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Abstract

Social commerce (s-commerce) is a social media service enabling consumers' participation in the online marketing and sale of products and services. This study aims to (a) identify key functional and hedonic quality factors that affect consumer satisfaction based on consumers' perspective and (b) analyze the degree of efficiency of the quality-satisfaction relationship to propose distinct and actionable improvement strategies from the firms' perspective. The results identified the following key quality determinants: functional aspects of durability and safety, and hedonic aspects of enjoyment, awareness, novelty, and image. The result implies that most s-commerce service firms fail to efficiently convert the enhancement of safety, awareness, and novelty into consumer satisfaction. This study contributes to the stream of literature on both s-commerce and service operations management by determining key service quality elements based on consumers' perceptions and providing a decision-making aid to firms for quality-satisfaction efficiency improvement.

JEL CLASSIFICATION: M10; L20; L81

Keywords

S-commerce, consumer satisfaction, sustainable development, quality-satisfaction efficiency

Introduction

The inclusion of social interaction in the e-commerce business model, or “social commerce (s-commerce),” has gained theoretical and business attention in various fields, such as information technology (IT), service operations management, and consumer management research. S-commerce is defined as “forms of internet-based social media that allow people to actively participate in the marketing and selling of products and services in online marketplaces and communities” (Yu et al., 2020). The s-commerce market anticipates an annual investment of US\$50 billion by 2020 (Busalim & Hussin, 2016). Amazon, a key e-commerce leader, has begun integrating social customer relationship management to encourage communication among business players (Amblee & Bui, 2011; X. Lin et al., 2015). Because of its profitability and overall improvement of consumer satisfaction, the business value of service integration is clear (de Souza et al., 2018). Thus, strategic allocation of time and financial investment for service design relative to social media is vital for gaining sustainable competitive advantages in the s-commerce market.

Several s-commerce and consumer management studies investigated various aspects, from distinguishing key differences between conventional and modern commerce systems (C. Y. Li & Ku, 2018), identifying key determinants of s-commerce success (C. Y. Li, 2017), offering operational measures of user perception of s-commerce (Williams, 2018), highlighting the effectiveness of social capability (Braojos et al., 2018), and developing strategic management from the aspects of profitability and service users' perspectives. However, there has been limited focus

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on s-commerce service quality design, such as how to develop efficient s-commerce platforms based on the vast knowledge of service platform quality elements.

Despite pervasive technological advancement in the platform service business, not enough scholarly attention has been paid to s-commerce design strategies (Curty & Zhang, 2013). Researchers and practitioners constantly face challenges in synthesizing previously identified quality measures of commerce platform services (e.g., functional and hedonic qualities) and systematically achieving efficient s-commerce platform design (efficiency management). Thus, this study raises the following questions: (a) What are the key measures of s-commerce service quality performance? (b) How can service providers strategically improve consumer satisfaction and gain competitive advantage through efficient management approaches to service design? This study's objectives include (a) identifying key functional and hedonic quality drivers of s-commerce consumer satisfaction based on an elaboration likelihood model (ELM) and (b) providing a firm-level prioritized decision-making process for s-commerce success based on quality-satisfaction efficiency analysis.

Prior research has acknowledged the need for theoretical investigation and the business value of s-commerce research. With social media enabling Web 2.0, the bargaining power has shifted from vendors to consumers (N. Hajli & Sims, 2015), highlighting the importance of consumers' perception of overall service level, rather than vendors' management capability. For example, involvement of social media is recommended to improve the vendor-consumer relationship, thereby increasing sales and consumer loyalty (M. N. Hajli, 2014). S-commerce has been investigated as either a subset of existing e-commerce, which utilizes social media to improve the overall transaction experience (Liang & Turban, 2011), or a completely new commerce entity built upon Web 2.0, with distinct interactivity, collaboration, community, social aspects, and so on (Busalim & Hussin, 2016; Sharma & Baoku, 2013). Although studies explored s-commerce's unique features, a lot remains unknown regarding the main drivers of its success based on consumers' perceptions.

Existing s-commerce studies focused on identifying consumers' behavioral intentions in s-commerce, including trust, purchase, and word-of-mouth intentions; utilitarian and hedonic motivations; and social support (M. N. Hajli, 2014; S. Kim & Park, 2013; Lee et al., 2018; Liang et al., 2011; Ng, 2013; J. Yang et al., 2016; H. Zhang et al., 2014). Another line of research identified s-commerce quality aspects, such as relationship, information, and brand quality (M. N. Hajli, 2014; Liang et al., 2011; Pentina et al., 2013; K. Z. K. Zhang et al., 2016). The previous studies provided valuable insights into both consumers' behaviors and quality aspects of s-commerce. However, these studies did not investigate key determinants of s-commerce satisfaction by applying a robust

overarching theory and managerial insights for efficient s-commerce service design and improvement strategies.

Therefore, this study focuses on evaluating functional and hedonic quality levels by adopting an ELM and an efficiency level for top revenue-generating s-commerce service firms in South Korea. The investigated s-commerce service firms offer identical business models with homogeneous product portfolios, but varying quality levels of social interaction design and consumer connection. Thus, evaluating the quality of service performance among these firms will establish generalizable, critical success factors in s-commerce service design, and applying a quality-satisfaction efficiency model provides a basis to benchmark strategies for sustainable competitive market positioning.

This study utilizes multiple regression and data envelopment analyses (DEA) to demonstrate the process of delineating key elements before prioritization for efficient service management. The proposed approach contributes to the literature streams of both s-commerce and service operations management by determining key service quality elements based on consumers' perceptions and providing a decision-making aid to firms for quality-satisfaction efficiency improvement. To our best knowledge, few prior studies focused on a comprehensive view approach for s-commerce management with a complementary approach for efficient management, ultimately creating an opportunity to combine researchers' findings and practitioners' application in a real-world setting.

The remainder of this article is organized as follows: section "Literature review" reviews previous studies on s-commerce, s-commerce satisfaction management and improvement approaches, ELM, and quality-satisfaction efficiency management. Section "Data collection and methodology" describes the data collection and methodology. Section "Results and discussion" tests the research model empirically using multiple regression and DEA. Finally, section "Conclusion" discusses the study's findings, theoretical and practical implications, limitations, and opportunities for future research.

Literature review

Overview of s-commerce

The key quality determinants of s-commerce differ from the general web-based quality dimensions based on various aspects. S-commerce consumers comprise a natural form of network communities and are offered complete system control (Huang & Benyoucef, 2013). To cope with these changes in the network structure and system interactivity, service interface design visually differs between e-commerce and s-commerce (Y. Wang & Yu, 2015). Consequently, the different expectations of consumers of s-commerce resulted in forced changes in service providers' goals (Hu et al., 2019; J. Lin et al., 2019).

