



ANALYZING SERVICE MASS CUSTOMIZATION BUSINESS MODELS

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Abstract: *Services have received a lot of attention recently. However, a solid conceptual understanding of service mass customization is missing. The relatively sparse work to date includes individual case studies. Yet, it remains unclear how service characteristics affect key mass customization capabilities of solution space development, robust process design, and choice navigation.*

Applying the business model canvas developed by Osterwalder [1], we study which parts of a business model are affected by mass customization capabilities and how they are impacted. We compare and examine standardized, mass customized, and fully customized service business models and analyze the effects of service characteristics such as intangibility, heterogeneity, inseparability, and perishability.

Our results indicate that service mass customization has an effect on every part of a business model. The most important difference between the business models is in key resources. Mass customized services require more knowledge and skills than standard services and a more robust process design compared to fully customized services.

Key Words: *mass customization, services, business model*

1 INTRODUCTION

Mass customization, a way to provide customized products and services without a high price premium, has a lot of promising advantages. However, only a few companies have succeeded to turn these into profitable business. There is no single way to mass customize; rather it is a strategic choice to develop organizational capabilities that can turn into a profitable business. Mass customization affects the way of doing business, and requires three fundamental capabilities. These capabilities are solution space development, robust process design, and choice navigation [2]. Thus, a

company has to develop all of these capabilities, but the final goal of becoming a mass customizer is a journey.

Services were mentioned in the original definition of mass customization, and are important as their share of the global economy grows. However, the concept of services is not well defined and a debate has been ongoing for at least half a century. The distinction between services and physical goods has dominated the discussion. In most cases, services are defined by using the IHIP (inseparability, heterogeneity, intangibility, and perishability) characteristics to point out their differences from physical goods. These characteristics have been questioned [3]. For example, inseparability and simultaneous production and consumption are not always realized in a case of financial services. Similarly, many services include major tangible elements; for example, a restaurant service without food or drink would be useless. Even if the IHIP characteristics cannot exclusively distinguish goods from services, they can help to understand the nature of services.

A third catchphrase in the management literature is business model. It became popular in late 1990's when dot-com firms collected money from investors. Business models are simplified as a company's way of making money. However, when applied adequately, business models can summarize, for example, how a company operates, what its key resources are, and what it offers to customers. Every company has its own business model whether or not it is explicitly communicated.

Our interest lies in analyzing how the strategic choice to mass customize reflects on a business model in service contexts. The aim of the paper is to find out which elements of a business model are affected by mass customization capabilities. Moreover, we compare the differences among standardized, mass customized, and customized service business models. And finally, we discuss the effects of IHIP characteristics to the business model. The financial elements of a business model are beyond the scope of this study.

2 MASS CUSTOMIZED SERVICES

2.1 Services

The concept of services is not well defined and a long debate on the nature and definition of services still continues. In 1960, the American Marketing Association proposed that “[s]ervices are activities, benefits, or satisfactions which are offered for sale, or are provided in connection with the sale of goods” [4]. Grönroos’ definition is often-cited: “A service is an activity or a 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 physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems” [5][21, p.27]. Rathmell [6] considers a good to be a noun, whereas a service is a verb. As recently as three years ago, Sampson and Froehle [7] proposed a unified service theory, citing 17 published definitions for services and adding their own.

All candidates possible definitions agree that services always comprise activities or processes, involve the customer in at least some phases of the value creation system, co-creates value with the customer, and realizes value at the time of consumption. The customer’s perceived quality of a service not only depends on its technical quality (outcome), but also on the functional, process quality that is mediated by the customer’s quality expectations [8]. Furthermore, it is accepted that a continuum or mix exists between products and services, or goods and services [9-11]. In practice, products always have a service dimension, but services do not necessarily have a goods dimension.

