TECHNOLOGY DESIGN: CONNECTING CUSTOMER ORIENTATION AND TECHNOLOGY

Sari Heinonen[1], Saila Saraniemi[2] & Pauliina Ulkuniemi[2 3]

[1]OP Financial Group, Finland

[2] University of Oulu Business School, P.O. Box 4600, FIN-90014 University of Oulu, Finland,

[3]corresponding author, Department of Marketing, Management and International Business

tel. +358 8 553 2595, pauliina.ulkuniemi@oulu.fi

Abstract

This work-in-progress paper discusses the challenge of how to create customer focused service with the new technologies. Technologies have already had a huge impact on most service industries and several new and emerging technologies continues to offer opportunities, but such that most companies find difficult to see and put in practice. The present study examines, how the potential of the new technologies can be translated into customer value generating new service offerings. As a conclusion, we suggest that to combine the thorough customer understanding and opportunities of new technologies, a new design approach is needed; technology design. Technology design is a method for translating the customer needs and opportunities of technology into value creating business model.

Introduction

Currently, multiple technological developments that have a profound impact on various industries, their structures, business models and value creation logics. Significant developments in technologies include artificial intelligence, robotics, blockchain, 3D printing, 5G, Internet of things, virtual reality and augmented reality for example. From the perspective of firms in all industries, this technological development creates huge potential but also great overwhelming in terms of opportunities available for making use of these technologies within their business. This is of course not just a question of opportunities, but threats alike, as keeping at the front of major changes is something that all companies are forced to carefully consider as industries can undergo major changes almost overnight with technological innovations. In such a context, there might not be any readymade answers or guidelines on how to make use of these new technologies, but even the best efforts need to be approached as trials and explorations only. Some of these trials may lead to successful innovations making use of the technologies, but majority of them are most likely to fail.

In terms of making use of new technologies in service development, for example, often the key problem is related to customers being unable to predict or explicate their needs. To detect these unforeseen and future oriented customer value creation logics, the existing research and practice has introduced e.g. the customer dominant logic, customer value creation or service design. These highly customer focused approaches help to unveil thoroughly the customer perspective. In similar line, logics for connecting the customer value perspective to the business logic of the company have been introduced rather extensively in the existing literature including e.g. business models, ecosystems or business design principles. However, these approaches seem to insufficiently enable the combining of the potential of technologies to the thorough

understanding of the customer perspective. This is demonstrated in the struggles that companies have in terms of seeing the potential of the technologies in their business and generating real business based on these experiments.

In the present paper, we examine *how the potential of the new technologies can be translated into customer value generating new service offerings*? We will first discuss the existing views on some of the most promising future technologies relevant to digital services to form an understanding of their complexities. After this, we will examine the literature on customer value formation to shed light on the key issues in detecting the customer needs, based on existing knowledge in the area of customer value formation. In addition to this, we will also bring in some of the main principles from the existing discussion over the highly popular theme of service design, as it represents a methodology for discovering customer needs and connecting the service providers' competencies to these in order to generate service offerings. We will also conduct an illustrative empirical examination of a consulting firm, aiming to help their customers in making use of existing and future technologies in their service designs. The empirical study is a qualitative case study based on interviews, observation data and secondary data in the form of business development plans and documents.

As a conclusion, we suggest that to combine the thorough customer understanding and opportunities of new technologies, a new design approach is needed; technology design. Technology design is a method for translating the customer needs and opportunities of technology into value creating business model. In the paper, we present a process for technology design; its main functions, actors and connections to service design and business design.

Future service technologies

Technology has repeatedly been a game changer in service research, as Ostrom *et al*. (2015) claimed in their article on Service Research Priorities in a Rapidly Changing Context. Patrício et al. (2018, 4) thus call for service design to "explore new ways to leverage technology to innovate service". According to Patrício et al., (2018), on the other hand, service design could help organizations in reacting to technological disruptions and on the other hand, it could help technology experts to leverage technology to envision value creation for and with customers in novel services.

Complex service systems of today are configurations of people, technologies, and other resources interacting with other service systems to co-create value (Maglio *et al.*, 2009). Technological advancements have increasingly enabled services that are delivered through multiple channels, but many times, companies fail to perform equally in these different interfaces (see Patrício *et al*., 2011). The literature has recognized that technology infusion in services and increasing complexity of service systems call for interdisciplinary approach and competences such as computer sciences, engineering, social sciences and the arts in the service development (see Fisk & Grove, 2008).