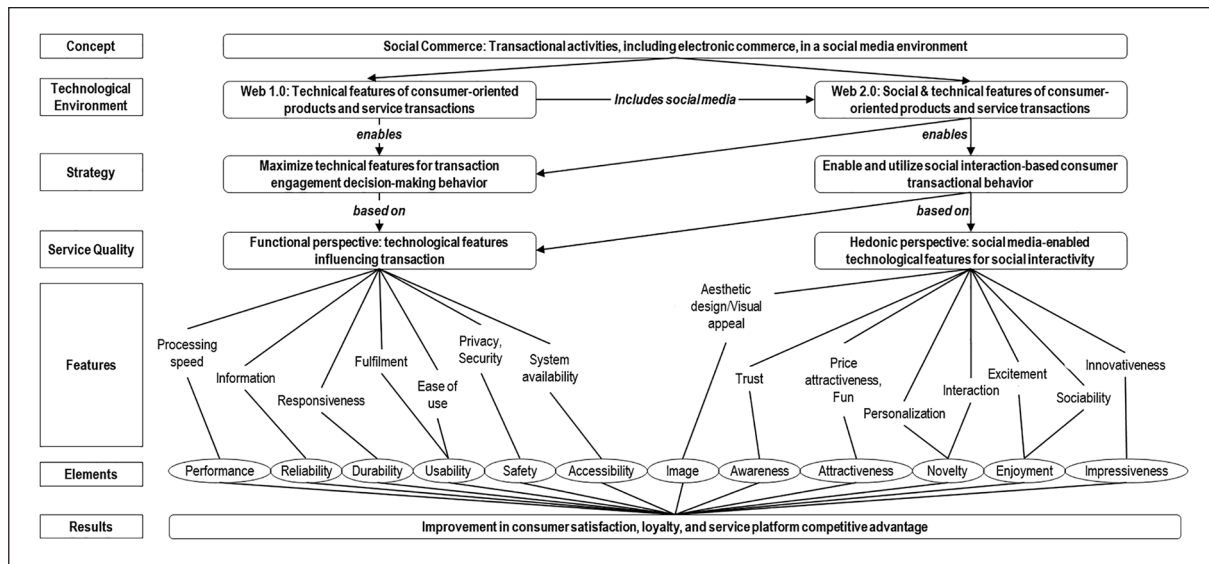


Figure 1. Summary of changes in strategy and management approach in the s-commerce context.

The existing e-commerce in Web 1.0 was built on the successive technical features of service transactions (Kowatsch & Maass, 2010). However, most quality dimensions developed in the Web 1.0 setting focused on websites' functional attributes (Bernardo et al., 2012), such as functionality, system availability, fulfillment, and privacy (Collier & Bienstock, 2006; Parasuraman et al., 2005; Wolfenbarger & Gilly, 2003), and website design, fulfillment, consumer service, and security/privacy, which were tested based on a meta-analysis of 31,264 individual observations (Blut et al., 2015). The aforementioned studies highlight the dimensions that are more appropriate for the technical and design features of e-commerce platforms, the nature of which may be considered functional rather than hedonic (Bernardo et al., 2012).

However, recent studies (i.e., Hu et al., 2019; J. Lin et al., 2019) suggested the need for a refreshed direction for e-commerce by investigating prominent interactions among consumers on social media-based commerce services. The role of hedonic quality emerged to be as important as that of functional quality (C. Kim et al., 2015). Web 2.0 technological advancements allow e-commerce platforms to involve social media users and enhance their participation (Akram et al., 2018; Huang & Benyoucef, 2013). Moreover, Web 2.0's emergence has enabled various studies to determine consumer- or community-driven quality elements such as enjoyment, aesthetics, pleasantness, curiosity, trust, and emotions (M. N. Hajli, 2014; N. Hajli & Sims, 2015; J. S. C. Lin & Hsieh, 2011; Ozkara et al., 2017; L. Y. Wu, Chen, & Chen, 2015; H. Zhang et al., 2014). The evaluation of the s-commerce experience should be more general than specific, as its natural benefits are experiential or hedonic rather than functional or utilitarian (C. F. Chen & Chen, 2010).

The transition from e-commerce to s-commerce is evident in both information system and service quality management perspectives. The shift mainly differs between the application of Web 1.0 and Web 2.0—the sole enablers of the transition process (J. Lin et al., 2019). A summary of changes in management strategies, key service quality elements, and improvement approach in an s-commerce context is presented in Figure 1. It contends that the introduction of new technological features distinguishes the two environments—Web 1.0 and 2.0—which leads to changes in management goals, followed by an extension of relevant service quality elements that are pertinent to s-commerce success.

This study focuses on functional and hedonic quality elements (Table 1) to understand consumers' holistic experiences. This approach contributes by capturing the intrinsic and extrinsic service attributes, thereby including both objective and subjective service performance (Stone-Romero et al., 1997). This assessment of service performance's functional and hedonic values can be used to design appropriate quality improvement strategies for s-commerce businesses.

S-commerce satisfaction management and improvement approaches

Although the conceptual definition of s-commerce is beginning to emerge, its identified measures and degree of operationalization for practical usage is fragmented, as shown in Table 2. There has been limited focus on service quality design, such as how to develop efficient s-commerce platforms by synthesizing and delineating key service platform quality elements. Particularly, three gaps were identified: (a) integration of functional and hedonic

Table 1. Determinants of s-commerce service performance and relevant subfactors.

Constructs	Definition	References
Performance	The extent to which the consumer perceives that basic needs have been met	Bernardo et al. (2012), Collier and Bienstock (2006), Janda et al. (2003), Parasuraman et al. (2005), and Z. Yang et al. (2005)
<i>Examples</i>	<i>Processing speed and useful information</i>	
Reliability	The extent to which the consumer perceives the service operates as promised	Barnes and Vidgen (2002), Bernardo et al. (2012), Collier and Bienstock (2006), Parasuraman et al. (2005), Wolfenbarger and Gilly (2003), and Z. Yang et al. (2004, 2005)
<i>Examples</i>	<i>Reliable transaction, content quality, information accuracy, and information adequacy</i>	
Durability	The extent to which the consumer perceives the service performs as long as the promised term	Parasuraman et al. (2005), Stone-Romero et al. (1997), and Yoo and Donthu (2001)
<i>Examples</i>	<i>System availability, no temporary termination, stable processing speed, technical adequacy, and responsiveness</i>	
Usability	The extent to which the consumer perceives the service as convenient	Barnes and Vidgen (2002), Bernardo et al. (2012), Collier and Bienstock (2006), Wolfenbarger and Gilly (2003), Z. Yang et al. (2004, 2005), and Yoo and Donthu (2001)
<i>Examples</i>	<i>Efficiency in navigation, easy transaction, usefulness, ease of use, and fulfillment</i>	
Safety	The extent to which the consumer perceives security during the service use experience	Barnes and Vidgen (2002), Bernardo et al. (2012), Collier and Bienstock (2006), Parasuraman et al. (2005), Wolfenbarger and Gilly (2003), and Z. Yang et al. (2004, 2005)
<i>Examples</i>	<i>Privacy and security</i>	
Accessibility	The extent to which the consumer perceives the convenience of customer service access	Janda et al. (2003) and Z. Yang et al. (2004, 2005)
<i>Examples</i>	<i>Customer service accessibility, online information system accessibility, and system availability</i>	
Image	The perceived pleasure derived from the service design and overall quality characteristics	Barnes and Vidgen (2002), Collier and Bienstock (2006), Johnson et al. (2001), Wolfenbarger and Gilly (2003), and Yoo and Donthu (2001)
<i>Examples</i>	<i>Aesthetic design, visual appeal, and service brand image</i>	
Awareness	The perceived pleasure derived from the service and brand awareness and trustworthiness	Barnes and Vidgen (2002) and D. H. Shin (2013)
<i>Examples</i>	<i>Trust</i>	
Novelty	The perceived pleasure derived from the service's uniqueness	Barnes and Vidgen (2002), Bernardo et al. (2012), Stone-Romero et al. (1997), and Z. Yang et al. (2005)
<i>Examples</i>	<i>Easy to communicate, personalization, distinctiveness, interaction, and social innovation</i>	
Attractiveness	The perceived pleasure derived from the service's attractiveness	Andreassen and Lervik (1999) and Johnson et al. (2001)
<i>Examples</i>	<i>Relative attractiveness and price attractiveness</i>	
Enjoyment	The perceived pleasure derived from the service's enjoyment and affection	Alonso-Almeida et al. (2014), Johnson et al. (2001), and Mundorf et al. (1993)
<i>Examples</i>	<i>Affective commitment, excitement, likability, fun, and sociability</i>	
Impressiveness	The perceived pleasure derived from the service's impressiveness and sensation	Curic et al. (2008), Hassenzahl (2001), and Janda et al. (2003)
<i>Examples</i>	<i>Innovativeness, sensation, and pride</i>	

SNS: social networking site.

perspectives of quality measure, (b) systematic approach to consumer-based service design and management, and (c) strategic improvement planning through quality-satisfaction efficiency management approaches to gain a competitive advantage in the market.

