

# Process Oriented Production System for Service Providing Companies

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## Abstract

Design and realization of services are affected by high individuality and high requirements of quality and productivity. To meet these requirements, numerous approaches have been developed in service research. Although these existing approaches allow a selective methodological support of service design and realization, concepts that transparently display the interrelations between existing approaches and thus allow a coordinated and standardized methodological support of service design and realization are not common. Furthermore, an organizational framework for service providing companies that enables staff to continuously improve both service quality and productivity on the job is missing. To close these gaps, the concept of process oriented production systems that evolved from companies producing physical goods represents a promising starting point. This paper therefore illustrates a framework for a process oriented production system for service providing companies.

## Keywords

Service, Production System, Methodology

## 1 INTRODUCTION

In recent years, market structures and competitive environment of service markets continuously changed. This also led to an increasing dynamic of innovation in the service sector [1]. As a consequence, service providing companies cannot gain advantages in competition by being the cost, quality or technology leader in the market. Furthermore, differentiation by innovative and sustainable services became a crucial factor of success.

To increase competitiveness and to fulfil customer requirements, service providing companies are forced to offer services of high individuality while ensuring high quality and productivity [2]. Thereby, it is up to the service providers to design and organize the service processes in a way that guaranties efficiency in terms of productivity and cost effectiveness. To meet these requirements, numerous approaches have been developed in service research. Although these existing approaches allow a selective methodological support of service design and realization, concepts that transparently display the interrelations between existing approaches and thus allow a coordinated and standardized methodological support of service design and realization are not common. Furthermore, an organizational framework for service providing companies that enables staff to continuously improve both service quality and productivity on the job is missing [3].

To close these gaps, the concept of process oriented production systems that evolved from companies producing physical goods represents a promising starting point. This paper therefore discusses chances and limits of transferring the concept of process oriented production systems to service providing companies and illustrates a framework for a process oriented production system for service providing companies. A concept for planning, implementing as well as steering the process oriented production system for service providing companies completes this paper.

## 2 SERVICES

### 2.1 Characteristics of Services

In the research community, the definitions of service are multifaceted. Up to now, there is no definition available that is generally accepted. Already existing definitions can be classified into following categories: enumerative, negative, institutional and constitutive definitions [4]. From a scientific point of view, the constitutive definition represents the most suitable. It defines service based on specific constitutive attributes [4]. Thereby, there is no global consensus in research concerning these service attributes.

The American literature distinguishes between four main characteristics specifying services:

- **Intangibility:** Services are predominantly performances of actions rather than objects that can be perceived using any of the physical senses.
- **Heterogeneity:** Service products quality is subject to variability because services are delivered by people to people.
- **Simultaneity of production and consumption:** Service products are typically produced and consumed at the same time – consumption cannot be separated from the means of production.
- **Perishability:** Services must be consumed as they are provided. In general, they cannot be saved, stored, returned or carried forward for later use or sale [5].

Authors in British literature also base their definitions on these characteristics. Additionally, relations between them are introduced. In this way, intangibility and customer integration are pointed out as the two main characteristics of services [5]. Thereby, the other service characteristics could be derived from the two main characteristics, e.g. perishability could be derived from intangibility and both simultaneity and heterogeneity could be derived from customer integration. German authors also consider intangibility and customer integration as the main service characteristics. Based thereon, every other characteristic can be derived [6]. Depending on the kind of service, external factors can be personnel resources as well as objects (e.g. physical goods) of the customer.

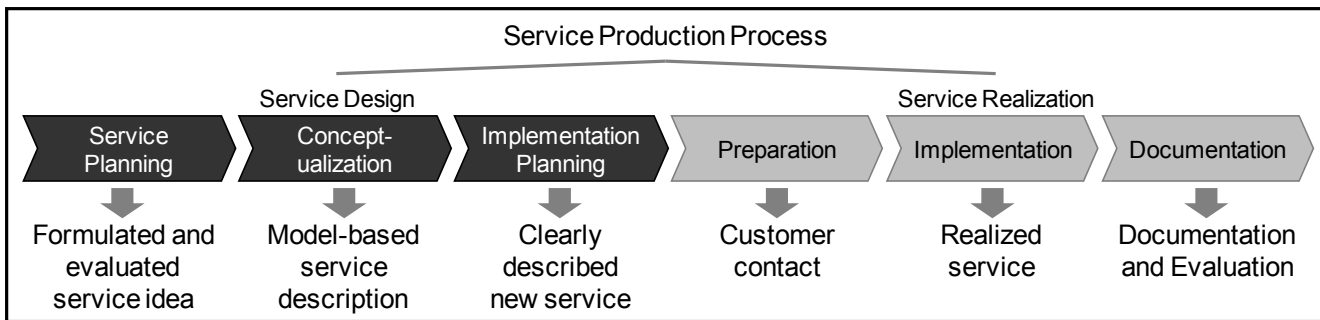


Figure 1: Service Production Process.

