

Effect of Medical Care Platform Monitoring System on to Customer Interaction and Loyalty

Li -Wei Lin *

School of Information ,
Zhejiang University of Finance &
Economics Dongfang College,
Haining, China
Linlw1982@gmail.com

Shih-Yung Wei

Business School of Yulin Normal
University , China
noahsywei@163.com

Su-Mei Gan

School of Information ,
Zhejiang University of Finance &
Economics Dongfang College,
Haining, China
zjcjgan@163.com

Abstract—Two-step stratified sampling was performed from 31 Taiwanese e-health companies and 362 users. By using hierarchical linear modeling, the study presents a research model which includes service innovation, value co-creation, interactive quality, perceived value, satisfaction, and e-loyalty.

The results show that individual-level value perception has a significant positive impact on satisfaction; interaction quality has a significant positive effect on electronic loyalty; and corporate level value creation and service innovation have a direct impact on value perception and interactive quality. Overall, value perception plays an intermediary role in the relationship between service innovation and value creation and satisfaction.

For future researchers, the paper provides a theoretical model of the relation between co-creation and service innovation on e-health platforms.

Keywords—service innovation; value co-creation; interactive quality; e-health

I. INTRODUCTION

In Taiwan from 1994, in order to focus on health care resources, more effective utilization, and reduce the abuse of medical resources, e-health has been introduced to improve the quality of medical services in remote areas

Many countries facing an aging society have been offered e-health[1]. E-health is an application of the Internet of Things (IoT), and is widely used in tele-home care (THC). IoT is based on a network comprising objects in our environment, for example, radio frequency identifications (RFIDs), sensors, mobile phones, wearable devices, etc. [2]. Within such a perspective, e-health of IoT has a great impact on normal health monitoring systems. It allows the user to perform monitoring without time or location restrictions, and for health sensing components to become more compact and portable [3]. One example of this is that the BodyTel company, through the IoT, monitors blood sugar, blood pressure and weight, and uploads the data to service providers.

In today's environment, companies are increasingly dependent on the relationships that they have with their clients. Customer relationships often bring about greater profits for companies, as well as perceived value, satisfaction, and loyalty (Akhoondnejad, 2016; Angilella, Corrente, Greco, and

Słowiński, 2014; Cheng, Chen, and Chang, 2008; Derawi and Zhang, 2016;W.K, Kim and Cha, 2002).

Janita and Miranda (2013) asserted that loyalty is a key to a company's survival, particularly in e-commerce. The characteristics of loyalty are not only achieved with technology, but also require improving the customer's experience (Reichheld and Scheffer, 2000).

Activities designed to maintain and enhance customer relationships are continuously implemented in e-health businesses. First, operators strive to deliver superior service that enhances the value perceptions of loyalty, which in turn leads to customer satisfaction. Mortazavi, Kazemi, Shirazi, and Aziz-Abadi (2009) noted that patient satisfaction had a positive effect on loyalty, so that one unit increase in patient overall satisfaction increased patient loyalty by 54% to 77%.

II. THEORETICAL BACKGROUND

[4] asserted that value co-creation is derived from the resource-based view (RBV), which is based on the competitive advantage of a firm, which lies primarily in the application of a bundle of valuable tangible or intangible resources at the firm's disposal.

[5] asserted that service innovation draws on the dynamic capability based view. Project-oriented companies often have long project life cycles that involve clients providing input to the innovation process.

In a review of the extant literature, some authors proposed the SERVQUAL model of service quality. [6] proposed a conceptual framework of service quality. Service quality includes interactive quality, physical environment quality, and outcome quality. The most important issue of service quality is customer interaction, which is why customer evaluations affect companies that provide service quality.. [7]

[8] found that customer value and satisfaction constitute two key antecedents of customer loyalty for VSL. In other words, customer value positively influences satisfaction, and loyalty is cultivated and retained by satisfaction.

[9] proposed that the concept of value co-creation is explored in service dominant (S-D) logic. This is a common denominator in an exchange and not a special phase of exchange regarding the basis of a service. In other words,

providers and beneficiaries (such as manufacturers and consumers) are always together and reciprocate through integrations of resources and applications of competencies [10]. This study suggests the following hypotheses:

H1a: Value co-creation is positively related to perceived value.

H1b: Value co-creation is positively related to interactive quality.

[11] asserted that new developments in service processes involved in delivering core products and services can be viewed as a set of improved processes for delivering existing services/products. Service innovation creates value by enabling service providers to use electronic technologies to improve customer-firm interactions and reduce service/product risks. [12] [13]. Therefore, [14] believed that service innovation drives users' motivation so that providing more service innovation would enhance satisfaction. It thus follows that:

H2a: Service innovation is positively related to perceived value.