Previous studies identified new elements that are relevant in s-commerce, rather than integrating and updating the existing service quality management studies. For example, Y. C. J. Wu et al. (2015) adapted e-service quality measurements to

evaluate and identify consumers' commercial activity preferences. M. N. Hajli (2014) and N. Hajli and Sims (2015) focused on informational quality, and H. Zhang et al. (2014) identified technological features as the leading factors to s-commerce intention. However, these elements are contingent on the commerce platform's functionality. Y. C. J. Wu et al. (2015) emphasized that functionality-based quality dimensions do not always address all features of consumers' social media experiences.

Table 2. Existing research on s-commerce and satisfaction management.

References	Conceptual definition of s-commerce	Operationalized elements	Level of analysis
Liang and Turban (2011)	S-commerce involves using a social networking site for commercial activities	Social support, relationship quality, website quality	Effects on s-commerce intention and continuance intention
Y. C. J. Wu et al. (2015)	An online medium that combines Web 2.0 technologies and the psychology of social shopping within a virtual community	Electronic service quality (reliability, responsiveness, information, security, ease of use, trust)	Effect on service quality of commercial activities
N. Hajli and Sims (2015)	The use of Web 2.0 commercial applications and social media to facilitate the interactions of individuals on the Internet to support consumers' acquisition of services and products	S-commerce constructs (forums, communities, ratings, reviews, recommendations)	Effect on social support and s-commerce intention
Lu et al. (2016)	New design features built upon social media and Web 2.0 technologies which help enhance consumer participation and allow them to collect socially rich information	Social presence of web, perceptions of others, social presence of interactions with sellers	Effects on trust in sellers and purchase intention
Huang and Benyoucef (2017)	The use of social media tools and Web 2.0 technologies in e-commerce	Design quality (usability, functionality, sociability)	Effects on consumer purchase decision-making
C. Y. Li (2017)	A new form of social media-mediated commerce that allows consumers to participate actively in the marketing and sales in online marketplaces	Ratings and reviews, recommendations, referrals	Effects on cognitive and affective state, trust in product recommendation, shopping intention
A. Chen et al. (2017)	A form of commerce mediated by social media involving convergence between the online and offline environments	Forums and communities, ratings and reviews, social recommendations	Effect on purchase intention
Williams (2018)	A form of commerce resulting from the combination of commercial and social activities, being underpinned by Web 2.0 technologies to facilitate consumer interactivity and content generation	Convenience, perceived ease of use, perceived usefulness, risk, trust	Effect on intention to use
Y. L. Wu and Li (2018)	A business model that uses social media to support not only B2C but also C2C e-commerce transactions offering effective interactive services	Utilitarian value, hedonic value, social value	Effect on consumer loyalty
Yu et al. (2020)	Forms of Internet-based social media that allow people to actively participate in the marketing and sale of products/services in online marketplaces and communities	Service innovation (platform functionality)	Effect on consumer engagement
C. Y. Li and Ku (2018)	An integration of e-commerce functionalities to social networks, thus helping people purchase goods and services from places that they are already connected to	Transaction efficiency, sociability, conformity, personal experiences	Effect on switching intention to s-commerce
N. Kim and Kim (2018)	A form of e-commerce that uses social networks to influence sales or Groupon-like s-commerce	Social influence (referrals)	Effect on sales performance
Braojos et al. (2018)	A new concept characterized by the interplay of social media and e-commerce platforms that influences consumers' participation, engagement, and decision-making behavior	S-commerce IT capabilities (social media, e-commerce)	Effects on online consumer engagement and firm performance
This study	Web 2.0 technologies based on social media that enable consumers to market, sell, and purchase products and services in online marketplaces and communities	S-commerce service quality attributes (functional, hedonic)	Efficient management approach to s-commerce service operations

Despite the need to focus on social media-enabled attributes for desirable consumer behavioral outcomes, studies that investigate systematic approaches to consumer-based service design and management are still in their infancy (Huang & Benyoucef, 2013). With e-commerce, a firm's concern is bounded by leveraging utilitarian aspects of the technologies (Benitez et al., 2018). However, firms now have to deal with additional technology and experiential elements that enhance consumers' commitment and participation in service usage (Hu et al., 2019). Although previous studies covered various forms of consumer engagement ranging from intention to use, purchase intention, and continuance intention, to service loyalty (C. Y. Li & Ku, 2018; Lu et al., 2016; Williams, 2018; Yu et al., 2020), they did not formally propose a practical, systematic, and effective approach to service operations management. The limited analysis in the process of creating a link between service quality attributes and consumer behavioral outcome exacerbates confusion in service quality management in the s-commerce context.

The key to understanding IT-based performance variation is examining how firms leverage and manage their IT capabilities, rather than its availability (Braojos et al., 2018). Existing studies on s-commerce mainly focus on building hypotheses and proposing causal maps while largely relying on expanding and supporting a theory-driven framework of service quality elements. However, to achieve sustainable growth, strategic guidelines from a practical perspective are necessary to overcome the shortcomings of business models (D. Kim, 2013). From the service operations management perspectives, efficiency measurement can quantitatively identify whether a firm's resources are efficiently allocated in service quality production (Soteriou & Stavrinides, 2000). An integrative assessment of consumer satisfaction and how efficiently a firm can manage its service design process will allow firms to determine appropriate strategies for attaining a novel competitive edge.

ELM perspective

The ELM, proposed by Cacioppo and Petty (1986), explains that changes in individuals' attitudes are determined by their level of objectivity and subjective needs. Specifically, attitude differs based on individuals' cognitive perception of task-related performance and its delivered merits (via the central route) and subjective inferences during task completion (via the peripheral route) (Bhattacharjee & Sanford, 2006; Cacioppo & Petty, 1986; C. Y. Li, 2013). Consequently, the model gained popularity in the consumer behavior field for its effectiveness in modeling the drivers of consumers' attitude formation (Ho & Bodoff, 2014; Kwon & Chung, 2010). The ELM is applied widely to investigate the effects of dual processing in the intent to use e-commerce; studies that utilized

the ELM theory in online and social media-based service contexts are summarized in Table 3.

From an s-commerce perspective, Cyr et al. (2018) called for further examination of the central and peripheral routes in service use engagement to better understand the dynamics of online persuasion. Consumers in a social network environment now have unlimited freedom to participate in content publishing, thereby dynamically transforming the relationship between service quality and its impact on service usage (Yu et al., 2020). The ELM describes how individuals may take either a central or peripheral route toward attitude formation, based on their depth of service process (Ho & Bodoff, 2014). Ho and Bodoff (2014) clarified that central cues enable individuals to carefully process the logic of information or sources provided by the service, whereas peripheral cues enable individuals to engage and associate with service experience without requiring in-depth information evaluation. ELM is a powerful theory that explains the influential process—from the provided cues, the person's depth of processing based on motivation and ability, to the person's attitude toward the service.

