

A process oriented approach to service concepts

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Résumé - Cet article s'intéresse à l'amélioration de la qualité des services et à leur conception en discutant des concepts classiquement mobilisés dans l'analyse des services, au travers d'une approche orientée processus. Il commence par passer en revue les définitions proposées par quelques chercheurs bien connus, spécialistes des services. Il propose une nouvelle typologie des services basée sur une approche orientée processus, permettant de discuter la portée de certaines caractéristiques généralement associées aux services. Il pointe ensuite les similitudes existant entre la production de biens et celle de services et traite du continuum biens-services. Il s'intéresse enfin au clivage des opérations réalisées en front office et en back office, l'explicitation de la ligne de partage permettant de discuter de la qualité de service du double point de vue du consommateur et du producteur, dans une perspective de conception d'un service.

Abstract - The authors aim to contribute to the research on improvement of service quality and on service design by discussing service concepts through a process oriented approach. They begin by reviewing the service definitions given by some well known researchers working on service. They propose a new process oriented service classification which helps to challenge the validity of some service characteristics. They point out similarities between manufacturing and service production and discuss good-service continuum. They focus on separation of back-office operations from the front-office operations by the line of visibility which may help to discuss service quality from both producer's and customer's perspective in a service design context.

Mots clés - Définition d'un service, continuum produits-services, classification et caractéristiques des services, coproduction

Keywords - Service definition, good-service continuum, service classification and characteristics (IHIP), co-production.

1 INTRODUCTION

Over the years, the service sector has assumed greater importance in world economies. As the economies have become more service oriented, so has the importance of service research in academic field. Many efforts are concentrated on customer satisfaction and service quality. Service quality is often the most important means of competition and a prerequisite for satisfied customers and profitability [Edvardsson *et al.*, 1994].

Service design is one of the key challenges for service quality. It involves a process oriented approach and allows conducting quality improvement research from both customer's and producer's perspectives. Zeithaml *et al.* [1990] were among the first researchers who emphasized the importance of service design: "Service design is a form of architecture that involves processes rather than bricks and mortar. The idea is to design high quality into the service system from the outset, to consider and respond to customers' expectations in designing each element of the service. The quality of virtually any service depends on how well myriad elements function together in the same service process to meet customers' expectations. These elements include people who perform various services that relate to the overall service, equipment that supports these performances, and the physical environment in which the services are performed".

Edvardsson [1997] points out the importance of service process design in his frame of reference for new service development: "The customer's role, participation and responsibility in the service production must be stressed. This is an important task in service development, but it is perhaps even more important to design simple, customer-friendly, pedagogic processes which are easy for people to learn".

Lately, Roth and Menor [2003], in the special issue of *Production and Operations Management Journal* dedicated to Service Operations Management (SOM), offer a research framework where "service concepts" and "service design" constitute key architectural elements of quality improvement research. This article is set within this framework and the authors discuss hereby service concepts to fill this gap. The same gap is indicated by Goldstein [2002]: "but while the

term [service concept] is used frequently in the service design and new service development literature, surprisingly little has been written about the service concept itself and its important role in service design and development".

This article begins by examining service concepts. Regarding various types of service, it's almost impossible to provide a short definition of "service" which is valid for the whole service sector. However, it's possible to gather some common aspects of services in one definition with a specific approach. The authors use process oriented approach to discuss service concepts.

Multiplicity of services requires classification of services for having consistent discussions among homogenous service classes. The authors propose to classify the services in terms of their production process and discuss most common service characteristics (intangibility, heterogeneity, inseparability, perishability, as known as IHIP) among these classes.

Two other concepts discussed in this article are : "good-service continuum" and "co-production". The authors explore the link between manufacturing and service production, a well known idea in SOM literature [Levitt, 1972, 1976; Chase, 1978; Bowen *et al.* 1989; Voss, 1992; Edgett, Parkinson, 1993; Bowen and Youngdahl, 1998; Bowen and Ford, 2001]. The authors claim a continuum between manufacturing and service production regarding two dimensions: added value creation and risk decrease.

The inseparability characteristic of services takes the most important place in this discussion. The authors examine "separation" of back-office and front-office operations by the "line of visibility", which is an important aspect in service process design [Edvardsson, 1997]. This separation may allow to discuss the conceived quality (from the producer's view) and the perceived quality (from the customer's view) in further researches.