Another topic of relative agreement is on the general characteristics of most services: intangibility, heterogeneity, inseparability of production and consumption, perishability, often referred to as IHIP, and a lack of transfer of ownership [12, 13]. *Intangibility* in this context means that services cannot be seen, touched, and examined prior to purchase [14]. *Heterogeneity* is often caused by the variation in service production resources, whether they are provider personnel or customers. Many services are labor-intensive [14], and the individuals involved in the production process cause (unplanned or planned) variation. *Inseparability* refers to the observation that significant parts of services cannot be produced without customer involvement. This has recently become a central issue in the service literature and is also referred to as value co-creation [15, 16]. *Perishability* refers to the time-sensitive capacity of the provider to produce services. Capacity is wasted if no customer inputs are available to be processed, such as a seat in a movie theater or a consultant’s time. Services cannot be stored, produced to stock, resold, or returned to seller. IHIP characteristics are not absolute, but are relative and exhibited in varying degrees [15].

Rather than engaging in a discussion on whether the characteristics attributed to services make any difference in how services should be managed [17-21], we concede that the characteristics may adversely affect the quality, consistency, reliability, and documentability of services.

2.2 Mass customization of services

The mass customization of services has been proposed as a compromise between standard and fully customized services. Specifications of standard services are determined prior to the customer’s participation in the service process. Examples include mass transit, broadcasting, lodging, and basic banking services. Due to standardization, high service production efficiency may be achieved. However, many services are adapted to support the value generation process of the customer, including taking into account preferences and needs of the customer, and properties of the customer, other stakeholders, or related equipment. Therefore, in numerous cases or even industries, at least some customization is required. Full customization is offered e.g. in professional services offered by lawyers, doctors, or management consultants. Any service content within current or even acquirable competences may be offered.

However, an economically viable business in many industries requires sufficient efficiency, which limits the applicability of fully customized services. For example, fully customized insurance terms for each private customer would call for an uneconomical effort of insurance for mathematicians, lawyers, etc. Similarly, high-volume telecommunications services, such as business-to-consumer (B2C) mobile and broadband subscriptions, cannot be fully customized for each individual, as they must be deliverable through automatic platforms. What, then, would mass customized services be like?

We adopt the following definition for mass customized services; Mass customized services contain pre-defined processes whose interfaces and interdependencies are well defined and that can be combined into flexible processes according to pre-defined rules. These processes are mixed and matched to meet the customer-specific description of the service, which is also based on pre-defined customization possibilities.

In this paper, we adopt a view that processes consist of activities that may themselves consist of (sub-) activities. Elementary activities describe acts on the most detailed but still practical level that is required to perform the acts successfully. We consider the descriptions and terms that define the service process outcomes that the customer can expect to receive as service modules. In service mass customization, these would be discussed during the elicitation phase. A collection of customer-chosen service modules and their parameters would then describe the mass customized individual service product, which the customer has a right to receive from the service process. The service provider performs corresponding (pre-designed) service processes that realize the service modules included in the individual service product sold to the customer. Repeated activities and the reuse of service modules enable reaping the benefits of learning effects, and also building effective IT support.

Examples of industries with service mass customization include the contract-based maintenance of equipment (e.g. selectable response times, scope of spare parts included in basic price, help desk options),

insurance (breadth of coverage, deductibles), and telecommunications services (speed, billing schemes, blocking options).

3 BUSINESS MODELS

Business models became popular in the 1990's when dot-com firms pitched them to attract funding [22]. There are numerous definitions of a business model and none of them are fully accepted by the business community [22]. In general, practitioners state that a: "business model describes [the] firm's core logic for creating and capturing value" or a "business model is a framework for making money". Shafer et al. [22] studied twelve different definitions of business model. Based on components cited twice or more and clustering them into categories, they defined four key components of a business model. These key components are: Strategic Choices, Create Value, Value Network, and Capture Value. Obviously, similar key components can be found in other definitions, but with different names or groupings. A widely acknowledged list of functions of a business model is one by Chesbrough and Rosenbloom [23]. The functions of a business model are to:

- articulate the value proposition;
- identify a market segment;
- define the structure of the value chain within the firm required to create and distribute the offering, and determine the complementary assets needed to support the firm's position in this chain;
- estimate the cost structure and profit potential of producing the offering, given the value proposition and value chain structure chosen;
- describe the position of the firm within the value network linking suppliers and customers, including identification of potential complementors and competitors; and

- formulate the competitive strategy by which the innovating firm will gain and hold advantage of rivals.