Although previous literature used ELM as a theoretical lens to explore consumers' attitudes in service use, few studies investigated the service quality elements in an s-commerce context. The ELM theoretical framework provides flexibility in exploring and incorporating additional variables to examine information dissemination behavior in information and service systems (Shi et al., 2018). Hence, this study incorporates comprehensive service quality elements that affect consumers' attitude changes in service usage from an ELM perspective with a quantitative approach for efficiency management.

Quality-satisfaction efficiency management

Efficiency is defined as the ratio of performance as output to resources as input in an organization (Thomas et al., 1998). High efficiency means either higher performance out of the same amount of resources or the same performance out of less resources (Klassen et al., 1998). When the resources used for production activities and its resulting performance are treated as input and output, respectively, various efficiencies can be measured. In particular, the relative efficiency value is measured by comparing the efficiency of the most efficient firm with that of others. Practitioners can then determine which inputs to improve and to what degree they should be improved for improvement in efficiency.

As firms have limited budgets and resources, they cannot satisfy consumers by infinitely improving quality elements. Therefore, efficiency in quality management gained significant attention from both operational excellence and consumer satisfaction management perspectives. Specifically, as marginal satisfaction diminishes when consumers' consumption of a particular product or service increases (Dermanov

Table 3. Overview of studies on ELM-based social media-enabled online services.

Studies	Findings	Signals or cues	Dependent variable(s)	Context
Zhou et al. (2016)	Initial trust develops along dual routes, including a central route represented by argument quality and a peripheral route represented by source credibility	Central (C): privacy policy, information quality Peripheral (P): reputation, privacy seals	Initial trust	Online shopping
Hur et al. (2017)	Argument quality and source credibility lead to an increase in information seeking and entertainment motives	C: argument quality P: source credibility	Information seeking, entertainment, motives	Tourism and hospitality industry
Cyr et al. (2018)	Both central and peripheral cues are positively related to change in issue involvement	C: Argument quality P: Image appeal, navigation design, social presence, connectedness	Change in issue involvement	Website browsing
Yusuf et al. (2018)	Information quality does not have a significant relationship with eWOM (word of mouth), whereas information credibility does	C: Information quality P: Information credibility	eWOM engagement	S-commerce
Shi et al. (2018)	Both the central and peripheral factors have positive impacts on individual dissemination behavior; information receiver-related and relationship-related factors are the most influential	C: Topical relevance, information richness P: Source trustworthiness, social attractiveness, value homophily, social tie strength, information social influence	Information dissemination behavior	Social networking
Aghakhani et al. (2018)	Review text is one of the antecedents of cognitive attitude; source credibility is the most important peripheral factor for explicit eWOM adoption	C: Product-related information in a review P: Source credibility	Cognitive attitude	Social networking
L. Wang et al. (2019)	Peripheral signals affected the intention to stop cheating behavior more than central ones	C: Technical advantage, attitude of game provider P: Perceived risk, source credibility, critical mass	Intention to stop cheating	Online gaming
This study	Both the central (durability, safety) and peripheral (enjoyment, awareness, novelty, image) factors have positive impacts on consumer satisfaction	C: Functional quality (performance, reliability, durability, usability, safety, accessibility) P: Hedonic quality (image, awareness, novelty, attractiveness, enjoyment, impressiveness)	Consumer satisfaction	S-commerce

ELM: elaboration likelihood model.

& Eklöf, 2001), a strategic approach to quality improvement becomes imperative. For example, Jääskeläinen et al. (2014) discovered that conflicting objectives exist among stakeholders regarding whether to prioritize a service based on quality or efficiency in performance. Jayaram and Xu (2016) emphasized consumers' perceptions of quality and efficiency as two primary and competitive priorities for service delivery systems. Consequently, efficient management of business decisions and consumer relationships gained attention as a "central" ability in obtaining and sustaining competitive advantage (Bayraktar et al., 2012).

Therefore, this study investigates the quality control strategies a firm should implement under limited resources, by measuring the quality-satisfaction efficiency of s-commerce

services. Such an approach can provide quantitative evidence for firms to identify whether their resources are allocated efficiently in service quality production (Soteriou & Stavrinides, 2000). Efficiency measurement literature presented various applications in the service quality management context such as customer satisfaction and loyalty model (Bayraktar et al., 2012), strategic planning based on costs of quality and maintenance (Weinstein et al., 2009), and quality improvement planning based on cost-profit function and marginal satisfaction model (C. C. Yang, 2003).

This study provides a systematic approach by selecting the functional and hedonic quality factors as input variables and consumer satisfaction as output variable for investigating quality-satisfaction efficiency. This approach

is beneficial, as examining and understanding a satisfaction model's efficiency allows firms to determine appropriate policies for sustaining strong competitive positioning and financial profit (Bayraktar et al., 2012).

Data collection and methodology

Data collection

This study aims to investigate which quality factors need to be managed preferentially by (a) elucidating key functional and hedonic quality factors that affect s-commerce consumer satisfaction and (b) analyzing quality-satisfaction efficiency. For this purpose, this study used data from the "Consumer Survey for the Use of S-commerce," which was conducted for representative s-commerce service firms between April and July 2014 by the Korean Standards Association. The Korean Standards Association is a national specialized agency with public confidence, which was established in 1962 to contribute to the nation's economic development by promoting quality management and advancement of science and technology for the overall enhancement of production efficiency. This agency collaborates with the Korean Society for Quality Management by involving numerous scholars and researchers for annual national reports on quality management in various areas, including s-commerce.

The firms COP, TCK, and WMP were selected, as they are publicly accepted as the top s-commerce service firms in South Korea. These firms deal with various product types, including fashion and beauty, pregnancy and baby, grocery, lifestyle and home decor, home appliances and digital products, sports and automobiles, books and hobbies, travel and leisure, and culture. These firms sell homogeneous product types while competing in the same market, which supports the generalizability and validity of the analysis results as being representative of the s-commerce service industry as a whole.

Consumers who had used the aforementioned s-commerce services were selected as survey respondents; a questionnaire was sent to them via email, which included questions regarding the functional and hedonic qualities of s-commerce platforms, which are presented in Table 1, and their satisfaction with the quality. A total of 180 responses were collected for each s-commerce platform, totaling 540 responses; insincere responses were excluded, resulting in a final 492 responses. The sample had more female (58.7%) than male (41.3%) participants, and people in their 30s (35.0%) were the most common, followed by those in their 40s (31.9%), 20s (21.7%), 50s and older (11.4%). The data were analyzed comparatively to determine whether the main constructs of this study had a significant relationship with the respondents' demographic characteristics (gender, age, etc.). There are no clear differences between the main constructs of this research and the respondents' demographic profiles ($p > .1$).

The potential for nonresponse and common method biases was assessed by scrutinizing the survey for polarization. To assess the nonresponse bias, the sample was divided into two groups according to time of responding to the questionnaire; in addition, it was determined whether there was a difference in the mean values of all questionnaire items (Armstrong & Overton, 1977). The t test was performed on the questionnaire items, which did not show any differences in the means of all variables. Therefore, it can be assumed that the data in this study did not have nonresponse bias. In addition, common method bias was analyzed using Harmon's single factor test. According to this test, if a common method bias exists, all items are tied in a single factor in the unrotated result of exploratory factor analysis, or a specific factor explains a large majority of total variance (Podsakoff et al., 2003). In this study, exploratory factor analysis of all measurement variables showed that factors with an eigenvalue larger than 1 did not converge to a single factor, and the factor that explained the largest quantity of variance could only explain 19.6%. Therefore, it is considered that the data in this study did not have any common method bias.