2 SERVICE DEFINITIONS

In the litterature, many authors proposed definitions for services :

- "A service may be defined as a change in the condition of a person, or of a good belonging to some economic unit, which

is brought about as the result of the activity of some other economic unit, with the prior agreement of the former person or economic unit", [Hill, 1977].

- "Any purchase of services by an economic agent B (whether an individual or organization) would, therefore, be the purchase from organization A of the right to use, generally for a specified period, a technical and human capacity owned or controlled by A in order to produce useful effects on agent B or on goods C owned by agent B or for which he or she is responsible", [Gadrey, 1992].
- "Service is a transformation of existence mode and/or dispositions of the person him self, of his body and his mind. While goods modify the existence conditions, services modify the existence modes, where goods are only supports", [Zarifian, 2001].
- "An elementary service is the result or the output of the servuction system, in other words, the result of an interaction between physical support, personnel and customer, [Eiglier and Langeard, 1975].
- "A service is any act or performance that one party can offer to another that is essentially intangible and does not result in ownership of anything. Its production may or may not be tied to a physical product", [Kotler, 1987].
- "A service is an act (or a succession of acts) of duration and localization defined, achieved thanks to human and/or material means, implemented for the benefit of an individual or collective customer; according to processes, codified procedures and behaviours", [Dumoulin and Flipo, 1991].
- "A service is an activity or series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between the customer and service employees and/or systems of the service provider; which are provided as solutions to customer problems", [Gronröos, 1990].

Regarding various types of service (using a vendor machine, healthcare consultation, sending letter, air transport, computer maintenance, renting a car...), attempts of giving a short definition of services for the whole service sector have always failed. However, it's possible to gather some common aspects of services in one definition with a specific approach.

Giard [2003] uses process oriented approach to define services : "A service can consist on :

- products provision to the customers by means of operators

or of machine,

- providing simple or complex information to the customer following his request, where the material support of this information is not essential,
- the modification of the state of certain resources (equipment, person...)." "

3 PROCESS ORIENTED CLASSIFICATION

The authors review, complete and discuss the service classification proposed by Giard [2004] which allows distinguishing different processes of service production. A customer point of view, which requires a particular attention to front-office operations, is adopted. From a generic point of view, production processes of services in back-office are similar to manufacturing processes; their coordination with front-office operations can be analyzed using the supply chain management methods.

Classification given in table 2 allows using space-time analysis grid (same or different space/time) of Johansen [1988]. Under this groupware grid, new subclasses can be created by taking into consideration relations between customers and personnel. It may help to examine presence of customers and personnel, as well as the synchronization of the service operations. This analysis makes possible to discuss service concepts like "co-production" or "separability" of the back-office and front-office operations.

This analysis grid, which allows using a process oriented approach, is essential for service engineering. Service production process can be analyzed as a sequence of operations including processed objects, queues, resources... Consequently, it is possible to inspect some production concepts (like processing time, added value per operation etc.) in order to use process improvement or reengineering techniques. It allows examining some of the most common service characteristics: "intangibility", "heterogeneity", "inseparability" and "perishability" (as being known as IHIP).

4 GOOD-SERVICE CONTINUUM

Economists consider mostly this concept as a continuity between goods and services. This consideration requires necessarily a "continuum axe" on whose extremities are situated "pure goods" and "pure services" and a term which encapsu-

Table 1. Service definitions

	What?	For Whom?	By Whom?	Why?	How?	Characteristics <u>underlined</u>
Hill [1977]	A change in the condition of a person or of a good	For a person or for a good	By an economic unit	On a prior agreement		Intangibility
Gadrey [1992]	Some useful effects	For an economic agent or for his goods	By an organization		By technical and human capacity	
Zarifian [2001]	A transformation of an existence mode	For the human person			By transforming dispositions of the person	
Eiglier & Langeard [1975]	An output of the servuction system				As a result of an interaction	co-production
Kotler [1987]	An act or a performance					Intangibility
Dumoulin & Flipo [1991]	An act of duration and localization defined	For a single customer or for a group of customers	By humans and/or by materials		Some processes, procedures or codified behaviours	
Gronröos [1990]	An activity or series of activities	For the human persons	By service employees and/or by systems of the service provider		By providing solutions to the customer problems	Intangibility and co-production
Giard [2004]	Providing products or information, a resource state modification	For a person or for his goods	By personnel or by machines	following to the customer demand	By providing products or information, modifying resource state	