H2b: Service innovation is positively related to interactive quality.

[15] and [16] suggested that, according to equity theory, the customer evaluates whether the expected cost of the products/ services is fair, including pecuniary and non-monetary sacrifices (perceived value). Perceived value has been regarded as a consumer's overall assessment of product/service utility based on perceptions of what is received (benefits) compared to what is given (costs) in a service interactive process [17].

Lam, Shankar, Erramilli, and Murthy (2004) [18] noted that, when customers purchase a product/service, they then receive perceptions of the value that is positively related to satisfaction. Cronin, Brady, and Hult (2000) [19] indicate that value perception has a major effect on satisfaction. Hence, this study proposes the following hypothesis:

H3: Perceived value is positively related to satisfaction.

The evaluation of interaction quality is affected the service for the company views, while if between providers and consumers feel good interaction will affecting loyalty. [20][21]Based on the above definition, the following hypothesis is presented:

H4: Interactive quality is positively related to e-loyalty.

Anderson, [22]defined satisfaction as an emotional response resulting from a cognitive evaluation process comparing personal expectations to the products'/services' perceived value. Evaluation of satisfaction is the consumer's purchase, and overall product or service experience emotional reactions. [23] [24]noted that satisfaction has an effect on increasing customer loyalty, and positively affects repeating sales and/or repurchasing intentions. This study thus further hypothesizes the following:

H5: Satisfaction is positively related to e-loyalty.

III. RESEARCH METHOD

To develop the survey instrument, a pool of items was identified from the literature for measuring the constructs of the research model. Data from an online survey sample were collected to assess the instrument's validity and reliability, and to test the hypothesized relationships of the research model.

E-health is a new concept, and we could not determine any measures in the extant literature. Alternatively, we explored studies with survey instruments that were developed from the e-commerce and supply chain literature. Where appropriate, the manner in which the items were expressed was adjusted to the context of e-health, as shown in Fig. 1. The surveys were initially developed in an English version first, then translated into Chinese, and then back-translated into English. When the back-translated English version was checked against the original English version, some questions were reworded to improve the accuracy of the translation, in accordance with the recommendation of Brislin. The expressions of the items were adjusted, where appropriate to the context of the e-health industry. The items were measured on a seven-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (7).

In order to improve the content and appearance of the 51-item questionnaire, a pre-test was performed on a sample comprising four academic researchers and two Ph.D. students. Then, several managers in the medical industry were contacted to assist with pilot-testing the instrument. The respondents were asked to complete the questionnaire and provide comments on the wording, understandability and clarity of the items, as well as on the overall appearance and content of the instrument. The responses suggested that all statements were retained, and only minor cosmetic changes were needed. After a further review by two other academic researchers, the instrument was deemed ready to be sent to a large sample in order to gather data for testing our research model.

To ensure the cross-validation of results, the study investigates different e-health companies and user samples.

HYPOTHY

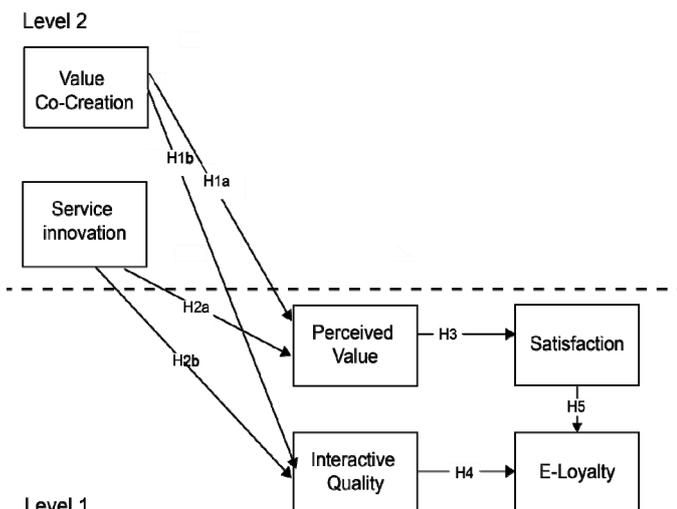


Fig. 1. The research model.