Regression modeling for s-commerce satisfaction

As an ongoing research effort for examining key service quality elements, this study conducts multiple regression analysis based on a model developed under the ELM theory. A multiple regression analysis is advantageous compared to other techniques as it avoids potential multicollinearity, heteroscedasticity, and polynomial relationships (Neter et al., 1990) and can pre-emptively delineate key quality factors, which enables avoiding exhaustive sequential analysis. Moreover, the integrated ELM is an appropriate basis for operationalizing central and peripheral routes toward consumer satisfaction. Specifically, it demonstrates (a) functional quality attributes' effects on task-related judgments (Did the consumer safely complete a transaction?) and (b) hedonic quality attributes' effects on the same judgment, except this is based on consumers' subjective experiences in task completion (Did the consumer enjoy the transaction process?). To test the hypothetical relationships between the quality attributes and level of consumer satisfaction, a multiple regression analysis is used to assess the effects of the independent variables (functional and hedonic quality attributes) on the dependent variable (consumer satisfaction).

DEA for efficiency performance evaluation

To provide complementary strategies to improve the decision-making process for efficient service management, this study utilizes DEA to measure the relative efficiency of decision-making units (DMUs) by considering multiple

inputs (e.g., functional and hedonic qualities) and output (e.g., consumer satisfaction). DEA measures relative efficiency by applying linear programming to construct an efficient frontier and calculating the distant function of each DMU from the identified frontier (Charnes et al., 1978). DEA determines whether the assessed DMU is efficient or inefficient and suggests decreasing the level of input or increasing the level of output for the DMU to become efficient.

DEA's advantages compared to traditional efficiency measurements are as follows: First, DEA estimates the productivity relationship between input and output non-parametrically without assuming the form of a production function between multiple inputs and outputs. Traditional methods assume a specific form of production function, that is, Cobb-Douglas production function, regarding the relationship between input and output, and estimate the parameters of the production function based on measured data (Chu et al., 2019). Second, DEA does not require a statistical assumption on residuals. While regression analysis requires a specific statistical assumption on the distribution of residuals, DEA calculates efficiency by estimating the productive relationship based on the given data. Third, as DEA does not predetermine the weight on multiple inputs and outputs, it can exclude the subjective judgment of researchers. Ratio analysis, a conventional measurement method for efficiency, requires the weight on various inputs and outputs to be predetermined, thereby leading to the subjective judgment of researchers (Berger & Humphrey, 1997). Based on these advantages, DEA is considered superior to other methods for a minimal required assumption and has been widely used for efficiency measurement in the service sector (Liu et al., 2018), including in retail (Keh & Chu, 2003), Internet marketing (Shuai & Wu, 2011), mobile phone brands (Bayraktar et al., 2012), and banking (Ebrahimnejad et al., 2014; Soteriou & Stavrinides, 2000).

This study selected an input-oriented model for orientation classification and a Banker–Charnes–Cooper (BCC) model for input–output relationship classification. The input-oriented model reduces the input level as much as possible while maintaining the current output level. The BCC model assumes that a variable returns to scale by assuming a 1% increase in the input results with a greater or less than 1% output (Banker et al., 1984). Therefore, the BCC model was selected as its assumption on the productive relationship between input and output is more realistic than that of the alternative model, Charnes–Cooper–Rhodes (CCR) model, which assumes that a constant returns to scale by assuming a 1% increase in the input results with a 1% output (Charnes et al., 1978). Finally, DEA requires the number of DMUs to be sufficiently greater than the inputs and outputs. For example, Dyson et al. (2001) suggested that the number of DMUs would be desirable when it is more than double the product of the

input and output numbers. Y. Chen and Zhu (2004) suggested that the number of DMUs must be three times greater than the sum of the inputs and outputs. This study has 492 DMUs, six inputs, and one output, thereby satisfying the criteria.

Results and discussion

Verification of validity and reliability

Explanatory factor analysis (EFA), principal component analysis of the construct, and Cronbach's α were utilized to examine the quality constructs' reliability and validity, as illustrated in Table 4. The EFA results for both functional and hedonic quality constructs formed single factors. From the principal component analysis, first, the general rule of unidimensionality requires a construct's Cronbach's α to be greater than .7 (Tenenhaus et al., 2005); all constructs have Cronbach's α values greater than .8. Next, a construct is unidimensional if the first eigenvalue of the construct manifest variables' correlation matrix is greater than 1 and the second eigenvalue is either less than 1 or is a noticeably different from the first eigenvalue. The constructs' first and second eigenvalues satisfied these criteria; therefore, this study concludes that all constructs are unidimensional. This verification of the quality constructs' unidimensionality provides a strong basis for the DEA.

Haugland et al. (2007) created a correlation matrix to examine the relationships among the variables in Table 5. The analysis indicates significant relationships among the variables. Furthermore, a correlation coefficient of .8 or higher generally indicates multicollinearity (Gunst & Mason, 1980). In this analysis, as the correlation coefficients between all variables were much smaller than the reference value, the possibility of multicollinearity is considered low.

This study additionally performed multiple regression analysis for multicollinearity by referring to the variance inflation factor (VIF). VIF values for all functional and hedonic quality constructs were between 4.767 and 8.305. Although Hocking and Pendleton (1983) argued that a VIF value of higher than 10 indicates multicollinearity, others suggest different numbers for the cut-off point. Akinwande et al. (2015) claimed that VIF should not exceed 5, as a VIF value of 5–10 represents a problematically high correlation. Papamichael et al. (2016) proposed 3 as the cut-off point, thus indicating that multicollinearity does not exist when VIF is lower than 3. This study applies the cut-off point of 3, which is the most rigorous criterion among the suggested values. To reduce the VIF, the usability and attractiveness factors were omitted, both of which had the largest VIF values among the functional and hedonic constructs that displayed multicollinearity. As a result, VIF values of functional and hedonic quality factors ranged from 1.171 to 1.995, all lower than 3. Hence, multicollinearity may not exist among

Table 4. Reliability and validity of the constructs.

Factors	Constructs	Mean (SD)	Cronbach's α	First eigen value	Second eigen value
Functional	Performance	4.525 (0.730)	.880	3.749	0.567
	Reliability	4.375 (0.826)	.881	3.392	0.506
	Durability	4.415 (0.782)	.866	3.257	0.626
	Usability	4.333 (0.845)	.883	3.404	0.583
	Safety	4.292 (0.840)	.859	2.819	0.465
	Accessibility	4.385 (0.840)	.845	2.732	0.517
Hedonic	Image	4.317 (0.929)	.854	2.324	0.405
	Awareness	4.384 (0.851)	.866	2.862	0.476
	Novelty	4.369 (0.824)	.839	2.271	0.435
	Attractiveness	4.274 (0.798)	.893	3.909	0.654
	Enjoyment	4.360 (0.779)	.878	3.360	0.495
Satisfaction	Impressiveness	4.407 (0.879)	.855	2.329	0.387
		4.400 (0.841)	.831	2.244	0.421

Table 5. Correlation matrix.

Constructs	1	2	3	4	5	6	7	8	9	10	11	12
1 Performance												
2 Reliability	.346**											
3 Durability	.279*	.146*										
4 Usability	.469**	.350**	.427**									
5 Safety	.296*	.235*	.401**	.483**								
6 Accessibility	.251*	.163*	.402*	.453**	.356**							
7 Image	.321**	.240*	.302**	.470**	.319**	.291*						
8 Awareness	.346**	.242*	.330**	.414**	.366**	.362**	.345**					
9 Novelty	.347**	.336**	.307**	.375**	.333**	.340**	.393**	.355**				
10 Attractiveness	.382**	.390**	.352**	.487**	.380**	.367**	.427**	.381**	.362**			
11 Enjoyment	.339**	.318**	.239*	.446**	.222*	.173*	.351**	.203*	.357**	.412**		
12 Impressiveness	.230*	.218*	.188*	.368**	.202*	.170*	.272*	.257*	.293*	.430**	.275*	
13 Satisfaction	.277*	.194*	.268*	.430**	.315**	.274*	.314**	.352**	.321**	.425**	.244*	.184*

* $p < .05$, ** $p < .01$.

the independent variables. Therefore, these data are suitable for conducting a multiple regression analysis.