Moreover, they point out that the business model process begins with articulating a value proposition; market focus is needed to define what target customers value and to define a revenue model. The sixth point formulates the competitive strategy, and links the business model to strategy. It is pointed out that the business model is not a strategy, but rather the business model is a reflection of the strategic choices made [22].

Osterwalder [24] analyzed the existing body of literature on business models and constructed his "business model ontology". The business model ontology takes into account the fact that products are not just goods, but possibly a complex combination of different types of offerings, from goods and service elements.

The ontology consists of four different aspects of the business model. They are infrastructure management (the internal configuration of the value creation capability), product (the value proposition of the company), customer interface (the way the company intends to interact with the customer), and the financial aspects (the way the company intends to profit from the business model) [24]. The original business model is divided into nine main elements and their sub-elements [24].

In this paper we will apply a simplified version, the Business Model Canvas [1] (Figure 1), to analyze service mass customization. The business model canvas only handles the nine main elements, which are partly renamed [1].

Following this simplified approach we concentrate on the main elements. *Customer Segment* is the core of business model and it answers the question: whom does a company aim to reach and serve? There can be different segments or customer groups from mass market to niche

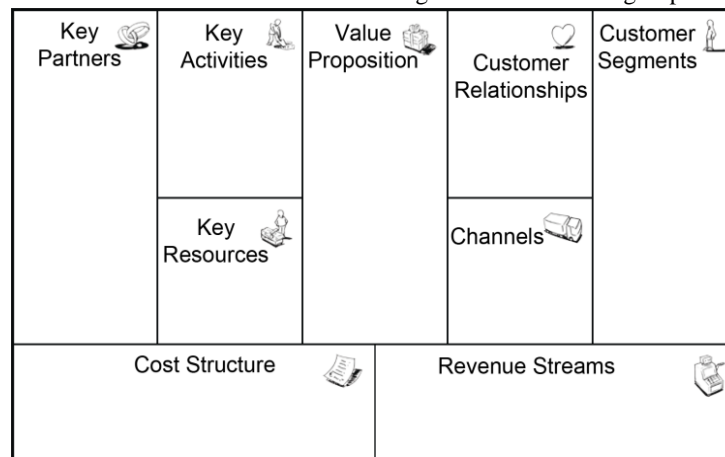


Figure 1. *Business Model Canvas* (MS-Osterwalder et al. 2009, p. 44)

market.

Value proposition tells which one of customer's problems a company is helping to solve and what the customer will get.

The role of *channels* is to raise awareness among customers, to allow customers to purchase products and services, and to deliver a value proposition to customers. Thus, it answers the question: through which channels does a company keep in touch with customers?

Customer relationship defines the type of relationship a company has with each specific customer segment. Relationship can be based on personal assistance, self-service, or communities.

Revenue streams represent the cash flows each customer segment generates. They tell how and how much customers are paying. Also, the pricing mechanism can be found in the revenue streams.

Key Resources describe the most important assets to create, offer, and realize value propositions. They can be physical, intellectual, human (the provider's, the customer's, and network resources in a suitable mix), or financial.

Key Activities define the most important activities that help to realize the value proposition.

Key Partners describe suppliers and partners that make the business model work and what activities they perform.

Cost Structure describes all costs incurred to run a business, and identify the most expensive resources and activities.

In the next section, we discuss how mass customization capabilities reflect different aspects of the business model canvas in service contexts. However, financial aspects, revenue streams, and cost structure are left out of study. This is because studies of the effects of service mass customization on financial aspects are sparse, and our own experience cannot bring anything new to that discussion. In general it is said that people are willing to pay more when a product is mass customized instead of standard, but simultaneously costs can be higher. It is not unambiguously clear whether mass customization is profitable or not [25]. Moreover, that is only studied in the context of goods businesses and the results may not transfer to service businesses.