When designing and realizing services, three dimensions of services need to be distinguished [4]:

- The result dimension: service components provide the customer with a certain set of expected functionalities.
- The process dimension: service realization is based on different processes that continuously change the state of both the service provider and the customer.
- The infrastructure dimension: the company offering the service provides the resources needed for executing the service realization.

## 2.2 Service Production Processes

A service life cycle consists of two main phases: service design and service realization, whereas service realization follows the service design process [7]. This service life cycle is also referred to service production [8] (Figure 1).

Service design comprises both the planning and the conceptualization of a service as well as the preparation of service realization [9]. Within the service realization, certain activities (process dimension) were carried out on or with the external factors by the service provider applying certain resources (potential dimension). The aim of the activities is to generate an expected result (result dimension). Customer interaction as one of the core characteristics of services primarily takes place during the service realization phase [9].

### Service Design

Already existing approaches to systematic service design (e.g. [10]) mostly comprise three main phases:

- Service Planning
- Service Conceptualization
- Implementation Planning

Service planning comprises all activities necessary for finding, formulating and evaluating service ideas. After the analysis of internal potential, an analysis of the market situation follows. Based on the results, promising service ideas are chosen, formulated in detail and evaluated in a next step. Thus, service planning aims at getting formulated and evaluated service ideas.

The aim of the service conceptualization phase is to substantiate the idea gathered in the service planning phase. Thereby, the components of a service are defined and described by means of predefined service models comprising all characteristics of services. The result of this phase is represented by a model-based service description evaluated against feasibility and marketability.

Implementation planning aims at guaranteeing a systematic and efficient implementation of the service realization phase. This comprises the planning of the resources as well as the processes necessary for the implementation of service realization. At the end of this phase there is a completely designed service.

### Service Realization

The service realization process can be divided into three main phases as well:

- Preparation
- Implementation
- Documentation

The preparation comprises the contacting as well as the planning of the later implementation. By contacting the customer, the appointment for the service implementation is granted. The implementation planning then focuses on the definition of the scope of work as well as the allocation of the required resources.

The implementation phase comprises the substantiation of the initial situation of the customer as well as the realization of the expected service result.

Following the service implementation, the information gathered during the servicing processes are documented and analyzed.

## 2.3 Service Production Management

Two essential functions of the service production management can be derived from the characteristics of service production processes:

- Service production has to be of a continuous customer orientation. Thereby, already existing information provides the basis for both design and realization of service providers' activities that aim at providing the customer with an expected result [11].
- With respect to the efficiency of both the service production processes realized within the service providing company as well as the interaction with the customer, design and realization of service production processes has to consider the importance of the customer and to take advantage of him [12].

### Strategic Service Management

The establishment, development and continuance of a service oriented business culture represent the essential strategic task of an intentional service management. This requires a consistently implemented customer orientation as a central value of the business culture [13].

The definition of standards concerning customer integration represents the major task of the functional service management. Thereby, the form of customer interaction during the service production has to be defined considering spatial, chronological, functional and social criteria.

### Operational Service Management

The constitutive service characteristics as well as strategic decisions affect a multitude of activities that aim at supporting both design and organization of the service production. According to Stauss, these activities can be summarized as follows [14]:

- Tangibility management
- Management of environmental aspects
- Capacity management

- Time management and scheduling
- Human resource management
- Customer management
- Process management
- Quality management

#### 2.4 Conclusions for Methodological Service Support

To strengthen the competitive situation of service providing companies as well as to improve their market position, services have to be realized in a high process and product quality, comparable to the standards of the production of physical goods. Therefore, it becomes necessary that the engineers involved in design and realization of service production processes would link the methods and tools that are already established in the production of physical goods. The experiences made in this step will help them to design and organize customer oriented and innovative service production processes more efficiently [15].

### 3 PROCESS ORIENTED PRODUCTION SYSTEMS

The idea of process oriented production systems as they are widespread in companies producing physical goods goes back to the Toyota Production System (TPS).