Among the most often mentioned future service technologies is the artificial intelligence or machine learning, which refers to an engineering discipline that focuses on constructing computer systems that automatically improve through experience (Jordan & Mitchell, 2015). The commercial use of such technologies has grown substantially and the interest to its potentials continues to raise. The use of data-intensive machine learning methods in services promise to produce more evidence-based decision-making across various service areas,

including health care, manufacturing, education, financial modeling, policing, and marketing (Jordan & Mitchell, 2015). With the exponentially growing amount of data in all walks of life and artificial intelligence technologies, there is an enormous potential in developing new services. Jordan & Mitchell (2015) bring forth an example of connecting location data from our mobile phones or credit cards to online medical data of emergency room admissions, it would be possible to provide a service that alarms potential global pandemic spread from infectious diseases. However, of course, complex privacy issues and regulatory restrictions may hinder the development of services. But in addition to these, from the marketing point of view, the problem is that often times these and other examples are developed from the data or service point of view, instead of from the point of view of a thorough understanding of the customer's broad value formation process.

Another key technology impacting services, especially within the financial services industry is the block chain technology. Basiclally, Blockchain is a technology which provides a decentralized environment where third parties, traditionally banks, that are in control of the transactions and data are no longer needed (Yli-Huumo et al., 2017). This technology basically may offer significant service innovation potential in all aspects of life, where payment and money exchange is needed. The cryptocurrency Bitcoin has served as the first famous example of these new methods for payments, but potential applications for Block chain technology are numerous. Like in many of also the other promising technologies, the application of the block chain in different industries still remains in the starting line as the application possibilities of these technologies are challenging.

Internet of thins (IOT) represents yet another highly emphasized new technology with huge business potentials. Some of the most prominent fields of application include e.g. smart industry offering intelligent production systems; smart building with intelligent thermostats and security systems; the area smart transport solutions including, e.g., vehicle fleet tracking and mobile ticketing and the smart health area with e.g. solutions to surveillance and chronic disease management (Wortmann & Fluchter, 2015). Basically, innovation in the IOT is characterized by the combination of both physical and digital elements to create new products and services and thus also enable novel business models (Wortmann & Fluchter, 2015).

New technologies offer opportunities for new services, even to an extent of disrupting the existing industries and business models. There exist examples of companies that have been able to successfully adopt the new technologies, not only to digitalize the existing processes and services, but to develop some drastically new offerings. However, a large amount of companies in various industries do not have a clear idea of how to make use of the technologies, either to digitalize the existing processes of to create something new. This incapability may also be associated with fear of not being able to keep up with the development and possible disruptions can be seen as great threats. Therefore, it is highly crucial to find out the means to enable businesses to take use of the technologies.

Customer value formation and service design

The importance of services in almost all aspects of societies has grown and they have become integral part of advanced knowledge-based economies (Barrett et al. 2015). The current theoretical discussions around services, such as service logic (Grönroos 2011) and the service-dominant logic (Vargo and Lusch 2004; 2008) focus on the need for mutual investments and the active roles of both service providers and customers in value creation. Heinonen et al. (2010, 2013) argue that the customer's role is in fact even more integral in services and suggest a

customer dominant logic (CDL) where the key focus is shifted from how customers consume a service to how customers live their everyday lives and behave in their internal and external life context. According to this logic, value is formed in two separate but related processes, one for the customer and one for providers (Heinonen and Strandvik 2015). The customer's process, is highly subjective and based on customer's experience from their own perspective, and that automatically includes bringing one's past life experiences to new situations (Helkkula et al., 2012). Detecting such a process has been one of the key interest in current marketing research.

Service experience formation is based on complex and contingent, physical and relational elements in customer´s environment; physical setting, actors and social interaction with other actors in the service formation system (Gupta and Vajic 2000). If such a process forms the key to understand customer needs, the managerial implications of such a phenomenon becomes a rather complex issue. The key question for service providers is, how to form this kind of understanding of one's customers?