Determinants of s-commerce satisfaction

Results of the multiple regression model considering consumer satisfaction with both functional and hedonic quality are displayed in Table 6. The multiple regression analysis revealed that approximately 67.3% of variance in consumer satisfaction can be explained by a linear combination of the five functional quality predictors and five hedonic quality predictors. Among the functional quality constructs representing central cues, durability and safety were significant. However, the effects of performance, reliability, and accessibility were insignificant. Among the hedonic quality constructs representing peripheral cues, enjoyment, awareness, novelty, and image significantly affected consumer satisfaction. However, impressiveness demonstrated insignificant effect.

This finding implies that service providers must consider both central and peripheral cues as necessary

Table 6. Effects of functional and hedonic quality constructs on consumer satisfaction.

Factors	Constructs	B	SE	β	t	p
Functional	Constant	0.424	0.190		3.855	.000
	Performance	0.044	0.059	0.039	0.755	.450
	Reliability	0.067	0.048	0.066	1.413	.158
	Durability	0.250	0.056	0.233	4.460	.000
	Safety	0.105	0.052	0.105	2.006	.045
Hedonic	Accessibility	0.077	0.051	0.077	1.509	.132
	Image	0.127	0.047	0.140	2.707	.007
	Awareness	0.199	0.053	0.202	3.789	.000
	Novelty	0.164	0.056	0.161	2.918	.004
	Enjoyment	0.264	0.054	0.245	4.930	.000
	Impressiveness	0.002	0.045	0.002	0.049	.961

SE: standard error.

Adj. $R^2 = .673$, $F = 47.593$, $p < .01$.

conditions in service offerings. Service design must consider consumers' objective and subjective evaluations of service quality elements to enhance their

overall satisfaction in the s-commerce context. In particular, these results demonstrate that hedonic quality has a higher impact on consumer satisfaction than functional quality. Among the functional quality factors, only durability and safety had significant impacts, whereas among the hedonic quality factors, enjoyment, awareness, novelty, and image had significant impacts. Thus, when the impact of the five quality factors of both functional and hedonic quality on consumer satisfaction was investigated, the impacts of two functional quality factors and four hedonic quality factors were found to be significant. Even when functional and hedonic quality factors were examined comprehensively, enjoyment (0.245) had the largest impact, followed by durability (0.233), awareness (0.202), novelty (0.161), image (0.140), and safety (0.105). This study empirically validates that most quality factors with a large impact corresponded with hedonic quality.

Similar findings are also observed when compared among various consumer segmentations. For example, the millennials—or Generation Y—who are 30s or younger have lived with smartphones and social networks for most of their lives. These adults are more likely to own personal accounts on social networking websites, and to use social networking site (SNS) for up to 3 hr a day, which is far greater than for other age groups (X. Li & Chen, 2014; Y. C. J. Wu, Shen, & Chang, 2015). When consumer groups of age below 30 are delineated ($n=305$), the statistical analyses illustrate that only accessibility (0.313) and usability (0.229) of the functional aspects have significant effects on consumer satisfaction, whereas enjoyment (0.303), awareness (0.203), image (0.201), and novelty (0.184) of the hedonic aspects significantly lead to consumer satisfaction. Compared with the results of all consumer groups (Table 6), the age group of 30s and younger showed different results in terms of functional quality, and both groups demonstrated high similarity in terms of hedonic quality. The impact of hedonic quality on consumer satisfaction has been shown to be distinctively higher than other qualities, not only in the age group of 30s and younger but also in other age groups, which indicates that s-commerce service firms must primarily manage their hedonic quality attributes.

The above-mentioned findings also bring a different perspective to previous studies, which argued that functional quality, such as information support, is more important than hedonic quality (M. N. Hajli, 2014; N. Hajli & Sims, 2015; H. Zhang et al., 2014). In line with the study of Wu et al. (2015), which claimed that functional quality factors have limitations in revealing consumers' social media experiences, the results of this study contribute toward updating the existing literature on consumer behavioral intentions (i.e., J. Yang et al., 2016), and s-commerce quality determinants (i.e., K. Z. K. Zhang et al., 2016). For example, hedonic quality factors that are found to have a

greater impact on consumer satisfaction in this study are enjoyment, awareness, novelty, and image; most of these are driven by the interactivity within the service. Consumers develop affection for the service through experiences that are pleasant and indulging (enjoyment), brand awareness and trustworthiness (awareness), unique compared with competing services (novelty), and highly reliable with brand reputation (image). The above-mentioned qualities require and consider consumers' dynamic feedback, whereas functional quality elements such as durability and safety are directly provided by the static service system. The finding that hedonic quality has a greater influence than functional quality on consumer satisfaction can be explained by the key features of social interaction being added to the e-commerce business model. Modern service providers are currently faced with new challenges in cocreating value with consumers to identify their needs and provide innovative services (Yu et al., 2020). With the technological progress of platforms, service providers are advised to prepare and modify their services appropriately (Oh & Hong, 2018). Thus, the identified hedonic quality elements can be utilized to measure the cocreated operational value by leveraging social interactivity.

Regarding the generalizability of this finding, similar results were obtained with diverse consumer demographics in various geographic and sector contexts. W. Y. Wu et al. (2018) suggested an integrative model proposed from utilitarian and hedonic perspectives that explained online shopping behaviors such as attitude, satisfaction, and repurchasing intention. A survey of 505 consumers of varying ages, genders, occupations, and monthly spending on Internet shopping showed that functionality-related website design had a significant impact on utilitarian value and rational trust, whereas hedonic-related website design had a significant impact on hedonic value and emotional trust. W. Chen and Chen (2017) analyzed the utilitarian and hedonic values that had an impact on users' continued usage and purchase intention on s-commerce platforms. In the analysis of 250 users in Taiwan with varying genders, ages, education levels, and occupations, it was revealed that hedonic value played a more important role than utilitarian value. Huang and Benyoucef (2017) analyzed the impact of three social commerce design qualities (usability, functionality, and sociability) on five purchase decision-making stages (product awareness, information search, evaluation, purchase, and post-purchase) in a study involving 262 undergraduate and postgraduate students. The sample consisted of consumers aged over 18 with varying genders, degree of Internet usage, and online shopping frequencies. As a result, it was shown that sociability corresponding to hedonic quality had a significant positive impact on consumer purchase decision-making, in addition to usability and functionality corresponding to functional quality. They emphasized that s-commerce service firms should

Table 7. Average input and output values along with quality-satisfaction efficiency scores.

DMU name	Input						Output	Efficiency scores
	Durability	Safety	Image	Awareness	Novelty	Enjoyment	Satisfaction	
COP	4.464 (0.772)	4.242 (0.835)	4.254 (0.909)	4.394 (0.793)	4.322 (0.828)	4.268 (0.831)	4.299 (0.876)	0.820 (0.119)
TCK	4.390 (0.806)	4.373 (0.835)	4.371 (0.904)	4.475 (0.834)	4.450 (0.764)	4.389 (0.774)	4.546 (0.791)	0.842 (0.121)
WMP	4.385 (0.773)	4.271 (0.850)	4.333 (0.974)	4.292 (0.918)	4.345 (0.870)	4.431 (0.722)	4.373 (0.834)	0.826 (0.112)

DMU: decision-making units.

develop s-commerce websites based on the awareness of consumers' online interactions and behaviors. Thus, hedonic quality must be generally considered as a timely appropriate service design element driven by the social interactivity technical feature.