The founder of Toyota, Sakichi Toyoda and his engineer Taiichi Ohno developed the so called Toyota Production System (TPS) to cope with the market pressure under turbulent market conditions [16]. The TPS can be regarded as a general framework and philosophy to organize the manufacturing facilities and processes at Toyota as well as the interaction of these facilities and processes with the suppliers and customers to provide best quality, lowest cost, and shortest lead time through the elimination of the seven forms of waste [17]. Thereby, one basic idea was the involvement of all employees [17]. Thus, a process was introduced that helped Toyota to continuously change the performance of the production for the better. Thereby, the basic idea is the increase of efficiency of the production by a stepwise continuous improvement.

Process oriented production systems represent a methodological framework that comprise basic principles, methods and tools necessary to design and organize production processes to produce marketable goods. Due to the success of the TPS and the need to continuously improve the own business, the TPS and several of its inherent methods have been adopted by many European producing companies in order to improve productivity and flexibility of the production [18]. Thereby, very often an adjustment of the basic principles, methods and tools according to the company individual requirements took place. Approaches to support production system planning and design are above all considering waste avoidance in the sense of lean manufacturing [19].

### 4 TOWARDS A PROCESS ORIENTED PRODUCTION SYSTEM FOR SERVICE PROVIDING COMPANY

In order to maximize product and process quality in service production, process oriented production systems as already established in the physical goods industry can be taken as a promising starting point.

Based on an analysis of current process oriented production system concepts, the following fields of action for the design and implementation of process oriented service production systems can be identified:

- To support the continuous improvement process in service production as well as to enhance the motivation of the employees, the characteristics of services require the visualization of services respectively the materialization of the services by means of tangible elements.
- The context of service realization significantly affects the service quality experienced by the customer. Thus, in view of design and organization of service production processes, environmental aspects have to be taken into account as well.
- The intangibility of services leads to increasing demands on the capacity management of the service provider that aims at realizing, evaluating and eliminating quantitative, qualitative, chronological or spatial deficits between the customer demand and service providers offerings.
- Time management of physical goods production mainly focuses on the minimization of the throughput time while guaranteeing high quality products right in time. A comprehensive time management in service providing companies differs significantly. Thus, e.g. the analysis of customers time structures as well as his subjective and objective time perception, the planning of capacities provided by both customer and service provider as well as the scheduling of service production processes have to be taken into account.
- During service production, the employees of the service provider are often interacting with the customer. Thus, both the behaviour as well as soft skills of the employees becomes a significant role for the service quality and productivity perceived by the customer. Therefore, human resource management in service providing companies has to be complemented by service specific approaches.
- An efficient design and organization of service production processes also makes high demands on the customer, e.g. in view of providing necessary information. Therefore, the steering of customers' behaviour in situations of interaction between the customer and the service provider has to be taken into account. Furthermore, the management of customer relationships becomes a crucial role since services very often are realized in long term cooperation between customer and service provider.

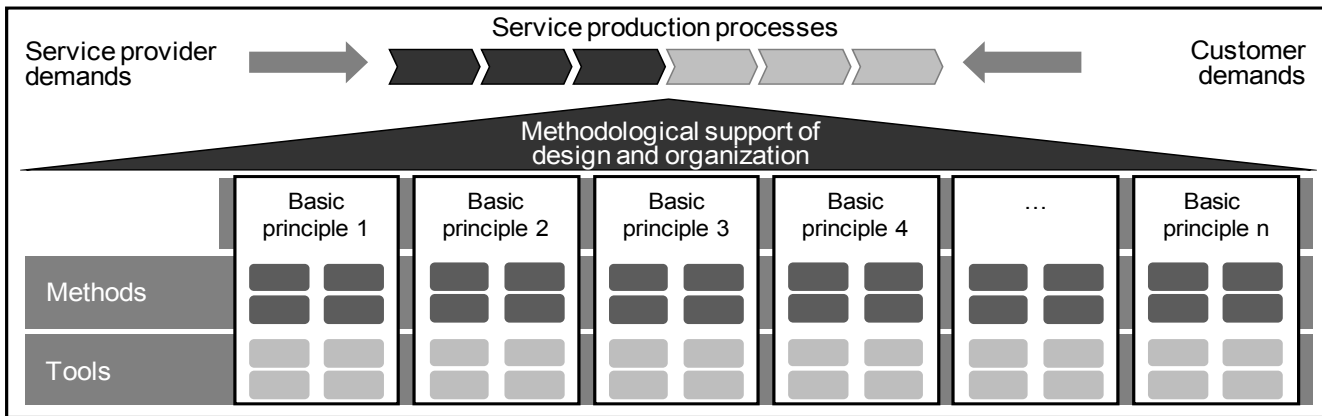


Figure 2: Methodological Support of Service Production Processes.