4 MC CAPABILITIES AND BUSINESS MODEL

Salvador et al. [2] defined three capabilities that will determine the ability of a company to mass customize its offering. First, a company must identify the customer needs and recognize product attributes in which customer needs diverge the most. After that information is gathered, a company must decide what it will offer and what it will not. This process is called *solution space development*.

Second, a company should ensure that a wide variety of different customized solutions could be delivered with near mass-production efficiency and without significant extra cost. For this reason, a company needs a *robust process design*. As a result, a company has the flexibility and capability to reuse and recombine existing resources.

Finally, a company needs to help its customers with *Choice Navigation*. A company can easily offer too

much variety, thus causing mass confusion [26] and simultaneously increasing unnecessary customer sacrifices during the buying process. A company should simplify the evaluation process, for example, by using recommendations, offering pre-defined starting points, or introducing fast-cycle, trial-and-error learning possibilities.

Since the *customer segment* is the core of business model, a company should first decide whom it aims to reach and serve. Thus mass customization capabilities should not affect customer selection. However, quite often the company's own capabilities affect the decision and the process actually becomes iterative. When defining *value propositions* a company makes a choice whether or not to customize, and mass customization capabilities have significant effects on what a company chooses. Moreover, the *value proposition* can be seen as similar to a *solution space development*, a decision of what to offer or not to offer; both affect all other parts of a business model.

In order to get robust processes, a company has to assure that its *key resources* and *key activities* are suitable and scalable for a wide variety of offerings and a large variation of volumes. Similarly, *channels* and *customer relationships* have to be designed so that a wide variety can be delivered to customers.

Channels and *customer relationships* have to deliver the information of what a customer wants so that the company can deliver exactly what the customer has ordered. This elicitation process has a crucial role in successful mass customization (tähän lähde, jos ei muu niin minun väikkäri). A *choice navigation capability* helps a customer to choose and buy a product. It focuses on customers identified through *customer relationships* and *channels*.

Achieving a *robust process design* is a comprehensive task that affects all processes and activities of a company.

An interesting question is how mass customization capabilities affect *key partners*. Partners can be used as a flexible extra capacity and, thus, alleviate negative effects of fluctuating demand. Mass customization might also require competencies that are not found within a company, and partners are invited to fulfill the gaps. However, we see that ideally the effects of mass customization on partners are the same as on internal activities and resources. Thus, key partners are not discussed separately and the effects are found mainly in *key resources*.

5 MC SERVICE BUSINESS MODEL

5.1 Value Proposition

The value proposition for a mass customized service is designed to meet most (but not all) customer requirements closely. Such a value proposition is built to be modular and parametric. A standard service is often presented as an acceptable compromise between the price and fit of needs on a "take it or leave it" basis. A fully customized service is tailored to a customer's individual needs and is a unique result of the negotiations between the customer and provider. These negotiations can be characterized as co-design, whereas for mass

customization co-configuration is a more appropriate term. Standard services are inexpensive and readily available without delay. The availability is often worse and the price higher for mass customized and customized services. For a summary of discussion, see Table 1.

Table 1. Value proposition

Standard	Mass customized	Customized
Acceptable - good enough	Close to customer's requirements, useful	Fulfills customer's requirements
Take it or leave it	Parametric/modular	Unique, result of negotiations
Easy to buy	Easy to buy, specification required, Buying experience	High customer sacrifice when buying
	Co-configuration	Co-design
Readily available	Medium availability	Limited availability
Low price	20%-100% extra	>100% extra

5.2 Channels

The information used in different channels to reach customers is usually focused on what is on offer and where it can be acquired. For a mass customized service, the information about the value proposition is systematized, whereas for a customized service the information exchanged via channels is in "free-form" as little can be fixed before negotiations with the customer.

Standard and mass customized services can often be purchased without personal contact. For mass customized services this requires configurators or similar toolkits to provide choice navigation support. True customization is not possible without some level of personal contact between the provider and customer at some point in the cycle.