Table 2. Process oriented service classification

<p>I. Services consumed by persons (B2C)</p> <p>I.1 Providing products or information to the customers</p> <p>I.1.1 Product provision (example: supermarket; output: ownership of a new product)</p> <p>I.1.2 Transportation (example: post office; output: location change)</p> <p>I.1.3 Providing information to the customers (example: consulting; output: acquired information)</p> <p>I.2 Using individually or collectively a resource of the service provider</p> <p>I.2.1 Using collectively a limited-capacity resource of the service provider</p> <p>I.2.1.1 <i>Customers arrive and depart at the same moment</i> (example: cinema; output: mental changes on customer)</p> <p>I.2.1.2 <i>Customers arrive and depart at different moments</i> (example: museum or public transport, output: mental changes, entertainment or location change)</p> <p>I.2.2 Using temporarily resources of the service provider</p> <p>I.2.2.1 <i>In favour of the customer's good</i> (example: maintenance, repair; output: physical changes on customer's good)</p> <p>I.2.2.2 <i>In favour of the customer himself</i> (example: hair dresser, beauty cares; output: physical changes on customer)</p> <p>I.2.2.3 <i>Rent an equipment</i> (example: rent a car; output: equipment utilization)</p> <p>II Services consumed by enterprises (B2B)</p> <p>II.1 Providing information (example: audit; output: acquired information)</p> <p>II.2 Using temporarily resources of the service provider</p> <p>II.2.1 <i>In favour of equipment</i> (example: maintenance; output: physical changes on customer's equipment)</p> <p>II.2.2 <i>In favour of personnel</i> (example: training programs; output: mental or physical changes on personnel)</p> <p>II.2.3 <i>Rent an equipment</i> (example: rent a machine; output: equipment utilization)</p> <p>II.3 Logistics (example: transportation; output: location change)</p>
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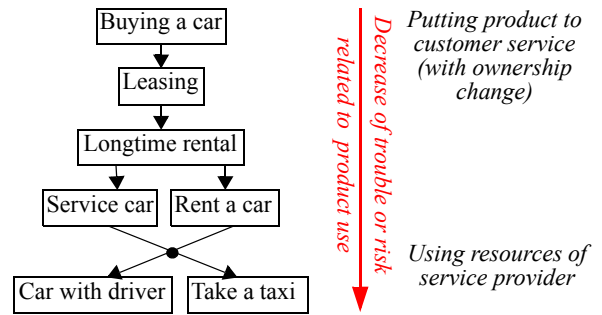


Figure 1. Good-service continuum and trouble/risk decrease

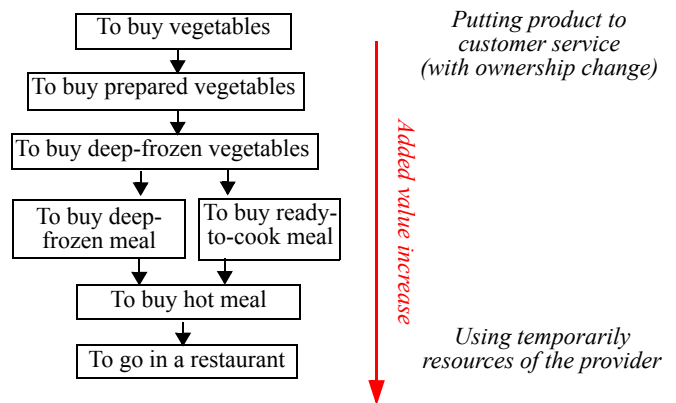


Figure 2. Good-service continuum and added value increase

5 SERVICE CHARACTERISTICS

In the Sixties, researchers started to enumerate distinctive characteristics of services in order to distinguish them from goods. The tendency was more to make a distinction in order to develop strategies or methods in marketing and in production management. Four most cited characteristics were "intangibility", "heterogeneity", "inseparability" and "perishability" (named "IHIP") of services. But, these characteristics are not always specific to services. The authors give in the following tables the views of well known authors and they use their service classification (B2C) to discuss where they fail.