Quality-satisfaction efficiency performance-based improvement planning

For sustainable operational productivity and market competitiveness, s-commerce service firms must develop a novel approach in addition to identifying key determinants of s-commerce service performance. Examining relative performance by comparing competing service firms provides valuable insights for quality improvement planning. S-commerce quality-satisfaction efficiency was evaluated based on the multiple regression analysis results. This study selected durability and safety (functional quality factors) and enjoyment, awareness, novelty, and image (hedonic quality factors) as input variables, with consumer satisfaction as the output variable for the DEA.

First, a DEA was conducted for the each of the three s-commerce service firms. Table 7 reveals the average values of the input and output variables for the firms (COP, TCK, and WMP), and numbers within parentheses indicate the standard deviation. The input-oriented BCC efficiency scores illustrate the mean value of the quality-satisfaction efficiency of how s-commerce users evaluate and perceive their own choice of a particular s-commerce service firm. Such a high efficiency score means that the consumer satisfaction level is high compared with the level of functional and hedonic quality recognized by consumers who have used the corresponding s-commerce service. Among the firms, TCK (0.842) had the highest quality-satisfaction efficiency score, followed by WMP (0.826) and COP (0.820).

Second, a Kruskal–Wallis (KW) test was conducted to determine whether the differences among the services' quality-satisfaction efficiency scores were statistically significant (Bayraktar et al., 2012). Table 8 indicates that the null hypothesis (H_0)—that no difference exists in quality-satisfaction efficiency among s-commerce service firms—was rejected ($p < .01$).

Table 8. Kruskal–Wallis test results for quality-satisfaction efficiency.

DMU name	Mean rank	KW	p value
COP	241.11	10.084	.006
TCK	291.37		
WMP	254.22		

DMU: decision-making units; KW: Kruskal–Wallis.

Table 9. Rank-sum test results for multiple comparisons between s-commerce service firms.

DMU name	Mean rank	DMU name	Mean rank	KW
COP	241.11	TCK	291.37	9.658**
COP	241.11	WMP	254.22	0.652
TCK	291.37	WMP	254.22	5.018*

DMU: decision-making units; KW: Kruskal–Wallis.

* $p < .05$, ** $p < .01$.

Table 9 shows the multiple comparison rank-sum test results for the s-commerce service firms. TCK with the highest mean rank displayed a statistically significant difference from the other firms, COP ($p < .01$) and WMP ($p < .05$). Such KW test results indicate that TCK has the highest quality-satisfaction efficiency. In contrast, COP and WMP firms did not show a statistically significant difference from each other ($p > .05$).

Finally, based on the DEA results, this study provides firms with the means to enhance quality-satisfaction efficiency by benchmarking other competing s-commerce service firms. As the input-oriented model was applied in this study, the inefficiency level was determined by the excesses of quality factors as input. Excessive input quality levels are calculated by subtracting ideal values of the best practice service firm from evaluated quality values of a given s-commerce service. That is, excesses of quality factors represent the average inefficiency caused by the difference between the level of ideal quality factors of a s-commerce service firm and the level of quality factors recognized by consumers. Such identification is expected to determine which quality factor should be prioritized by s-commerce service firms to efficiently improve consumer satisfaction. Table 10 presents the excess of inputs

Table 10. Average relative inefficiencies for s-commerce service firms.

Input excesses (%)		DMU name		
Factors	Constructs	COP	TCK	WMP
Functional	Durability	1.35	1.06	0.29
	Safety	8.67	5.70	9.83
Hedonic	Image	1.49	2.31	2.53
	Awareness	6.85	1.63	5.42
	Novelty	3.50	4.09	4.21
	Enjoyment	1.72	1.58	2.04

DMU: decision-making units.

comprising quality constructs. This corresponds with the average inefficiency that needs to be reduced for a s-commerce service firm to satisfy consumers efficiently. In general, most firms had the highest level of input excess on safety ranging between 5.70 and 9.83, followed by awareness and novelty. The input excesses of remaining quality factors were similar, ranging between 0.29 and 2.53, and image was the highest, followed by enjoyment and durability. With respect to the ELM perspective, s-commerce service providers must manage safety first and then adjust durability for central cues' enhancement. In addition, inefficiencies in the hedonic quality—corresponding to the peripheral cues—should be managed sequentially as awareness, novelty, image, and enjoyment.

These results imply that most s-commerce service firms fail to efficiently convert the enhancement of safety into consumer satisfaction. For example, firms' efforts of designing the transaction of products to be safely protected from external risks, such as exposure of private and financial information, and providing safe payment methods to users, are not efficiently leading to higher levels of satisfaction. In addition, efforts to enhance awareness (i.e., raise brand reputation and visibility) and novelty (i.e., provide unique products, services, and experiences) are not converted efficiently into consumer satisfaction.

Specifically, on a firm-level, TCK had the least input excesses in all quality constructs except durability, image, and novelty. This result is in agreement with Table 7, which shows that TCK (0.842) has higher efficiency score than WMP (0.826) and COP (0.820). TCK's excess of awareness is smaller than that of other firms, likely because TCK is the first s-commerce service firm established in South Korea. Thus, TCK has higher brand reputation and is more visible to s-commerce service users than other firms. Subsequently, consumers think of TCK first among s-commerce service firms, which is converted efficiently into enhancement of consumer satisfaction. TCK can benefit more by assigning appropriate priorities to quality constructs for improvement planning to utilize limited resources and enhance satisfaction efficiently. Preferentially, excessive input into safety should

be reduced, followed by novelty. Thereafter, reduction of input into the remaining items—image, awareness, enjoyment, and durability—should follow.

COP had lower excesses in image and novelty than other firms. This implies that efforts toward improving image were devoted to corporate image and superior design, and efforts toward providing unique services were efficiently converted into enhancement of consumer satisfaction; this directly translates into COP's competitive advantage over other firms. COP implemented "Rocket Delivery," an unprecedented overnight delivery service never attempted by competitors; established COP Logistics Service, a subsidiary company specializing in delivery; and built a large-scale logistics warehouse. In addition, COP hired a permanent workforce for delivery services and provided a 1-day delivery service that ensures delivery of goods the next day if they are ordered before midnight. Thus, COP has made significant efforts to enhance its image and novelty through services such as "Rocket Delivery," which has led to efficient enhancement of consumer satisfaction.

Finally, WMP had lower excess of durability than other firms. This indicates that WMP efficiently enhances consumer satisfaction by providing excellent standardized services to consumers and by making efforts to maintain consistency in service levels without being affected by external environmental changes. Thus, durability is a competitive advantage of WMP. It can be exemplified by the case in which WMP regularly provides a special bargain service by collaborating with merchandisers. WMP actively organizes special bargain events at specific dates and times, and the most representative of them is the monthly "Bargain Day" that takes place on the day the number of the month is the same as that of the day. Although conventional s-commerce services provided bargaining prices only when a certain number of consumers wanted a particular product or service, WMP offers bargain prices over a time window, which motivates consumers' purchase intention. Thus, availability of a wide range of bargain opportunities with high price competitiveness is been regarded as WMP's core strength.