Standard services can be sold and delivered via many channels. With increased customization the skill requirements of the channel increase. Standard services may be supported by a catalog and mass customization by configurators, but customization requires personal assistance. For a summary of discussion, see Table 2.

Table 2. Channels

Standard	Mass customized	Customized
What & where	Information in systematized form	Information in free-form
No personal contact required when purchasing	No personal contact required when purchasing	Personal contact required (also in virtual)
Many channel types		Skilled channels
Catalog	Configurator	Personal assistance

5.3 Customer Relationships

Personal assistance is always required in specifying customized services, whereas at least part of the choice navigation support might be automated in mass

customization. Self-service is possible for standard services and for mass customized services to some extent. The more customized the service is, the more the customer relationship entails customer intimacy.

Standard services may be more transaction-like whereas customized services tend to exhibit longer and more intimate customer relationships. As standard services do not include much information about customer choices, the potential for re-applying customer information is low. In mass customized services, the customer makes choices from a number of systematically documented service options. Re-applying the customer information is not only possible, but also necessary for alleviating choice complexity when customer needs change and the offering should be updated accordingly. In customization, a lot of information is probably transferred, but it is often not documented in a systematic manner. There is potential to re-apply it, but it might be more difficult. For a summary of discussion, see Table 3.

Table 3. Customer relationship

Standard	Mass customized	Customized
Self-service?	Can be (partly) automated	Personal interaction necessary
Transaction		Long relationship
Limited potential for re-applying customer information	Re-applying customer information necessary	Potential for re-applying customer information
Customer intimacy low		Customer intimacy high

5.4 Key Activities

Standard services manifest process activities that are strictly defined and limited. For mass customized services, the activities are also limited in number and type. For customized services, anything is possible within the limits of the resource capabilities of the company and the customer. Standard and mass customized services exhibit robust, pre-defined processes, whereas customized services may involve creative activities. As Johnston describes[27], the process tasks are runners for standard services, runners and repeaters for mass customized services, and often strangers for customized services. *Runners* are standard, usually high-volume activities with relatively good predictability and suitability for tight process control or automation support. *Repeaters* are also standard activities. Their volume is lower, complexity is potentially higher, and relearning or readjustment may take place in conjunction with each execution. Finally, *strangers* are non-standard, potentially one-off, or project activities. Forecasting demand or resource requirements may be difficult and efficiency is lower.

With increased customization, more of the activities tend to move from back-office to the front-line. In standard services, activities are focused on production and execution of predefined tasks. With customization, design, and problem solving, activities become more

common. Also, the customer inputs tend to increase with customization. For a summary of discussion, see Table 4.

Table 4. Key activities

Standard	Mass customized	Customized
Limited – strictly defined	Limited – pre-defined	Everything possible within resource limits
Robust	Robust	Creative
Runners	Runners, Repeaters	Strangers
Back-office		Front-office
Production, execution		Design, problem-solving
Limited customer inputs		Significant customer inputs

5.5 Key Resources

For standard services, key competence is the efficient, fault-free execution of activities. Multi-skilled and creative resources with high expertise are required with increased customization. In standard services, the resources must be able to perform routine tasks. Mass customized services in turn require skills to combine pre-defined, routine tasks. Customization may require skills in applying tacit knowledge to creating new tasks. In general, required resources become scarcer with more customization in the offering. With more customization the IT-systems are more adaptable, or support creative work. For a summary of discussion, see Table 5.

Table 5. Key resources

Standard	Mass customized	Customized
Efficiency	Multi-skilled	Multi-skilled, creative
Fault-free		Know-how, expertise
Able to perform routine tasks	Able to combine routine tasks	Able to apply tacit knowledge to create new tasks
	Flexible IT-systems	Adaptable IT-systems
Easily replaceable		Scarce

6 DISCUSSION

Earlier in this paper we conceded that the IHIP characteristics commonly attribute to services may adversely affect their quality, consistency, reliability, and documentability. This is based on goods-dominant thinking, which considers services to be inferior products because of their characteristics [28]. However, taking into account that the characteristics are relative and not absolute, and also that they can be attributed to any product to at least some degree, we may speculate that an increase in relative IHIP may affect the business model canvas of Osterwalder and coworkers [1].

