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Service design blueprint approach incorporating TRIZ and service QFD for a meal ordering system: A case study

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ABSTRACT

This study applied the cloud-based production service concept to form a scalable and interoperable ordering model for self-service restaurants. We developed and demonstrated a structural and empirical service design using an integration of TRIZ (Theory of Inventive Problem Solving), service QFD (Quality Function Deployment), and service blueprint approaches. Problem-formulator was carried out to generate customer requirements in the problem definition phase. The combination of service QFD and TRIZ contradiction analysis were applied to derive service solutions. In the solution evaluation stage, cloud-based self-service ordering system was proposed and a blueprint of the new meal service is then presented. The proposed new service can enhance the flexibility of meal-production by immediately responding to ordering requests and enable a tight partnership between case company and staff canteen operators with minimal management effort. The contribution of this structural and empirical service design methodology can improve performance and competitiveness of service innovation. In general, the proposed cloud intelligent solutions, with an interactive menu and a cloud-based interoperable meal order system can be applied to other canteen meal services and even other businesses providing meal services.

1. Introduction

Since the beginning of the 1970s, the gross output value of service industries has grown to become the main contributor of the gross domestic product (GDP) in many developed countries. With the rapid economic and technological advances, nowadays, consumers not only focus on buying the right products but also pursue service experiences, such as the unique pleasure of personal services while purchasing. Manzini and Vezzoli (2003) emphasized that service solutions have the potential of offering a more efficient way to answer people's needs than simple product offerings. With the arrival of the information society, design fields have shifted from the design of tangible objects to the intangible world of interactive design, experience design and service design (Mager & Sung, 2011). Good service design can provide good interaction and experiences: people-to-people, people-to-system and people-to-environment (Stuart, 2006; Zomerdijk & Voss, 2010).

Many innovative and qualitative methodologies are being used in service design, and the focus has shifted from tangible products to intangible services. For example, the Theory of Inventive Problem Solving (TRIZ) can be applied to effective service design. Quality Function Deployment (QFD) can be applied to the service innovation field to generate the service design needs and to process the service requirements based on customer needs. A service blueprint is the main tool to transfer the abstract, front-stage and back-stage of a service system to a clearly depicted process. In this study, the case company wanted to build a smart dining environment for its employees and visitors using an interactive, technology-based catering service. Moreover, the case company also aims to enhance negotiation, coordination and collaborative partnership with its outsourcing restaurants by gaining information from their customers, such as real-time ordering, the manufacturing situation, the ranking of meals through sales, and their opinions of the content and the style of the menus of each restaurant. Using service QFD and TRIZ, a cloud-based meal ordering system of the new staff canteen is designed and developed. The service blueprint depicting the process and the architecture of the new service system is also presented. The remainder of this paper is organized as follows. Section 2 presents the research

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method and defines the structure of the service design stages. In Section 3, the methodology and the research framework are described. As described in Section 4, customer requirements are analyzed by problem-formulator. In the problem resolution phase, the service design requirements and service resolution are analyzed based on service QFD and TRIZ. In the solution evaluation phase, service QFD is used to evaluate the service functions. In Section 5, the paper describes the expectation model of new interactive menu and cloud-based interoperable meal order system with a transparent screen kiosk. A service blueprint of the expectation model is then depicted. The paper also discusses the practical benefits of the new interactive menu and the cloud-based interoperable meal order system provided by the new kiosk system. Conclusions are drawn in Section 6.

2. Literature review

Nowadays, service design is a very popular and important issue both in practice and in academia. Compared to general and traditional product design, service design is a more of a macro-design activity and a planning progress (Morelli, 2002). Generally, service design refers to the integration of the tangible and intangible interfaces with the systems and processes (Morelli, 2006) and service design can provide a complete and attentive customer service experience (Schneider & Stickdorn, 2011). Bedford and Lee (2008) interpreted service design as a design of systems and processes around the idea of rendering a service to the user.

