Moving Integrated Product Development to Service Clouds in the Global Economy J. Cha et al. (Eds.) © 2014 The Authors and IOS Press. This article is published online with Open Access by IOS Press and distributed under the terms of the Creative Commons Attribution Non-Commercial License. doi:10.3233/978-1-61499-440-4-698

# A Mass Personalization Methodology Based on Co-creation

Wen-Pin HSIAO and Ming-Chuan CHIU<sup>1</sup> National Tsing Hua University, Taiwan

Abstract. Although the mass customization which utilizes modularization to increase product variety, and keep mass production efficiency simultaneously has become a trend, there are some limitations in mass customization. Firstly, the customers do not completely participate in the design phase. Secondly, the possible combinations are predetermined by designers. Thirdly, the concept of mass customization is not necessary to satisfy with individual requirements and not capable of providing personalized services and goods. In an effort to overcome the gaps between mass customization and mass personalization, the proposed method applies service engineering concept to break through the mentioned drawbacks. A web-based platform would be developed to demonstrate the efficiency of mass personalization through customer co-creation. Also, this study will evaluate the customer satisfaction to validate the effectiveness based on SERVQUAL questionnaire.

Keywords. Modularization, Service Engineering, Co-creation, Mass Personalization

#### Introduction

Recently, the mass customization has drawn more and more attention, because it could increase the variety of the product and keep the production efficiency at the same time. In order to achieve the perception of mass customization, the modularization is an efficient approach that could produce a variety of products or services by different combinations of modules. However, there are some limitations in mass customization. Customers do not completely participate and experience in the design phase, so the products or services are not unique for them, and they can not acquire the sense of achievement among the phase. In addition, the design parameters are predetermined by designer, so the combinations are restricted. Moreover, the notion of mass customization is not able to satisfy with latent needs and individual requirements, because customer often do not sure what they want and what they need. Therefore, extending the scope of design from customization to personalization has emerged as a trend. This study developed a method in effort to help manager integrate all services into service packages. They could achieve personalization and offer a variety of services to many customers at the same time. To validate this methodology, this study

<sup>&</sup>lt;sup>1</sup> Department of Industrial Engineering and Engineering Management, National Tsing Hua University Hsinchu, Taiwan, 30013, R.O.C e-mail: mcchiu@ie.nthu.edu.tw

would utilize the questionnaire to measure the satisfaction for customers who adopted this personalized service and concluded the research.

## 1. Literature Review

# 1.1. Mass Customization

Mass customization was viewed as a paradox that combined the unique products with lower cost. Jose and Tollenaere (2005) showed that the modularization was the one that we can easily update architecture to develop different products. More and more companies utilized product family and platform-based product development to increase variety, shorten lead time and reduce costs. Simpson et al (2007) primarily focused on the optimization approaches artificial intelligence techniques to help the process of product family design and platform-based product development. Duray et al (2000) developed a conceptual model based on the customer involvement in the design stage. Jiao and Tseng (1999) presented systematic steps to formulate a product family architecture in terms of functional, technical and physical views. There were notable voids in mass customization, so Kumar (2005) indicated the factors of transforming from mass customization to mass personalization, such as customer, IT capabilities, P2P communication, data mining and recommendation engines, search engines, and customer relationship management (CRM).

# 1.2. Mass Personalization

Mass personalization has been viewed as a promising strategy which makes a market of one a reality. Zhou et al (2012) compared mass personalization with mass customization according several viewpoints. Mass personalization views each customer as an individual, and focused on implicit need. Customer co-created products with manager by platform in mass personalization. Also, mass personalization emphasized that the value outperforms cost. Zhou et al (2012) also classified crucial dimensions of mass personalization into four points, consisting of market of one, mass efficiency, customer co-creation and user experience. Although personalization is valuable for customers, it still depends on the level of participation. Miceli and Costabile (2007) developed a framework to support the decisions associated with the appropriate degree of personalization in terms of value, knowledge, orientation and relationship quality. Tseng et al (2010) also illustrated the technical framework of DFMP which included five domains of the customer, functional, physical, process and logistics domains. Zhou et al (2012) constructed a simple framework so that mass personalization had been achieved in terms of the affective and cognitive need elicitation, affective and cognitive analysis, and affective and cognitive fulfillment.