With an offering relatively high in IHIP, the provider probably addresses a different customer segment – or

customers with a different strategy – and requires collaboration with different partners – or partners with different capabilities – than with an offering relatively low in IHIP. As with the other parts of the business model, mass customization seems to be a nice compromise in alleviating the adverse effects of service characteristics, thus providing a suitable mix between customer and provider benefits.

This effect of mass customization alleviating the detrimental effects of IHIP characteristics is most clearly seen in moving from a full customization model to a mass customization model. Unwanted heterogeneity may be reduced with standard processes and documentation. Intangibility, a problem especially during choice navigation, may also be decreased with more systematic documentation. With mass customization, more activities might be moved to the back-office and the required customer inputs become more standardized.

A more customized value proposition is aimed at lowering the customer’s sacrifice in use, i.e. improving the match between the offering and the customer’s needs, without increasing the customer’s sacrifice during choice navigation. For key activities, more customization means less potential for back-office activities. More customization also increases customer inputs, e.g. by providing information and participating in the activities. In mass customization, the information provided by the customer might increase faster than actual customer participation in the process. Mass customization would still require processes that are well defined and followed accordingly.

For physical goods, the large volume manufacturing of customized goods entails different challenges than service mass customization; these challenges that take place inside a factory, without customer interference. In services, the customer usually plays a bigger role during production. When analyzing the business models, differences between physical products and services in mass customization do not seem to be extensive.

Service mass customization research is scarcer than research into the mass customization of physical products. Heiskala et al. have studied the literature and compared the benefits and challenges of mass production, mass customization, and full customization in services [29] and physical products [30] similar to our discussion of the business models here.

Our study has some limitations. The work is based mostly on conceptual analyses. The findings should be validated with empirical work. Empirical case studies describing different mass customization service business models and their differences in developing and nurturing key mass customization capabilities would be useful.

7 CONCLUSIONS

In this paper we analyzed and discussed service mass customization from three viewpoints. We conceptually analyzed how key mass customization capabilities choice navigation, robust process design, and solution space development effect different parts of a business model. Furthermore, we compared business models for standard, mass customized, and fully customized services. We also

discussed how service characteristics affect the business models.

Our results indicate that mass customization affects how all parts of the business model should be set out. There are differences in which parts of the business model the key mass customization capabilities are most important. When comparing standard customization, mass customization, and customization business models, the main difference appears to be in key resources. Mass customization requires a more skilled and knowledgeable workforce than standard services. Compared to a fully customized service, the robust process design becomes more significant in service mass customization.