Mager and Sung (2011) pointed out that comprehensive service design focuses on the customer experience, including pre-service, in-service and after-service touch-points. Service design can provide the customer with useable, useful and desirable products and services, but it can also help companies or organizations become more efficient and effective (Hollins & Hollins, 1991). Basically, service design can be regarded as a method of experience design. By experiencing different contact points, customers can feel the value of the entire service process (Pullman & Gross, 2004). Contact points are not only the key points of the overall customer experience, but also play very important roles in integrating their experiences. Briefly speaking, service is the interaction and experience delivered to customers. Service design is an approach to design the way to deliver a series of unique experiences that customers view with favor and with a positive perception of their value (Saco & Goncalves, 2008). Therefore, the objective of service design is to generate links with people through various contact points in the experience journey. Service design not only pays attention to the links of customer emotions and services, but also to customers' participation in the servicescape. The servicescape is a sum of the service delivery and customer interaction within the physical environment, such as restaurants, professional offices, banks and retail stores (Bitner, 1992; Moggridge, 2007).

This study adopts TRIZ, service QFD and service blueprinting as the service design methods for the case. The TRIZ-based method allows the design of new and inventive services focusing on solving business problems with a non-experiential domain background using a knowledge-based approach (Chai, Zhang, & Tan, 2005). Service blueprinting can be used to analyze the detailed processes for handling the business context and for ensuring that an adequate parameter of TRIZ is generated. Moreover, service blueprinting is helpful in establishing a complete service model and setting out individual service responsibilities in a service system (Shostack, 1984).

2.1. TRIZ-based service design

TRIZ was proposed by the Russian researcher, Altshuller (1984), who found that very creative patents solve "creative" problems, which usually have the features of paradoxical and conflicting demands (Hua, Yang, Coulibaly, & Zhang, 2006). TRIZ is a unique way of systematic thinking with a useful knowledge-base as its foundation. Therefore, TRIZ is helpful for generating breakthrough ideas and delivering solutions (Sheu & Hou, 2013). TRIZ is also a design method that is much less experience-dependent than many existing service design methods which rely too heavily on specific, previous experience, and thus limit potential innovation (Chai et al., 2005; Dew, 2006; Chang & Lu, 2009). By using TRIZ, service designers can always rely on the TRIZ knowledge base, rather than on previous experience.

Altshuller (2000) analyzed and summarized 39 frequently-encountered engineering parameters of technical contradiction that can be used to define problems. These parameters can create a 39×39 contradiction matrix as shown in Table 1. Altshuller also summarized 40 principles of invention from these patents, corresponding to the contradiction matrix. The 40 principles are generic suggestions for performing an action to, and within, a technical system. The R&D personnel or designers can determine the parameters of different cases and then check the matrix to use these principles individually and in combination for solving technical contradictions and other problems. The TRIZ approach is widely used in the engineering and technical fields for R&D and in the design of tangible goods. Zlotin et al. (2001) were the first to systematically apply TRIZ in non-technical cases. Now, there are more researchers focusing their research attentions on applying TRIZ in non-technical areas, such as art, medicine, biotechnology, business, organization, management, and political campaigning (Chai et al., 2005; Dew, 2006; Chang & Lu, 2009).

Furthermore, Mann (2002), Mann (2007) found 31 suitable business and management parameters based on TRIZ theory and enterprise cases. Marsh, Waters, and Mann (2002) developed 31 corresponding educational parameters, and built a contradiction matrix to solve the conflict when designing an innovation based on Mann's (2002) study. Zhang, Chai, and Tan (2003, 2005) applied

Table 1
Partial TRIZ contradiction matrix.

Improving parameter	Worsening parameter					
	1. Weight of moving object	2. Weight of stationary object	3. Length of moving object	4. Length of stationary object	…	39. Productivity
1. Weight of moving object	N/A	N/A	15, 8, 29, 34	N/A	…	35, 3, 24, 37
2. Weight of stationary object	N/A	N/A	N/A	10,1,29,35	…	1, 28, 15, 35
3. Length of moving object	8, 15, 29, 34	N/A	N/A	N/A	…	14, 4, 28, 29
4. Length of stationary object	N/A	35, 28, 40, 29	N/A	N/A	…	30, 14, 7, 26
⋮	⋮	⋮	⋮	⋮	⋮	⋮
39. Productivity	35, 26, 24, 37	28, 27, 15, 3	18, 4, 28, 38	30, 7, 14, 26	…	N/A