- Since design and realization processes significantly are responsible for the quality and productivity of the service production, planning, organization, steering and controlling of service production processes have to be supported by appropriate methods. Thereby, customer integration has to be considered.

Approaches conceptualizing service quality (see e.g. [20, 21, 22]) consider a lot of aspects that can be reduced to the characteristics of services. These aspects have to be taken into account during the development of a comprehensive quality management supporting the planning, steering, measurement and improvement of service quality.

## 5 FRAMEWORK CONCEPT

### 5.1 Objectives

To enhance the controllability of service production processes represents the main objective of the process oriented production systems for service providing companies. Thus, both quality and productivity of the service production would increase strongly. The approach of the process oriented service production system thereby increases the understanding for the fundamentals of both design and realization of services as well as their methodological support.

The integration of already existing methodological approaches supporting design and organization of service production processes thereby not only enhances the transparency of single methods and tools in view of their effectiveness. Furthermore, fundamental interrelations between the methods and tools become clearer. In this way, an active design, controlling and assessment of service production processes becomes feasible.

Hence, further objectives can be derived as follows:

- A coordinated and standardized methodological support of service production processes requires a systematic identification of company specific demands.

Based thereon, an approach has to be provided that allows the service provider to systematically and individually identify and develop basic principles of methodological support as well as appropriate methods and tools included therein. Thereby, the mutual interrelations between the basic principles as well as the methods and tools included therein have to be taken into account.

- The way of realizing the customer integration in service production processes plays a key role for the effectiveness of service production. Therefore, the condition of the customer as well the resulting effects on both design and organization of the service production have to be described transparently and considered in view of the methodological support. This also includes the interface between customer and service provider.
- Design and organization of service production is influenced by multiple factors. Thus, the identification of customer and service providers objectives as well as of resulting demands on the service production has to be supported by appropriate methods. Thereby, influenceable and non-influenceable environmental aspects of service production have to be taken into account, too. Thus, the basis for the systematic integration of basic principles, methods and tools to a process oriented service production system is laid.
- The transparency of the performance of the process oriented service production system represents a further objective. Based on the individual characteristics of the service production, an approach to systematically measure the performance of the process oriented service production has to be provided as well. This also represents a basis for the systematic derivation of improvement potentials of the production system as a whole.

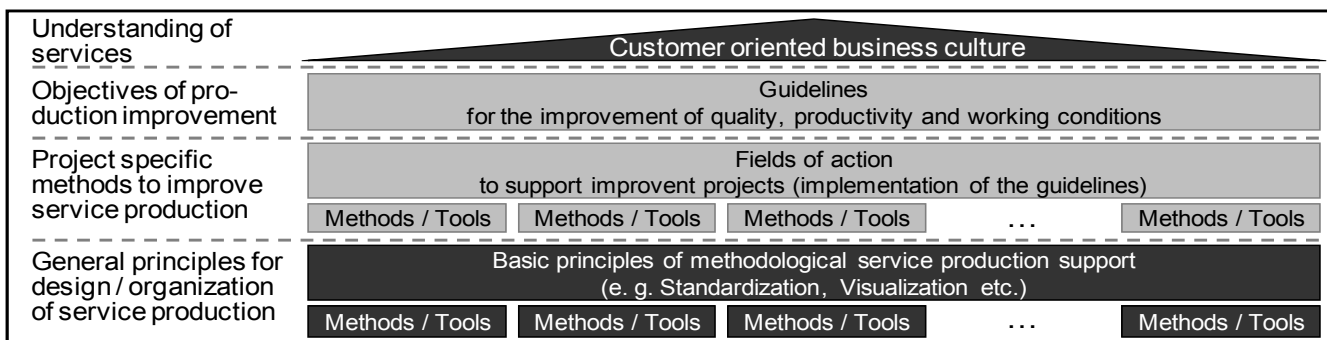


Figure 3: Process Oriented Service Production System: Overview.