# 1.3. Value Co-creation

Traditional models of value creation focused on the firm's output and price in goodsdominants logic. Prahalad and Ramaswamy (2004) explored how the concept of a market was changing the relationship between the consumer and the firm through cocreation. Vargo et al (2008) provided an overview of the major differences between goods-dominant logic and service-dominant logic. Akaka et al (2012) aimed at exploring the concept of value co-creation from the perspective of service-ecosystem which considered the network, relationship and resources in markets. Gebauer et al (2010) utilized five activities of co-creation, including customer engagement, self-service, customer involvement, problem-solving, and co-design. Although many researches emphasized the importance of co-creation. Few of research discussed about customers engagement in the process of value co-creation. Payne et al (2008) aimed at providing managers with a framework and tools for managing the process of value co-creation. Gronroos and Ravald (2010) was concluded that the process of creating value consist of two sub-processes, including supplier's process of providing resources for customer's use and the customer's process of changing service into value.

# 2. Method

Although prior researches have built conceptual frameworks of mass personalization, they did not specifically explore how to integrate with the advanced technology. Moreover, there was scant mention of researches proposing explicit guideline that how to achieve mass personalization. Therefore, this study aimed to develop a systematic method to fulfill the mass personalization. As shown in Figure 1, mass personalization was composed of four phases.



Figure 1. Method of Mass Personalization.

## 2.1. Phase 1 - Customer Need Analysis

In phase 1, this study found out the customer needs consisting of physical, mental and environmental needs by intervewing with the customers, observing the behavior of customers, and utilizing situtional model. Then, this research could utilize concept generanation and brainstorming to generate corresponding services for each service activity.

#### 2.2. Phase 2 – Service Design and Modularization

In phase 2, companies should develop the feasible services and determine the priority of development in terms of the their capability, risk and resources. The feasible services were classified into many modules according to the characteristic of function and interaction. Subsequently, each of service modules was classified into common service modules or unique service modules according to the criteria, such as the frequency of use. Common service modules were necessary to meet requirement of all groups. On the other hand, unique service modules were satisfied with specific requirements in terms of different customer groups. Customers could prefer to select a variety of services through the different options of service modules.

#### 2.3. Phase3 – Customer Co-creation

In phase 3, the process of co-creation is the critical elements to transform from mass customization to mass personalization. In the process of co-creation, the customer is always a co-creator of value. Because internet technology plays a critical role in communicating with customer and service provider, service provider could provide interactive platform or self-service platform for customers. This research inferred that service providers and customer were actively engaged in the process of co-creation, as well as co-creating value through the use of the self-service platform or interactive platform. By utilizing the web-based platform, service providers could offer additionally personalized services for individuals, and produced unique value for customers according to personal experience and perception of customers.

#### 2.4. Phase 4 – Customer Satisfaction Evaluation

Phase 4 measured the customer satisfaction to validate that the case presented in this methodology. Furthermore, this study would utilize the willing to pay (WTP) according to the contingent valuation method or Vickrey auctions to measure the price that customer would pay. Then, we could measure the acceptance of market according to the customer satisfaction, WTP and costs.

## 3. Case Study

This study took a hotel as a case study. The processes of the service activity were divided into four parts that were shown in Figure 2. The four parts included the reservation, check-in, housing and check-out.

#### 3.1. Phase 1-Customer Need Analysis

In phase 1, this research required to inversigate the customer needs firstly by intervewing with customers or observing the behavior of customers. It could utilize Quality Function Deployment, reffered to as QFD, to find out corresponding services that company was capable of providing for each of service activity. The customer needs and feasible services were shown in Figure 2.



Figure 2. Customer Needs and Corresponding Services.