The e-health operators data were obtained from the Ministry of Health and Welfare, Taiwan, in 2014. This study decided to introduce a traditional paper-based survey of e-health operators, including: 1) a cover letter explaining the research objectives; (2) a questionnaire; and (3) a stamped, return-addressed envelope. These three items were distributed to managers at each e-health company. In order to make the submission as convenient as possible, participants were offered several options for returning the questionnaire (via mail or via fax). In addition, online surveys were offered, and present some advantages, including faster responses, higher response rates, and geographically unrestricted sample. However, it must be noted that an online survey is liable to involve multiple completions by one person. To prevent this situation, identical IP addresses were eliminated to minimize the risk of a participant repeatedly filling out the survey using several email addresses. We can observe from Fig. 2.

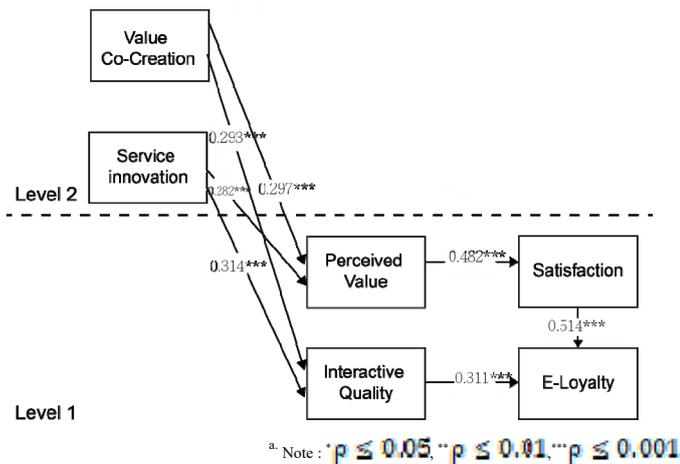


Fig. 2. The HLM model.

IV. DISCUSSION

Conforming to the hypothesis, value co-creation is positively related to perceived value. This finding is consistent with [25]. In Taiwan's medical industry, value co-creation is crucial among doctors, nurses, and patients because it positively affects relationships. Therefore, patients can experience a positive relationship between value creation and benefit, and thus perceived value is increased. Such participation should lead to agreement between patients and healthcare providers, leading to greater patient adherence [26] [27].

Service innovation is positively related to perceived value. This finding is in line with previous research [28]. This indicates that e-health should consider that service innovation will be affected by perceived value, which drives satisfaction. In Taiwan's e-health, continuous innovation should be accomplished in order to provide better service.

Perceived value is positively associated with the relationship on satisfaction in e-health, which is consistent with previous work. [29] Satisfaction is positively associated with e-loyalty, which is consistent with the extant literature [30]. In Taiwan's medical industry, value co-creation is a critical factor

in online platforms in e-health. In a similar way, nursing staff observes patient needs, and provides useful information about medical services. In the process, patients not only receive assistance, but also establish good relationships with the hospital. Therefore, long-lasting effects are achieved regarding the perception of satisfaction and loyalty to the hospital [31].