Service design has been suggested in the design management as a method for making sense of the customer's perspective and forming service offerings based on these. So far, service design can be seen as being is notably under-researched area within marketing literature (see Andreassen *et al.*, 2016). The concept has been defined as "the activity of planning and organizing people, infrastructure, communication, and material components of a service in order to improve its quality and the interaction between service provider and customers" (Mager, 2009). Furthermore, service design has been seen as a critical mindset needed in organizations to innovate successfully and to become more customer centric. The need to understand why customers buy certain service solutions has made service design and design thinking (e.g. Brown, 2008) prominent for service providers to create value for customers, further focusing on their experiences and the context of a service. (Andreassen *et al*., 2016).

The roots of service design go back to the models of Shostack (1982) and Bitner (e.g. Bitner *et al*., 2008), in regards using service blueprinting for depicting customer's and service provider's journeys during the service encounter. Today, in addition to blueprinting, numerous methods and techniques are used in implementing service design, such as marketing or buying personas, emphatic design, storytelling and prototyping (LÄHDE). Moreover, broader focus on service system design has been suggested (e.g. Patrício *et al.*, 2011) to enhance organizational performance in value creation for customers (see Andersson *et al.*, 2016)

When designing complex systems, thinking with models has been suggested to bridge the gap between problem and solutions (Dubberley *et al*., 2008). This is an iterative process starting from observation of the current situation and aiming at finished solutions. Patrício *et al*. (2011) for example, developed a general model of multilevel service design (MSD) for bridging the understanding of customer experience and designing the service offering. Their multilevel design process tackles designing the service concept, the service system and the service encounter, acknowledging the need for formation of multidisciplinary team to succeed in design process. However, even if their design process involves the customer, the frontstage service interfaces, and the backstage support people and IT systems (Patrício *et al*., 2011), particularly inclusion of novel technologies and customer orientation need further understanding in service design. Furthermore, MSD model has been applied in offering provided by a constellation of several firms (consumer buying a car), but concentrating on customer-firm interaction in consumer context only. Clearly, other relationships, between the firms and between the customers deserve more research and new methods in regards service design in service ecosystems.

Empirical study

To complete our study, we have conducted a qualitative case study of a business service provider firm that offers consulting services for companies that wish to adopt new technologies and explore their inclusion to their product and service innovations. The services focus especially on the digital transformation and the company aims at connecting the customer firms with the technology providers. The chosen consulting firm offers a fruitful case study for our research aim, as our intention is to examine how the potential of the new technologies can be translated into customer value generating new service offerings. The company's role is a mediator between the utilizer companies and technology providers. The empirical data collected includes interviews of the consulting firm representatives but also observation data. In addition to these, we also use as a secondary data, different kinds of documents and online sources describing the services of the consulting firm to strengthen our interpretations of the mechanisms though which the customer companies' customers' needs are detected and combined together with the technologies provided by the companies participating into the consulting projects as technology providers.

In our preliminary analysis, we have observed that to connect the new technologies and deep customer understanding to generate new service offerings, three interrelated design areas are needed; 1) Service design to focus on connecting customer's value formation to a service offering, 2) Business design to implement new business concepts as part of the business model and 3) Technology design to connect the opportunities of a certain technology with both customer needs and business models. These three design areas are integrally connected but yet independent in the sense that their focus and aims should not be restricted by other areas. Out of these three, the Technology design is a conceptual innovation that our study aims to put forward. Technology design is a design function that opens up the opportunities of the existing and new technologies to businesses. Whereas the service design allows the development of services that provide customer value and support the holistic customer value formation process, technology design allows combining these into technologies. Technology design is composed of three layers including the experimental pilot project level, architectural level and strategic level. In each of these levels, activities are needed to strengthen the communication, commitment and actions that allow the discovery of technology and service opportunities. Moreover, technology design is about integrating the technology providers into the holistic design process and thus the importance of co-operation in such relationships as well as acting in wider technology networks becomes crucial activity in all three levels of technology design.