# 3.2. Phase 2-Service Design and Modularization

In phase 2, this study took service activity of housing as an example of service modularity because most of customers spend much time on housing. The study segmented customers into four groups and classified the service into modules in terms of eating, living and playing. For each of service module, this study also classified services into common services and unique service according to the frequency of use. The common services are satisfied with all customer groups, whereas unique services are satisfied with specific customer group. Then service providers should focus on the unique services to co-create value with customers. Customer can choose their own service package by the combination of unique services. The services were classified into different kinds of modules illustrated in Table 1.

Type of service	Customer Group	Eating	Living	Playing
Common services	All Groups	Introduction of surrounding gourmet, Meal voucher, Provision of refreshment	Room cleaning, Swimming pool	Custody of valuable goods or pets, Customized traveling, Rental of automotive
	Business Traveler	Fast food delivery	Massage chair, Rental of suit, WiFi, Fax, Newspaper delivery Projector screen	Route Planning
Unique services	Family	Set Meal of family group	Home theater	Rental of Baby carriages, Rental of Wheelchair
	Colleagues and Friends	Dishes together	Rental of table game, Rental of equipment about party	
	Couple	Set Meal of Couple	Bouquet of chocolate	

# 3.3. Phase 3-Customer Co-creation

In phase 3, the co-creation is the crucial element which transforms from mass customization to mass personalization. The study took the internal layout as an example. This phase firstly required to create a internal layout by internet to establish the relationship between customers and company. The virtual platform provided customers with some top views of furniture and equipment so that customer could choose the favorite furniture and equipment. In the virtual platform, the furniture and equipment could be moved and rotated by the customer according to the preference of customer. Customers could experience the sense of achievement when self-designing their own internal layout. The schema of internal layout was shown in Figure 3. Taking business travelers as example, they prefer to place the projector screen next to the table, because they would like to practice the report before presentation. Business travelers possibly required to deliver the documents, so they expect to place WIFI or Fax device in the room. For colleagues and friends, they would like to play table game with friends, so they may set some chair around the table. After customers designed their own internal layout, hotel careers would move the furniture and equipment and help customer create unique or ideal room while customers live in hotel. The actual layout was shown in Figure 4.



Figure 3. The schema of layout



Figure 4. The actual layout

# 3.4. Phase 4- Customer Satisfaction Evaluation

Phase 4 evaluated the satisfaction of customer according to the responsiveness, reliability, empathy, assurance and tangible. This study consulted ten people through questionnaire to measure each value shown in Table 2. This research compared the hotels which applied this methodology with that were not to prove the effectiveness of proposed framework. On average, the result showed that the level of overall customer satisfaction increased after applying the methodology.

	Before using methodology	After using methodology
Responsiveness	77.5	82.5
Reliability	75	78
Empathy	76	84
Assurance	74	83.5
Tangible	74	89
Average	75.3	83.4

#### Table 2. Measurement of Service Quality

## 3.5. Discussion

In academia, the research developed a new methodology of service experience engineering in an effort to promote the spirit of service innovation. In contrast to the prior research, this study presented a systematic method rather than a conceptual framework. Also, this study integrated web-based platform in order to fulfill the efficiency of mass personalization. In the interactive platform, service provider can actually understand the customer needs and individual preference. In the self-design platform, customers could acquire the sense of achievement when designing their own personalized product. This research expected that our methodology would be applicable to all service industries as long as service providers follow the methodology.

The methodology in service-dominant logic guided practitioner and manager to systematically develop the personalized service through the comprehensively thinking model. For each phase, this study also provided supporting tools which could help service provider integrate with the existing services and web-based platform to develop newly personalized service. Service provider could provide personalized services for different levels of customers. The result showed that the personalized services had significant impact on customer satisfaction, so it validated that the provided services could help manager increase customer satisfaction, and further improve the overall levels of service quality. The personalized services could not only reserve original customer, but also attract more and more new customers. In addition, this research suggests that the personalized service would help service industries strength competitive advantage and finally attain concept of sustainable development.