REFERENCES

- [1] Chou, H.-K., Yan, S.-H., Lin, I.-C., Tsai, M.-T., Chen, C.-C., and Woung, L.-C. (2012), "A Pilot Study of the Telecare Medical Support System as an Intervention in Dementia Care: The Views and Experiences of Primary Caregivers", *The Journal of Nursing Research*, Vol.20No.3, pp. 169-180
- [2] Q Ashraf,.. "Autonomic schemes for threat mitigation in Internet of Things", [J] *Journal of Network and Computer Applications*, 2015, Vol.49No3, pp.112-127.
- [3] A Hussain, R Wenbi, A da Silva, M Nadher, M., "Health and emergency-care platform for the elderly and disabled people in the Smart City," [J] *Journal of Systems and Software*, 2015, vol.110No.3, pp. 253-263.
- [4] C Prahalad, G Hamel, "The Core Competence of the Corporation," [J] *Harvard Business Review*, 1990, vol.68No.3, pp. 79-91.
- [5] S Salunke, J Weerawardena, J McColl-Kennedy, "Towards a model of dynamic capabilities in innovation-based competitive strategy: Insights from project-oriented service firms," [J] *Industrial Marketing Management*, 2011, vol.40No.8, pp.1251-1263.
- [6] M Brady, Cronin, Jay, "Customer orientation effects on customer service perceptions and outcome behaviors," [J] *Journal of service Research*, 2001, vol.3No3, pp.241-251.
- [7] D Gremler, K Gwinner, "Customer-employee rapport in service relationships," [J] *Journal of Service Research*, 2000, vol.3No.1, pp. 82-104.
- [8] E Anderson, W Fornell, D Ray. "Customer satisfaction, market share, and profitability: Findings from Sweden," [J] *The Journal of marketing*, 1994, vol. 23(21), pp.53-66.
- [9] S Vargo, R Lusch (2008), "Service-dominant logic: continuing the evolution," [J] *Journal of the Academy of marketing Science*, 2008, vol.36No.1, pp. 1-10.
- [10] C Grönroos (2011), "Value co-creation in service logic: A critical analysis," [J] *Marketing theory*, 2011, vol.11No.3, pp. 279-301.
- [11] A Oke, "Innovation types and innovation management practices in service companies," [J] *International Journal of Operations and Production Management*, 2007, vol.27No.6, pp. 564-587.
- [12] A Eisingerich, B Rubera, G, "Managing service innovation and interorganizational relationships for firm performance to commit or diversify?," [J] *Journal of Service Research*, 2009, vol.11No.4, pp. 344-356.
- [13] C Hinnant, J O'Looney, "Examining pre-adoption interest in online innovations: an exploratory study of e-service personalization in the public sector," [J] *Engineering Management, IEEE Transactions on*, 2003, vol.50No.4, pp. 436-447.
- [14] T Duman, A Mattila, "The role of affective factors on perceived cruise vacation value", *Tourism Management*, 2005, vol.26No.3, pp.311-323.
- [15] R Bolton, "A dynamic model of customers' usage of services: Usage as an antecedent and consequence of satisfaction," [J] *Journal of Marketing Research*, 1999, vol. 36No.2, pp. 171-186.
- [16] Z Yang, R Peterson, "Customer perceived value, satisfaction, and loyalty: The role of switching costs," [J] *Psychology and Marketing*, 2004, vol.21No.10, pp. 799-822.
- [17] V Zeithaml, L Berry, A Parasuraman (1996), "The behavioral consequences of service quality," [J] *Journal of Marketing*, 1996, vol.11No.4, pp.31-46.
- [18] S Lam, V Shankar, M Erramilli, B Murthy, "Customer Value, Satisfaction, Loyalty, and Switching Costs: an Illustration from a

- Business-to-Business Service Context," [J] *Journal of the Academy of Marketing Science*, 2004,vol.32No.3,pp. 293-311.
- [19] J Cronin, , Brady Ma, " Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments", [J]*Journal of retailing*, 2000,vol.76No.2,pp. 193-218.
- [20] M Brady, Cronin, Jay , " Customer orientation effects on customer service perceptions and outcome behaviors", [J] *Journal of service Research*,2001,vol.3No3, pp.241-251.
- [21] D Gremler,K Gwinner, "Customer-employee rapport in service relationships," [J]*Journal of Service Research*,2000,vol. 3No.1,pp. 82-104.
- [22] E Anderson, W Fornell, D Ray. "Customer satisfaction, market share, and profitability: Findings from Sweden," [J]*The Journal of marketing*, 1994,vol. 23(21), pp.53-66.
- [23] R Oliver,(1980), " A cognitive model of the antecedents and consequences of satisfaction decisions,"[J]*Journal of Marketing Research*, 1980,vol.4No.1,pp.460-469.
- [24] J Lewin, " Business customers' satisfaction: What happens when suppliers downsize?,"[J]*Industrial Marketing Management*, 2009,vol.38No.3,pp. 283-299.
- [25] S Vargo,P Maglio, M Akaka, M., " On value and value co-creation: A service systems and service logic perspective,"[J]*European management journal*,2008, vol.26No.3,pp. 145-152.
- [26] T Bodenheimer, "Patient self-management of chronic disease in primary care. *Jama*," [J]*Journal of Marketing*,2002, vol. 288No.19,pp. 2469-2475.
- [27] K Haywood,S Marshall, R Fitzpatrick, "Patient participation in the consultation process: a structured review of intervention strategies,"[J]*Patient education and counseling*, 2006,vol63No1, pp.12-23.
- [28] A Oke, " Innovation types and innovation management practices in service companies,"[J] *International Journal of Operations and Production Management*, 2007,vol.27No.6,pp. 564-587.
- [29] D Flint, C Blocker, " Customer value anticipation, customer satisfaction and loyalty,"[J]*An empirical examination. Industrial Marketing Management*", 2011,vol.40No.2,pp. 219-230.
- [30] S Mortazavi.,M Kazemi,A Shirazi, A Aziz-Abadi, (2009), " The relationships between patient satisfaction and loyalty in the private hospital industry," [J]*Iranian Journal of Public Health*, 2009,vol.38No.3, pp.60-69.
- [31] L Van der Heyden.,H Mintzberg, "Organigraphs: Drawing How Companies Really Work,"[J]*Harvard Business Review*, 1999,vol.77No.5,pp. 87-94.