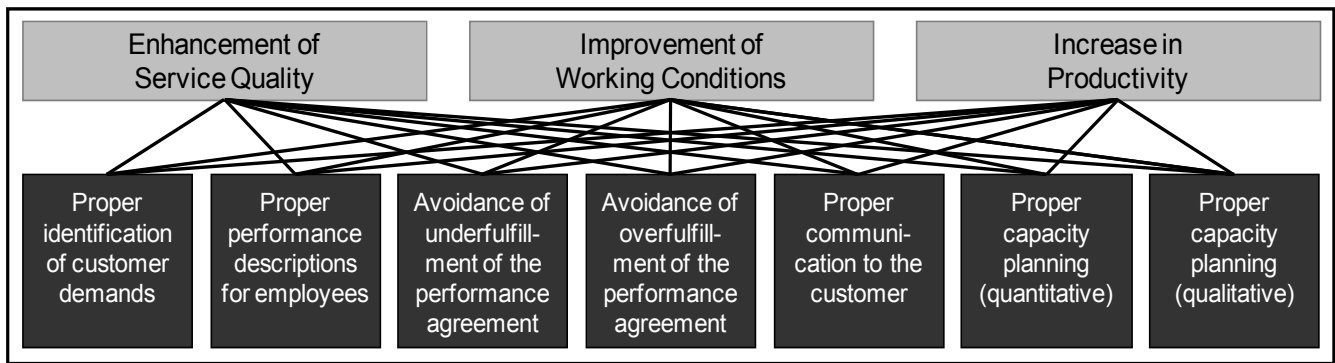


Figure 4: Guidelines for the Elimination of non-efficient Production Processes.

## 5.2 Overview

The process oriented service production system as a general framework and philosophy to design and organize the processes of service production comprises four essential elements (Figure 3):

- The understanding of service characteristics as well as the realization of a customer oriented business culture represents a necessary prerequisite to be fulfilled by every staff member.
- Basic principles of methodological service production support build enables the personnel to execute the service production processes in a predefined manner. In cause of occuring problems, the methods and tools help the employees to understand the problem and to analyse the causes of the problem.
- To avoid inefficient (wasteful) service production processes, the staff has to be enabled in order to identify these processes. The service production specific guidelines thereby represent a helpful mean.
- In case of identified inefficient service production processes, appropriate measures have to be taken in order to improve the service production processes. The systematic development of these solutions addressing a few fields of action is supported by a set of project specific methods.

## 5.3 Business Culture

Service oriented behavior highly depends from the specific situation of both customer and service provider. Thus, it comprises behavior pattern that exceed formalized instructions. From a personnel point of view it requires a high degree of freedom concerning the scope of the employees as well as their self dependency.

The service oriented business culture as the core element of the process oriented service production system therefore covers different points:

- Customer orientation in all production processes
- Production processes as the center of all business oriented action
- Customer management
- Forms of customer interaction
- Advancement of service orientation of the personnel being in contact with the customer
- Social and communicative skills of the personnel
- Abilities to emotional labour
- Prioritization of initializing and management of long term customer relationships

## 5.4 Guidelines

The process oriented service production system contains universal rules for the organization of service production that enables the staff of service providing companies to

execute his specific tasks while contributing to enhance the efficiency of service production as well as to improve working conditions. Thereby, improvements can only be realized by identifying and solving existing problems.

The guidelines for the identification of inefficient service production processes (Figure 4) provide a helpful tool to the personnel and enable them to identify weaknesses of the established production processes. Thus, deficits in view of service quality, service production productivity as well as working conditions can be identified systematically by the employees on the job.

## 5.5 Basic Principles of Methodological Support

The basic principles of methodological support comprise methods and tools that support both design and organization of service production processes as a whole. Thereby, most of the basic principles (e.g. visualization or continuous improvement) are universal, while the methods and tools included in these principles can be adapted individually according to the company specific requirements.

The most common basic principles for the methodological support of the service production are e.g.:

- Standardization
- Continuous improvement
- Visualization
- Quality management
- Skill oriented human resource management

For example, visualization (e.g. in form of process models) helps to clarify service production processes, service results as well as required resources. Thus, the personnel are enabled to identify weaknesses in processes that build the basis for a continuous improvement process.

## 5.6 Project Specific Methods

The basic principles of methodological support provide a non-exhaustive basis for a continuous improvement process, realized in iterative cycles of well-known phases (plan, do, check, and act). Furthermore, service specific methods have to be provided by the process oriented service production system that helps the employees to execute this iterative cycle.

This is realized by a sample of methods and tools that supports the execution of specific improvement projects within the service providing company. The methods and tools thereby address different field of action:

- Understanding existing problems,
- Analysis of causes,
- Development of product or process improvements,
- Planning of remedial action,
- Taking selective measures,

- Testing measures for target achievement,
- Improvement of taken measures
- Definition of new standards.