However, there were certain limitations in this research. Firstly, this research should strictly define more indicators to classify service into modules and sub-module. Secondly, this web-based platform only provided customers with top view of furniture. We have to improve the interface that customers can move the furniture according to the individual preference and requirement of customers. Thirdly, the cost of extra preparation such as labor hours, furniture and other related resources should be considered. Finally, it is an empirical study which only took hotel as a case study, so we would implement the personalized service into other service industries, and expect to apply this methodology to all service industries in an effort to validate the applicability of the methodology.

# 4. Conclusion

This study developed a method to help service providers know how to modularize current services, integrate with current internet technology and resources efficiently. The service providers would provide customers with diversified service to increase the customer experience, the process of value co-creation and to achieve efficiency of mass personalization. This study also took the interior design of layout in hotel as a cases study to depict the process of co-creation. Through the method, the results showed that providing personalized services for customer would not only increase the customer satisfaction and improve the customer experience substantially but also gain the competitive advantage of service providers.

#### References

- Akaka, M. A., Vargo, S. L., & Lusch, R. F., An exploration of networks in value cocreation: A serviceecosystems view. *Review of Marketing Research* 9(2012), 13-50.
- [2] Duray, R., Ward, P. T., Milligan, G. W., & Berry, W. L., Approaches to mass customization: configurations and empirical validation, Journal of Operations Management 18(6) (2000), 605-625.
- [3] Grissemann, U. S., &Stokburger-Sauer, N. E., Customer co-creation of travel services: The role of company support and customer satisfaction with the co-creation performance, Tourism Management 33(6) (2012), 1483-1492.
- [4] Gronroos, C., &Ravald, A., Service as business logic: implications for value creation and marketing, Journal of Service Management, 22(1) (2010), 5-22.
- [5] Gebauer, H., Johnson, M., & Enquist, B., Value co-creation as a determinant of success in public transport services: A study of the Swiss Federal Railway operator (SBB), *Managing Service Quality* 20(6) (2010), 511-530.
- [6] Jiao, J. R., Simpson, T. W., & Siddique, Z., Product family design and platform-based product development: a state-of-the-art review, *Journal of Intelligent Manufacturing* 18(1) (2007), 5-29.
- [7] Jiao, Jianxin, and Mitchell M. Tseng., A methodology of developing product family architecture for mass customization, Journal of Intelligent, 10(1) (1999), 3-20.
- [8] Jose, A., &Tollenaere, M., Modular and platform methods for product family design: literature analysis, Journal of Intelligent Manufacturing, 16(3) (2005), 371–390.
- [9] Kumar, A, From mass customization to mass personalization: a strategic transformation, International Journal of Flexible Manufacturing Systems (2007), 533-547.
- [10] Makkonen, H. S., & Komulainen, H., Networked New Service Development Process A Participant Value Perspective, *Management Decision* 52(1) (2014), 2-2.
- [11] Miceli, G., Ricotta, F., &Costabile, M., Customizing customization: a conceptual framework for interactive personalization, Journal of interactive marketing 21(2) (2007), 6-25.
- [12] Payne, A. F., Storbacka, K., &Frow, P., Managing the co-creation of value, Journal of the Academy of Marketing Science 36(1) (2008), 83-96.
- [13] Payne, A., Storbacka, K., Frow, P., & Knox, S., Co-creating brands: diagnosing and designing the relationship experience, *Journal of Business Research* 62(3) (2009), 379-389.
- [14] Prahalad, C. K., &Ramaswamy, V., Co-creation experiences: The next practice in value creation, Journal of interactive marketing 18(3) (2004), 5-14.
- [15] Tseng, M. M., Jiao, R. J., & Wang, C., Design for mass personalization, CIRP Annals Manufacturing Technology, 59(1) (2010), 175–178.
- [16] Vargo, S. L., Maglio, P. P., & Akaka, M. A., On value and value co-creation: A service systems and service logic perspective, European Management Journal 26(3) (2008), 145–152.
- [17] Zhou, F., Ji, Y., & Jiao, R. J., Affective and cognitive design for mass personalization: status and prospect, Journal of Intelligent\_Manufacturing (2012), 1-23.