offers all Customer Services that are required by the customers (see “4.2. Identification of objectives (internal / external)”).

4.4. Optimization and adjustment of Customer Service processes

Based on the identification of internal and external objectives and its conflicts combined with the output of the Customer Service process analysis, it is now possible to optimize and adjust the processes in Customer Service. All

Fig. 5. Identification of internal and external objectives

identified processes should be redesigned so that they meet the criteria of Customers and internal Management objectives.

By focusing on the process redesign and process organization, sustainable service performance improvements are realizable. Inefficient processes and sources of waste in Customer Services can be eliminated by the process redesign. [27] Therefore, appropriate interfaces between Customer Service processes and support processes as well as concrete responsibilities have to be defined. But here, it is important that the numbers of interfaces between the respective processes are kept to a minimum. A high number of interfaces results in a high coordination effort and a higher risk of unclear competencies in the processes. This can prevent the transparency of the Customer Service processes. [25]

Appropriate methods for the visualizations of the Customer Service processes are the use of the Swim lane diagrams or the use of the Value stream mapping. The Swim lane visualization provides information on activities and responsibilities for (sub) processes as well as direct interfaces between the (sub) processes. Hereby, mistakes or unnecessary interfaces in the processes can be identified and optimized. [28] By using the Value stream mapping, it is possible to visualize the current Customer Service processes and to identify non-value-adding processes or waste in the (sub) processes. Subsequently, it is possible to adjust all processes, material and information flows to the customer's needs with the help of the Value stream design. [29]

By the redesign of the Customer Service processes (based on the results of Swim lane visualization or Value stream mapping) defined input, outputs and key figures can be specified for all processes so that it is possible to achieve a transparency in the Customer Service processes. [30] By measuring the specified key figures, the control and monitoring of the Customer Service processes is realizable. [27]

On the basis of a consequent process orientation, internal or external objectives can be met more easily. For example, strategic internal objectives like higher customer loyalty and satisfaction, simplified processes, increased accuracy or higher market share can be realized. Besides the internal objectives, it is also possible to support external objectives that are required by the customers, like higher flexibility and shorter reaction times, lower prices or shorter process times for Customer Services. [31]

4.5. Implementation and Use of Lean Principles in Standardized Customer Service processes

After the assessment of general conditions in Customer Service, the identification of internal and external objectives, the detailed analysis and the optimization and adjustment of Customer Service processes, the implementation and use of Lean Production System principles is possible. Therefore, principles that are appropriate and approved in production sector have to be adapted to the Customer Service. The use of these principles contributes to the improvement in efficiency as well as the reduction of waste in production sector. [25]

Similar improvements are also realizable in Customer Service if the principles and methods of Lean Production Systems will be established. Therefore, each identified process has to be examined with regard to the implementation of a suitable Lean Principle. Principles like "Continuous Improvement", "Standardization" or "Avoidance of Waste" are generally applicable for all Customer Service processes. [20] The concrete selection of the usable methods and tools depends on the respective process and its objectives. In order to achieve an overall improvement of the respective Customer Service process, it is necessary to synchronize the efforts in terms of Lean principle use. [25]

At this step, the information on the processes (provided by the Swim lane diagrams or Value stream mapping, see "4.4. Optimization and adjustment of Customer Service processes") is necessary to implement Lean Principles in Customer Service. The Swim lane diagram is an opportunity for the Principle "Standardization" in order to create new process standards and to visualize the processes for the employees. Based on these new introduced standards, it is important that the will to improve the Customer Service processes continuously has to be embedded in the employees mind so that the mentality of the Continuous Improvement can be implemented in the organization.

The Value stream mapping is an effective method to reduce waste in the Customer Service processes. By identifying non-value-adding processes and eliminating these processes with the Value stream design, it is possible to focus on the customer's needs and to increase the efficiency in the Customer Service processes. Subsequently, the principle "Avoidance of Waste" can be supported directly.

Finally, the leadership is the main driver and motivator of the new Lean thinking in Customer Service and, therefore, it has to motivate and to provide new impetus. Moreover, it is important to highlight and to value improvements and success at early stages of the Lean implementation so that the employees can see the results of their Lean efforts. With regard to the new "culture" that is based on the Lean implementation in Customer Service, it is crucial that the employees understand the necessity of the change process. Otherwise, there is a chance that resistance of the employees can arise. Reasons for employee's resistance can be skepticism towards the chances of success of Lean in Customer Service because of the Lean origins in the field of production. Therefore, it is crucial that the purpose of the Lean implementation in Customer Service will be explained precisely. Otherwise, employees may fear that the Lean implementation is a kind of a rationalization action.

In order to implement Lean in Customer Service, within the mentioned research project a guideline will be developed that evaluates the principles with regard to the application in Customer Service. Above this, methods and tools will be identified and listed that can help to improve the processes in Customer Service. Thus, the guideline will build an appropriate basis for the selection and application of methods and tools so that it enables OEMs to implement a Lean Service System.

For a successful and sustainable transfer of Lean Principles to Customer Service, it is necessary that the basis and the

methodological approach, presented in this paper on a theoretical level, have to be implemented in Customer Service. Afterwards, concrete Lean Principles, methods and tools can be chosen with regard to the respective, organization-specific conditions on this basis.

5. Summary

The paper showed the need of OEMs to standardize and adjust their processes in the field of Customer Service. Therefore, a methodological approach for process identification in Customer Service is presented. This identification and adjustment of Customer Service processes is necessary to generate an initial point for further improvement of the processes. Hence, in future for OEMs it is possible to implement Lean Service.

For the implementation of Lean in Customer Service it is necessary to implement standardized processes in Customer Services that meet the criteria of the customer as well internal objectives. By means of a concentration on process organization in Customer Service, it is possible to implement principles, methods and tools of Lean Production Systems in order to create a Lean Service System and to focus the Customer Service processes on the customers demand.

But standardized processes can also be supportive for topics like Smart Service or respectively Cyber Physical Systems / Industry 4.0 in After Sales Service. Without standardized processes (including specified, measurable process inputs and outputs) these fields of research cannot be transferred to and implemented in After Sales Service.

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