## 6 REALIZATION

### 6.1 Overview

Within the concept supporting the realization of the process oriented service production system, firstly objects and processes of service production as well as their interrelations are structured systematically. In this context, also the personnel of the service provider are considered, comprising the agents in view of the design, controlling and assessment of service production processes.

Subsequently, activities for planning, designing, implementing and steering of the process oriented service production system are described. Their realization is supported by appropriate process models as well as corresponding methods and tools.

### 6.2 Planning

The management decision to implement a process oriented service production system represents the initial point for the planning phase. In this phase, focus is both on the development of organizational and operational prerequisites for the implementation of the production system as well as on the establishment of a service oriented business culture. In context of the latter, the clarification of interrelations between the design and organization of the service production and service oriented business ethics are of importance. This also applies to the importance of structural changes within the service providing company.

In a first step, an analysis of operational structures in context of service design and realization takes place. This analysis is complemented by an analysis of methods and tools supporting service production processes and already established within the service providing company. Further on, analyses take place in order to get transparency in view of the product portfolio, the design and realization of the customer interface as well as the influenceable and non-influenceable environmental aspects of service production. Based on the results of these analyses, an assessment of the current efficiency of the service production is realized.

The specification of customer and service provider demands on the design and organization of the service production follows in the next step. The identification of starting points for a coordinated and standardized methodological support of service production processes concludes the planning phase.

### 6.3 Design

In context of the design phase, the detailed composition of the process oriented service production system takes place.

The system configuration covers the selection of the approach to the company specific configuration of methods and tools. Furthermore, the basic principles providing already existing methods and tools to methodologically support the service production (e.g. capacity, customer, quality, process ore time management methods) are specified systematically. The system configuration is complemented by the development of a concept increasing professional and social skills of the personnel. Thus, the employees are qualified to actively participate in both design and improvement of the service production.

Based on the system configuration, the process oriented service production system is structured in detail. Thereby,

the methods and tools applied in context of the production system as well as the scope of both methods and tools are specified according to the predefined customer and service provider objectives (e.g. the establishment of company-wide production standards or the enhancement of transparency of production processes). Parallel, the definition of appropriate key figures to control the efficiency of the methodological support takes place.

### 6.4 Implementation

The next phase covers the implementation of the process oriented service production system as well as the realization of the concept increasing the skills of the personnel. Thereby, this phase aims at a continuous implementation of a coordinated and standardized methodological support of service production.

The chronology of implementation of methods and tools in the service providing company represents an important factor for the success of the process oriented service production system. Therefore, the sequentialization of the methods and tools to be implemented takes place at the beginning of the implementation phase. Further on, this phase comprises the implementation of an appropriate organizational and operational structure within the service providing company as well as the company-wide communication of the concept as a whole. A completed implementation of the production system determines the phase of system implementation.

The concept increasing both professional and social skills of the personnel aims at acquaints the employees with the possibilities offered by a systematic methodological support of service production processes. In this way, the personnel's orientation in their working environment is enhanced. Furthermore, a more efficient planning, performance and controlling of production processes that are realized by the employees becomes possible. Thereby, special requirements result from customer integration as well as the resulting customer interaction.

### 6.5 Steering

The steering of the process oriented service production system aims at continuously improving the efficiency of service production processes as well as improving the methodological support of the design and organization of the service production. Thereby, two aspects have to be distinguished.

In context of the operational steering the guidelines for the elimination of inefficient production processes as presented above are provided. By means of these guidelines, the personnel are enabled to identify deficits in service production processes. Thus both immediate measures as well as corrections of service production processes can be realized.

The strategic steering addresses both the continuous improvement of the mechanisms to avoid inefficient service production processes as well as measures to the strategic adaptation of the processes oriented service production systems, e.g. in case of changing customer and service provider requirements to the design and organization of service production processes.

## 7 SUMMARY

To increase competitiveness and to fulfil customer requirements, service providing companies are forced to offer services of high individuality while ensuring high quality and productivity. Thereby, it is up to the service providers to design and organize the service processes in a way that guaranties efficiency in terms of productivity and cost effectiveness.

To meet these requirements, there are numerous existing approaches that allow a selective methodological support of service design and realization. This paper provided a concept that transparently displays the interrelations between existing approaches and thus allows a coordinated and standardized methodological support of service production processes. Furthermore, the approach of a process oriented production system for service providing companies enables the personnel to actively take part in a continuous improvement process enhancing the efficiency of service production processes.

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