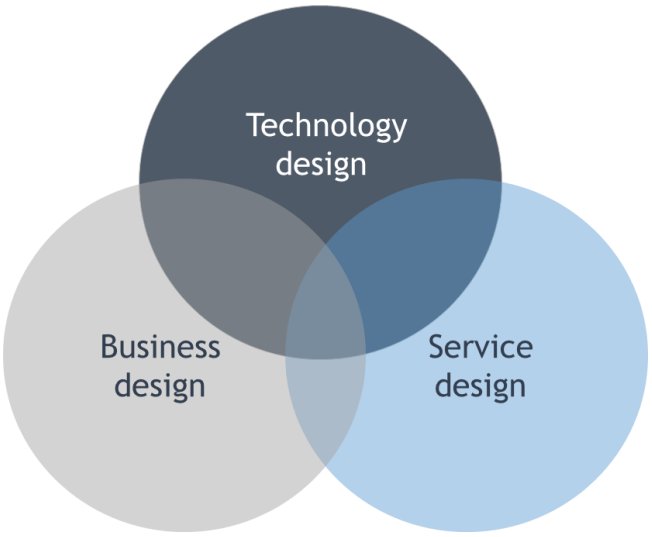

Figure 1. Integral design areas to develop customer focused services using new technologies.

Our preliminary analysis will be further advanced to provide a deep and thorough analysis and evidence of the activities and functions of technology design and the integration of all of the proposed three design areas.

Conclusions and implications

The technology design model proposed in the present work-in-progress paper extends Patrício *et al.´*s (2011) multilevel service design model through adding technology level to the service design process. Our holistic model that takes into account relationships, networks, ecosystem and related value co-creation beyond the boundaries of certain service encounter and solution. As Texeira *et al*. (2017) stated, bridging technology, service design and innovation approaches is important to establish a fruitful dialogue between research and practice. Our aim is to contribute to the existing knowledge around service technologies and co-operation between technology providers and customer firms.

In terms of managerial contribution, we aim to offer new knowledge for managers to integrate new technologies into their existing businesses, but more importantly, for new services and business concepts alike. Such knowledge may be of high value to many industries, which are not originally technology driven.

References

Andreassen, T.W., Kristensson, P., Lervik-Olsen, L., Parasuraman, A., McColl-Kennedy, J.R., Edvardsson, B. & Colurcio, M. (2016). Linking service design to value creation and service research, Journal of Service Management, 27(1):21-19.

Bitner, M.J., Ostrom, A.L. & Morgan. F.N. (2008). Service blueprinting: a practical technique for service innovation, California Management Review, 50(3):66-94.

Brown, T. (2008). Design thinking, Harvard Business Review, 86(6):84-95.

Dubberley, H., Evenson, S. & Robinson, R. (2008). The analysis-synthesis bridge model, Interactions, 15(2): 57-61.

Heinonen, K. & Strandvik, T. (2017). Reflections on customers' primary role in markets. European Management Journal,

Helkkula, A., Kelleher, C., & Pihlström, M. (2012). "Characterizing value as an experience: Implications for service researchers and managers", Journal of Service Research, Vol. 15 No. 1.

Jordan M. I. & Mitchell T. M. (2015) Machine learning: Trends, perspectives, and prospects. Science: 349 (6245) 255-260.

Mager, B. (2009). Touchpoint, Journal of Service Design, 1(1):20-29.

Maglio, P.P., Vargo, S., Caswell, N. & Spohrer, J. (2009). The service system is the basic abstraction of service science, Information systems E-business management, 7: 395-406.

Ostrom, A.L., Parasuraman, A., Bowen, D.E., Patrício, L. & Voss, C.A. (2015). Service research priorities in a rapidly changing context, Journal of Service Research, 18(2):127-159.

Patrício, L., Fisk, R.P, Falcão e Cunha, J. & Constantine, L. (2011). Multilevel service design: from customer value constellation to service experience blueprinting, Journal of Service Research, 14(2):180-200.

Patrício, L., Gustafsson, A., Fisk, R. (2018). Upframing service design and innovation for research impact. Journal of Service Research, 21(1): 3-16.

Shostack, L.G. (1982). How to design a service, European Journal of Marketing, 16(1): 49-63.

Texeira, J.G., Patrício, L., Huang, K-S., Fisk, R.P., Nóberga, L, Constantine, L. (2017), The Minds Method: Integrating management and interaction design perspectives for service design, Journal of Service Research, 20(3): 240-258.

Wortmann, F. & Fluchter, K. (2015) Internet of Things - Technology and Value Added. Business & Information Systems Engineering 57(3):221–224

Yli-Huumo, J, Ko D, Choi S, Park S & Smolander K (2016) Where Is Current Research on Blockchain Technology?—A Systematic Review. PLoS ONE 11(10).