To discuss the "intangibility" characteristic of services, they consider the "service production system" and its output (Table 3).

Table 3. Views of different authors about the intangibility

Authors	Views	Not Valid for
Rathmell [1966], Shostack [1977, 1982] de Bandt [1995]	Intangible: immaterial, not corporeal	I.1.1, I.2.2.1, I.2.2.2
Berry [1975] Kotler [1977] Zeithaml <i>et al.</i> [1985]	Intangible: inaccessibility to the senses	Output is always perceived
Bateson [1977] Shostack [1977] Flipo [1985] Schmenner [1995]	Intangible: untouchable, impalpable	I.1.1, I.2.2.1, I.2.2.2
Bowen <i>et al.</i> [1989] Lovelock [1983] Lovelock, Yip [1996] Lovelock, Gummesson [2004]	Intangible: absence of ownership	Possible through pre-payment
Gadrey [2000]	Intangible: observable (not physical) materiality	I.1.1, I.2.2.1, I.2.2.2

lates both goods and services to define the axe. The answer is different among authors; Hill [1977] uses the term "entity", de Bandt [1995] prefers "product", Shostack [1977] uses "molecule".

Marketing authors consider it like a relation between goods and services. Goods constitute the "physical supports" or "resources" of the service system. But this representation is not suitable since the term "good" is used in the sense of equipment. For many authors, goods constitute the "service-cape". According to Eiglier and Langeard [1975], goods are the showroom of service system. Shostack [1977] holds a position closer to the economists; she encapsulates goods and services in her molecular model.

For the authors, good-service continuum may have a meaning in two contexts: "decrease of trouble or risk related to product use" and "added value creation".

- Let's examine how to "have" a car (Figure 1). If you buy a car, you make the payment and you become the owner. In order to reduce the trouble or risk related to product use, some supplementary services can be added to this initial transaction, like insurance, loan etc. Customer can make leasing or rent a car for long time, insurance and all the expenditure of maintenance can be included. He can also rent a car when he needs it or he can take a taxi. Therefore, the service will become "using resources of the service provider".

- Some services can be added after manufacturing of the goods in order to create more value. A continuum can be established between "product provision" and "using resources of service provider" by using this added value creation principle. Let's consider vegetables that you buy, prepare and cook for diner (Figure 2). If you don't have enough time, you can buy vegetables ready to cook (frozen...), or a cooked dish, or make you deliver a hot dish, or to go to a restaurant.

Table 3. Views of different authors about the intangibility

Authors	Views	Not Valid for
Hill [1977,1999] Shostack [1982]	Goods exist in both time and space, services exist in time only	I.1.1, I.1.2, I.2.1.1, I.2.1.2, I.2.2.1, I.2.2.2
Bateson [1977] Gronröos [1984, 1988] Laroche <i>et al.</i> [2001]	Add mental intangibility: difficult to have a clear and concrete image before purchase	I.1.1, I.1.2, I.2.2.3
Brievik <i>et al.</i> [1998] Laroche <i>et al.</i> [2001]	Add general intangibility: how general and/or specific a consumer perceives a product	I.1.1
Kotler [1977] Bateson [1977] Zeithaml <i>et al.</i> [1985] Bowen [1989] Bitner [1992]	Physical intangibility is a distinctive characteristic of services	I.1.1, I.2.2.1, I.2.2.2
Rathmell [1966] Hill [1999] Shostack [1977, 1982] Gummesson [1995] Vargo and Lusch [2004]	Intangibility can be a continuum dimension between goods and services	Valid only between I.1.1 and I.2.12/ I.2.2.3

For the "heterogeneity" characteristic of services, the authors precise four different author positions. For each one, they give service classes as an example where they are not valid (Table 4).

Table 4. Views of different authors about the heterogeneity

Authors	Definitions	Not Valid for
Kotler [1977]	Variability between services	I.1.1, I.1.2, I.2.1.1, I.2.2.3
Lovelock [1983] Bowen <i>et al.</i> [1989] Vargo and Lusch [2004]	Inability to standardize the service output	I.1.1, I.1.2, I.2.1.1, I.2.1.2, I.2.2.1, I.2.2.3
Rathmell [1974] Sasser [1978] Zeithaml <i>et al.</i> [1985]	Variability in personnel performance	I.1.1, I.1.2, I.2.1.1, I.2.1.2, I.2.2.1, I.2.2.3
Eiglier and Langedard [1975] Gronröos [1984]	Variability in service quality	I.1.1, I.1.2, I.2.1.1, I.2.2.2, I.2.2.3

The "inseparability" and "perishability" characteristics of services have the biggest interest for the process oriented approach used by the authors. They are discussed more explicitly in the next paragraph. Definitions of different authors are given in the tables below (Table 5 and 6).