8 REFERENCES

- [1] A. Osterwalder and Y. Pigneur, *Business Model Generation*. 2009.
- [2] F. Salvador, P. M. de Holan and F. T. Piller, "Cracking the Code of Mass Customization," *MIT Sloan Management Review*, vol. 50, pp. 71-78, 2009.
- [3] L. Araujo and M. Spring, "Services, products, and the institutional structure of production," *Industrial Marketing Management*, vol. 35, pp. 797-805, 2006.
- [4] D. P. Cook, C. Goh and C. H. Chung, "Service Typologies: A State of the Art Survey," *Production and Operations Management*, vol. 8, pp. 318, 1999.
- [5] C. Grönroos, *Service Management and Marketing: Managing the Moments of Truth in Service Competition*. Lexington Books Lexington, MA, 1990.
- [6] J. M. Rathmell, "What is meant by services?" *The Journal of Marketing*, vol. 30, pp. 32-36, 1966.
- [7] S. E. Sampson and C. M. Froehle, "Foundations and implications of a proposed unified services theory," *Production and Operations Management*, vol. 15, pp. 329-343, 2006.
- [8] C. Grönroos, "A service quality model and its marketing implications," *European Journal of Marketing*, vol. 18, pp. 36-44, 1984.
- [9] R. B. Chase, "The customer contact approach to services: theoretical bases and practical extensions," *Oper. Res.*, vol. 29, pp. 698-706, 1981.
- [10] R. Oliva and R. Kallenberg, "Managing the transition from products to services," *International Journal of Service Industry Management*, vol. 14, pp. 160-172, 2003.
- [11] K. Paloheimo, I. Miettinen and S. A. Brax, *Customer Oriented Industrial Services*. Helsinki University of Technology, 2004.
- [12] D. W. Cowell, "New service development," *Journal of Marketing Management*, vol. 3, pp. 296-312, 1988.
- [13] V. A. Zeithaml, A. Parasuraman and L. L. Berry, "Problems and Strategies in Services Marketing," *J. Market.*, vol. 49, pp. 33-46, 1985.
- [14] G. Da Silveira, D. Borenstein and F. S. Fogliatto, "Mass customization: Literature review and research directions," *Int J Prod Econ*, vol. 72, pp. 1-13, 2001.
- [15] G. H. G. McDougall and D. W. Snetsinger, "The intangibility of services: measurement and competitive perspectives," *Journal of Services Marketing*, vol. 4, pp. 27-40, 1990.
- [16] J. Spohrer and P. P. Maglio, "The emergence of service science: Toward systematic service innovations to accelerate co-creation of value," *Production and Operations Management*, vol. 17, pp. 238-246, 2008.
- [17] J. Bowen and R. C. Ford, "Managing Service Organizations: Does Having a 'Thing' Make a Difference?" *Journal of Management*, vol. 28, pp. 447-469, 2002.
- [18] S. Chowdhury and G. Miles, "Customer-induced uncertainty in predicting organizational design: Empirical evidence challenging the service versus manufacturing dichotomy," *Journal of Business Research*, vol. 59, pp. 121-129, 2006.
- [19] B. Edvardsson, A. Gustafsson and I. Roos, "Service portraits in service research: a critical review," *International Journal of Service Industry Management*, vol. 16, pp. 107-121, 2005.
- [20] B. Stauss, "A Pyrrhic victory: The implications of an unlimited broadening of the concept of services." *Managing Service Quality*, vol. 15, pp. 219-229, 2005.
- [21] J. Sundbo, "Modulization of service production and a thesis of convergence between service and manufacturing organizations," *Scandinavian Journal of Management*, vol. 10, pp. 245-266, 1994.
- [22] S. M. Shafer, H. J. Smith and J. C. Linder, "The power of business models," *Bus. Horiz.*, vol. 48, pp. 199-207, 2005.
- [23] H. Chesbrough and R. S. Rosenbloom, "The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies," *Industrial and Corporate Change*, vol. 11, pp. 529, 2002.
- [24] A. Osterwalder, "The Business Model Ontology-a proposition in a design science approach," 2004.
- [25] F. T. Piller, K. Moeslein and C. M. Stotko, "Does mass customization pay? An economic approach to evaluate customer integration," *Production Planning & Control*, vol. 15, pp. 435-444, 2004.
- [26] J. Teresko, "Mass customization or mass confusion," *Industry Week*, vol. 243, pp. 45-48, 1994.
- [27] R. Johnston and G. Clark, *Service Operations Management: Improving Service Delivery*. Prentice Hall, 2005.
- [28] S. L. Vargo and R. F. Lusch, "From goods to service (s): Divergences and convergences of logics," *Industrial Marketing Management*, pp. 254-259, 2008.
- [29] M. Heiskala, K. Paloheimo and J. Tiihonen. Mass customisation of services: Benefits and challenges of configurable services. Presented at Frontiers of e-Business Research (FeBR) 2005, Conference Proceedings of eBRF.
- [30] M. Heiskala, K. Paloheimo and J. Tiihonen, "Mass customization with configurable products and configurators: A review of benefits and challenges," in *Mass Customization Information Systems in Business*, 1st ed., T. Blecker and G. Friedrich, Eds. IGI Global, 2007, pp. 1-32.

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