

Customer Value of Smart Grid Application: Implications for E-Service Design in Smart Cities

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ABSTRACT

The authors investigate customer value of smart grid application in smart city from the perspective of main research paradigms of customer value. Data is based on questionnaire for customers (N=131), deep interviews among specialists (7=N), and two months of observation. The results show that the typical user of smart grid technology is a male aged between 30 and 69 who considers that using the application is interesting because of the perceived benefits. Developing strong customer relationship is formed through the provision of e-service quality that has a key role in maintaining customer trust, satisfaction, and loyalty. End-product and service process paradigms to measure customer value do not fully take the complex context of smart cities into consideration, and the ecosystem paradigm must be developed to analyze customer value in smart cities in interactive dynamic decentralized environment where cumulative big data is used to match the customer needs with new digital services.

KEYWORDS

Customer Value, Design Thinking, E-Service Design, Smart City, Smart Grid

INTRODUCTION

In this paper, we investigate the customer value of smart grid application in smart city. Our paper combines two important topical themes: digitization of our basic infrastructure and e-service design from the perspective of the customer value. We approach the topic from design thinking perspective. Customers' are now using smart grid application to monitor their electricity, water and central heating consumption, thus information of the customer value of the application is needed to develop e-service design and to understand the role of customer value in smart cities. The basic premises of both the customer value literature and the service design thinking are quite similar in ways they highlight the value of the product or service for the customer, but differences exist in how they conceptualize customer value.

This paper is structured as follows: We first examine the paradigms of customer value with different basic categories and metrics to analyze customer value. After this we look smart grids of the smart cities as a context. After this literature review, we explain our empirical material and methods based on which we describe the perceived customer value of the smart grid application. In the end we discuss how customer value research should be further developed to take the smart grid context into account and what are the practical implications for e-service design in smart cities.

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Customer Value: Three Paradigms and The Smart City Context

Based on our literature review three main research paradigms of measuring the customer value can be recognized: 1) customer value paradigm which measures the customer satisfaction of end-product or outcome, 2) customer value paradigm that focuses on the service process, and 3) customer value paradigm which focuses on analyzing the value creation of “complex context” ecosystems paradigm. The historical background of two first customer value paradigms are formed from traditional marketing-oriented customer value research community that acknowledges that there are two overriding dimensions to service quality; the core or outcome aspects (contractual) of the service, and the relational or process aspects (customer-employee relationship) or the service (Gordon & McDougall, 2000). The third paradigm has its background in user centered and service design research community. Next, we describe the three different paradigms.

Paradigm 1: Customer Value of End Product (Outcome)

The first paradigm measures the outcome of customer value and focuses on creating reliability and validity of metrics. In our empirical study the customer value is measured in e-service environment, therefore we concentrate to describe how this paradigm views the customer value in on-line and e-service context. Collier & Bienstock (2006) and Madu & Madu (2002) state that experience-based trust formation is important in online services, because they lack the human interaction. Hult et al. (2019) confirm the difference of online and offline retailing; when customers buy electrical goods online, they feel purchase value as significant rating satisfaction and more satisfaction sensitive. Gordon & McDougall (2000) found a direct link between customer satisfaction and future intentions: both perceived value and service quality dimensions should be incorporated into customer satisfaction models to provide a more complete picture of the drivers of satisfaction. Madu & Madu (2002) estimated the customer value attributes in e-business context and listed the features necessity in achieving customer satisfaction in virtual operations. Yang, Jun &, Peterson (2004) identified the following three broad conceptual categories related to online service quality: (1) customer perceived service quality; (2) information systems quality; and (3) product portfolio. Chu, Lee & Chao (2012) studied the characters of customer perceptions in e-banking and concluded that e-banks must focus on service quality to increase customer satisfaction and trust and to obtain customer loyalty. According to Chu, Lee & Chao (2012) trust mediates the satisfaction-loyalty relationship and it has been suggested that trust is an antecedent to satisfaction, which is subordinate to loyalty.

Paradigm 2: Customer Value of Relational or Process Service

This second paradigm of customer value focuses on process and measures also the cumulative satisfaction of customers (Türkyılmaz & Özkan, 2007). Compared to the first paradigm there is less literature that focuses on the customer value of the service process, as it is easier to measure the static outcome than the quality of service process. To generalize, in this second paradigm quality evaluations based on the interactive process that takes place online (process), the outcome of how the product or service is delivered (outcome), and the manner in which service failures (if they occur) are handled (recovery). Collier & Bienstock (2006) extend the work on e-service quality to encompass the outcome and recovery quality, showing that the process quality has a relationship with satisfaction and behavioral intentions. These findings suggest that customers evaluate the process by evaluating the design, information accuracy, privacy, functionality, and ease of use. This process quality, in turn, positively affects their perceptions of the outcome quality of the transaction (Collier & Bienstock, 2006).

Gordon & McDougall (2000) investigated customers value process and the relationship between three elements 1) core service quality (promise), 2) relational service quality and perceived value and customer satisfaction and future intentions across four services. Türkyılmaz & Özkan (2007) and Gordon & McDougall (2000) define perceived value as viewed as benefits received relative to cost. The

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