Table 5. Views of different authors about the inseparability

Authors	Views	Not Valid for
Kotler [1977] Sasser <i>et al.</i> [1978] Zeithaml <i>et al.</i> [1985] de Bandt [1995] Bowen and Ford [2002]	Simultaneity of production and consumption	I.1.3, I.2.2.1
Hill [1977] Gronröos [1984, 1988] Czepiel <i>et al.</i> [1985] Bitner [1992] Schmenner [1995] Lovelock [1983] Lovelock, Yip [1996] Lovelock, Gummesson [2004]	Customer interaction or his presence in service production (co-production)	I.1.1 (online shopping), I.1.2, I.1.3, I.2.2.1
Chase [1978]	Front and back-office separation	I.1.3, I.2.2.2, I.2.2.3

Table 6. Views of different authors about the perishability

Authors	Views	Not Valid for
Kotler [1977] Zeithaml <i>et al.</i> [1985] Zeithaml, Bitner [2003] Edgett and Parkinson [1993] Bowen and Ford [2002]	Service can't be saved, stored for reuse at a later date, resold, or returned (Which yields marketing problems)	I.1.3, I.2.2.1, (Inventoriability of the output)
Sasser [1978] Lovelock [1983] Lovelock, Gummesson [2004] Darmon <i>et al.</i> [1996] Pride and Ferrel [2003] Fitzimmons and Fitzimmons [2004]	Unused service capacity of one time period cannot be stored for future use (Which yields capacity management problems)	I.1.1, I.1.2, I.1.3, I.2.2.1, I.2.2.2, I.2.2.3

Commentaries provided in the tables reveal that, for any of these characteristics, it is not possible to give a definition valid for all service processes. Every definition has its limits and it is valid only for some of the service classes.

6 INSEPARABILITY

A production process is conceived to produce, in a more or less regular way, a flow of goods or services. If one is interested in a set of products or services to be produced by this process in a given period, the problem can be analyzed under an angle of scheduling. To define without ambiguity the "inseparability" of services, one can use the formalization of scheduling problems which makes it possible to lay down precise decomposition rules of activities. A problem of scheduling, defined at the most detailed level, is characterized basically by a set of tasks whom duration depends on resources necessary for their execution, by a set of precedence constraints and by a set of resources constraints. The resources concerned are shared between several tasks and they can not be inventoried (hours of machines or operators). To convert a detailed scheduling problem into an aggregate scheduling problem, one must call upon rather obvious rules of the aggregation and several conventions being necessary but contestable. Three obvious rules must be used:

- Precedence constraints between elementary tasks belonging to the same macro-task disappear in the process of aggregation.
- Precedence constraints between macro-tasks are inherited from the precedence constraints between elementary tasks: precedence constraint between the two elementary tasks belonging to the two different macro-tasks is transmitted to the macro-tasks; it is then necessary to soften the relations of anteriority by authorizing overlap between macro-tasks. The exact calculation of the overlapping between macro-tasks requires an explicit resolution of the problem of scheduling formulated on the level of the elementary tasks.
- Resources mobilized by the macro-task correspond to the set of resources mobilized by its elementary tasks. Resource use levels depend on conventions adopted.

It is necessary to add two more rules which imply this use of conventions:

- Execution time of a macro-task is calculated as the maximum micro-tasks duration.
- The traditional convention of "constant resource use" is generally acceptable in a scheduling problem defined in a detailed level. The scheduling of the project corresponding to a macro-task leads mechanically to an irregular use of resources used by the macro-task. This irregularity is difficult to take into account in a formulation of scheduling problem but the assumption of a regular use of resources by the macro-task can be unrealistic.