Conclusion

This study aimed to propose and demonstrate an efficient service quality management approach by identifying key quality drivers of s-commerce satisfaction performance and providing a strategic quality improvement and decision-making process for service providers to gain higher competitive advantage in the market. This study first synthesized service quality constructs—six functional and hedonic constructs each—based on a comprehensive literature review. A set of statistical analyses were then conducted to quantitatively delineate key quality constructs based on survey results from South Korea's top revenue-generating s-commerce service firms. Then, as part of the

satisfaction-based quality management process, the identified key constructs were incorporated into the efficiency analysis to develop a service design and consumer retention strategies. These analyses allowed us to draw three major conclusions. (a) The key quality determinants of s-commerce consumer satisfaction are durability and safety for functional constructs as the central route and enjoyment, awareness, novelty, and image for hedonic constructs as the peripheral route. (2) The effects of hedonic quality elements on consumer satisfaction are larger than that of functional quality elements. (3) The recommended quality improvement order of priority differed among competing s-commerce service firms, and thus a firm-specific quality improvement strategy must be developed as the basis for strategic service design guidelines and principles for efficient service management.

With proliferation of Web 2.0 for openness and sharing, use of social media to improve transaction experiences through s-commerce gained importance from both academic and practitioners' perspectives. From the theoretical perspective, this study extends prior s-commerce service quality research by investigating functional and hedonic constructs' roles in service satisfaction using the ELM approach. This study clarifies that functional and hedonic qualities should be collectively examined by classifying them into two distinct influence routes as part of the s-commerce satisfaction improvement model. This study primarily aligns with calls for the integration of dual-process theories (Bhattacharjee & Sanford, 2006) and comprehensive perspectives on quality-based performance evaluation (Alonso-Almeida et al., 2014). In addition, this research aligns with Hu et al.'s (2019) notion that firms must continuously manage service experiential quality elements to improve consumers' commitment and to attain a competitive advantage in the social media-enabled service market. Through the ELM perspective, this study finds that peripheral cues play a higher influential role in consumers' satisfaction enhancement than central cues. Particularly, by operationalizing central and peripheral cues with service quality elements, this study demonstrates that although only two functional elements (durability and safety) were statistically identified as antecedents of central cues, four hedonic elements (enjoyment, awareness, novelty, and image) were statistically identified as antecedents of peripheral cues that lead to consumer satisfaction with s-commerce services. This result extends the discussion of previous studies that valued functional quality over hedonic quality (M. N. Hajli, 2014; N. Hajli & Sims, 2015; H. Zhang et al., 2014), and it empirically validates Y. C. J. Wu et al.'s (2015) claim that functional quality has limitations in revealing the general social media consumers' experiences.

Second, although existing studies have argued that consumer perceptions are becoming more important than management capabilities as the bargaining power shifts from the service providers to consumers, they have seldom

empirically validated it (i.e., N. Hajli & Sims, 2015). By identifying key quality elements driven by consumer satisfaction, based on consumers' perspectives, and integrating efficiency management based on the firm's perspective, this study overcomes the limitations of the existing literature on consumer behavioral intentions (i.e., Lee et al., 2018; J. Yang et al., 2016) and s-commerce quality determinants (i.e., M. N. Hajli, 2014; K. Z. K. Zhang et al., 2016). Moreover, the effect of s-commerce is increasing because of the evolution of information and communication technology (ICT) and the fourth industrial revolution, which is a technological revolution led by artificial intelligence, machine learning, big data, Internet of things (IoT), and cloud technology, among others; these are expected to bring a rapid change in the s-commerce ecosystem. In this context, this study makes a theoretical contribution by identifying the need for a refreshed operation decision-making process through a literature review and proposing a timely and appropriate quality improvement approach driven by the consumers' perception of ICT.

This study has several important practical implications for service quality management. First, it emphasizes the importance of strategic service design and consumer retention strategy. Service quality management is becoming increasingly complex with rapidly increasing consumer expectations. The shift from Web 1.0 to Web 2.0 not only enabled unique technological features such as social media interaction but also brought challenges in refocusing s-commerce design that fulfills consumers' needs. Through the ELM lens, this study identifies key functional and hedonic quality drivers of consumers' satisfaction with leading e-commerce service providers in the global context. Particularly, investigating this phenomenon in the Korean context is meaningful as South Korea is considered the third biggest e-commerce market in the world after China and the United States (Shu, 2019). For example, COP provides faster shipping than Amazon Prime as it guarantees overnight delivery for orders placed before midnight. Moreover, e-commerce exports in Korea rose from US\$1 billion to approximately US\$3 billion in 2018 and are expected to reach approximately US\$5.8 trillion in 2020 (J. Shin, 2019). The significance of hedonic features among Korean s-commerce service providers offers insights for service providers to sell products and services via social media interaction. For instance, conventional e-commerce firms transitioning to s-commerce platforms can focus on improvements in enjoyment (level of likeability, fun, and sociability), awareness (level of brand awareness and trustworthiness), novelty (level of personalization and social innovation), and image (level of platform design, visual appeal, and reliability with brand reputation) to enhance consumers' experiences and satisfactions.

Second, this study demonstrates a useful scientific approach for developing a strategic service quality management process. The key focus of consumer satisfaction

management is identifying the core satisfaction determinants from users' perspectives and then evaluating firms' performance delivery of those determinants (Bayraktar et al., 2012). While literature has widely investigated the former, the latter lacks diversity in methodological approach. This study adopts a DEA to examine relative efficiency in the quality–satisfaction relationship. The DEA approach enables application of quality constructs as inputs and consumer satisfaction as output, and it can be used to decide priorities regarding quality constructs for sustained growth in competitive environments. This effort is expected to optimize monetary investments in the quality improvement process. Most importantly, this study provides empirical evidence that no service firm had an efficiency score of 1, confirming that s-commerce service firms should manage their quality factors to improve efficiency. Service providers can apply the demonstrated quality-satisfaction efficient management approach to simultaneously reduce costs and maximize consumer satisfaction for high market penetration.

In summary, identification and evaluation of service quality features should be accompanied with an integrative approach utilizing the existing findings as a basis for developing a competitive management approach. This study demonstrates that existing service quality management studies focused on development of service quality measurement scales, technological features identification, its role in consumer's engagement experience, and/or operational capability management for performance improvement. Although it is well established that the relationship between service quality management and consumer satisfaction is a core aspect of market share attainment and has been studied extensively, the business management community can benefit by applying satisfaction-based efficiency analysis to improvement performance. Through a satisfaction-based efficient management approach, the service can maintain its primary goal of converting service users to permanent consumers and gain a novel competitive edge in service operations management. This study provides a useful decision process incorporating both research findings and DEA modeling to assist practitioners in making efficient decisions for competitive service operations management.

This study also has some limitations to overcome. First, further studies should validate quality-driven psychological cues through an experimental study and examine moderating effects of the elaborated conditions (i.e., levels of motivation and ability) (S. F. Yang, 2015). Second, this study measured consumers' responses to s-commerce qualities based on their perceptions; improvement in s-commerce qualities may have greater significance in practical application. Therefore, further study is needed to analyze quality-satisfaction efficiency by using objective indicators, such as speed of delivery and service recovery. Third, because this study analyzed s-commerce

service firms' quality-satisfaction efficiency for domestic consumers in the Korean s-commerce market, the cultural factor may have affected the results. Therefore, future research must investigate cultural factors, which this study does not consider; furthermore, a comparison with the quality-satisfaction efficiency of other countries' s-commerce service firms or consumers is desirable. Fourth, considering that s-commerce has begun to spread recently, further study may benefit from an examination of how the s-commerce quality-satisfaction efficiency or priority of s-commerce quality factors may or may not change over time.

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