The desegregation process yields problems simpler than those evoked for that of the aggregation because the analysis at a finer level makes it possible to define without ambiguity the relations of anteriority and resources consumptions. Arises

only the difficulty of decomposition to retain. The analysis of a production process of services can make it possible to separate tasks carried out without intervention from the customer, often in the back-office, of those carried out in the front-office, which can be called as co-production. Under these conditions, inseparability is related to the fact that the lack of the customer prevents the complete execution of the task. For services, where "production" and "consumption" of service can be separated, the production can be done in the back-office, which allows a more effective use of the productive resources and conceive technology transfers from the manufacturing field.

The authors extend their analysis to include the concept of "inventoriability". In the literature, it's discussed mostly as the inability of inventoring the service output. This concept is related to the inseparability of services by the simple fact that it is often possible to introduce inventories between two operations when they are separable. This separation reflects a process oriented point of view and allows performing efficiency analysis. The authors considered not only the "output inventories", but also the "order inventories" and "intermediate inventories". The monthly subway coupon corresponds to an "order inventory", sorting office in transport sector to an "intermediate inventory", a stock of repaired products to an "output inventory".

- *I.1.1 Good provision* - In a supermarket, shelves are filled before the customer begins shopping. These operations correspond to a part of services provided by the supermarket and are carried out without the presence of customer. Customer fills its basket without any help of personnel; this operation can be separated by the previous ones and by the payment. The interaction with the cashier is not exactly a co-production. Customer will empty his basket, subsequently the cashier will scan the products, and he will fill the bag. The only interaction will occur during the payment. This fine level of analysis makes possible to find out overlaps between customers. The merger of these elementary operations must be followed by an explicit recognition of the overlapping. The customer queue corresponds to a "job stock" for the cashier.

- *I.1.2 Transportation* - The "transport of the good" is always realized without any customer interaction and it is separated from the previous operations by inventories of goods to transport. These inventories are created following to front-office operations which may involve customer interaction (post office) or not (mail boxes). For big enterprises, deliveries are often done from the sorting offices. A sorting office corresponds to an intermediate inventory and helps to optimize the transport cost.

- *I.1.3 Providing information to the customers* - Providing information can be done verbally, during a face-to-face discussion or by telephone; or by written ways (like consulting, preparing a contract). The customer not only expresses his needs, but information is created during this discussion in co-production with personnel. At the end of the discussion, the customer is informed, and thus the service is delivered. All operations are interwoven, none of them can be separated. Customer can also receive recurring information resulting from a contract. In this case, contract corresponds to an "order inventory" and allows to separate "information production", which is carried out at the back-office, from the front-office operations. Information is often standardized for the B2C services and sometimes personalized for the B2B ones. Produced information can be stored on the hard disk of a computer, on CD, DVD or in a file.

- *I.2.1 Using collectively a limited-capacity resource of the service provider* "Expression of needs" and "payment" can be done in customer-personnel interaction or not. If the service is prepaid, "expression of needs" can be omitted; if not, these two operations will be necessarily merged. The prepayment gives to customer the possibility to store his right of use and better capacity management possibilities to service provider. Since the realization of service does not require any presence of the customer, there is no co-produ-

tion. However, it is not possible to separate the consumption and the production of the service because of the potential constraints. These two operations are realized mostly at the same time and at the same place.

- *I.2.2 Using temporarily resources of the service provider* - This utilization can be performed in favour of the customer's good (maintenance, repair). Reparation of good can be carried out in the back-office without any presence of customer. It can be separated from the front-office operations by an inventory of goods to be repaired and by an inventory of repaired goods. If this utilization is performed in favour of the customer himself (medical treatment, hair dresser), his presence is necessary. This co-production makes impossible to separate the production, consumption and the delivery of the service. On the other hand, it is possible to separate them from the front-office operations by appointments. This service class can also consist on "renting an equipment". Equipment delivery requires always the presence of the customer. It is possible to introduce "order inventories" in front-office to match better the demand and the supply.

7 CONCLUSION

The authors concentrate their effort in service quality improvement by service design and try to fill a gap in SOM literature with their discussion of service concepts using a process oriented approach. They argue that, regarding various types of services, services concepts should be discussed among homogenous groups. Their process oriented approach emphasizes discussion of inseparability characteristic of services. Separation of the back-office and front-office operations may allow discussing service quality from both producer's and customer's perspective. The authors conduct further researches on service quality from producer's (conceived quality) and customer's (perceived quality) perspective in a service design context.

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