Serbian Journal of Management 20 (1) (2025) 117 - 136

www.sjm06.com

Serbian Journal of Management

SERVICE QUALITY DIMENSIONS MANIFEST IN OMNICHANNEL SUPERMARKET RETAIL

Taha Falatouri[a, b, c*] and Felicita Chromjaková[a]

[a]Faculty of Management and Economics, Tomas Bata University in Zlín, 760 01 Zlín, Czech Republic
[b]Department for Logistics, University of Applied Sciences Upper Austria, 4400 Steyr, Austria
[c]Josef Ressel-Centre for PredictiveValue Network Intelligence, Steyr, Austria

(Received 23 Febraury 2024; accepted 22 November 2024)

Abstract

Businesses have increasingly adopted omnichannel retail strategies to deliver seamless services and enhance customer experiences across multiple channels. However, many have done so without fully understanding customer expectations in the globally integrated market. Despite the rise of new customer expectations compared to traditional services, research on service quality within omnichannel retail remains scarce. This study aims to fill that gap by examining how service quality dimensions manifest in omnichannel supermarket stores. Using a text mining approach, we analyzed 7,216 online customer reviews of omnichannel supermarkets. The findings reveal that while traditional dimensions such as personal interaction, efficiency, and fulfillment remain valuable to customers, new critical dimensions such as integration and compensation have emerged in omnichannel retail. Additionally, the results show that customer expectations have evolved, prioritizing factors beyond price in omnichannel services. Reliability of contact and system availability are essential, while product shortages are identified as the most dissatisfying aspect.

Keywords: omnichannel retail, text mining, service quality, supermarket chain

1. INTRODUCTION

Service Quality (SQ) assessment measures the excellence or superiority of overall service delivery performance (Akter et al., 2019). Practical SQ assessment enables companies to enhance their marketing strategies (Qin & Prybutok, 2009), retain existing customers, attract new ones, reduce costs, and improve their image (Ladhari, 2009). Furthermore, SQ assessment can predict various business

* *Corresponding author: Falatouri_moghaddam@utb.cz*

DOI: 10.5937/sjm20-49417

outcomes such as customer satisfaction, performance, and lifetime value (Akter et al., 2019).

Omnichannel retailing is an integrated sales approach that blends the advantages of physical stores with the information-rich experience of online shopping (Chris & Adam, 2014). The omnichannel approach creates opportunities both for customers and businesses. This approach provides a world free from barriers and limitations (Cui et al., 2022; Hossain et al., 2020), and customer's purchase journey can be influenced by interactions across multiple channels, affecting customer loyalty and satisfaction (Zhang et al., 2019). A successful omnichannel customer journey can lead to sustainable business growth (Lim et al., 2022). it was found that 86.3% of traditional retail businesses have integrated online platforms into their operations, with over 60% utilizing four or more distinct online channels (Cui et al., 2022). The growing trend among retailers to adopt omnichannel strategies poses challenges to current models of SQ assessment.

Retailers often assume that their customers will remain loyal indefinitely. However, as customers become more accustomed to omnichannel shopping, their tolerance for in-store experiences diminishes (Rigby, 2011); although this approach enhances their business strategies, such as integrating physical and virtual stores (Hossain et al., 2020), it poses challenges to maintaining seamless SQ. Therefore, developing omnichannel retail necessitates exploring the feasibility of utilizing traditional models for SQ assessment. However, limited publications are related to service quality (SQ) in omnichannel retailing (Zhang et al., 2019), and the customer experience still needs to be explored. Practical SQ assessment has remained challenging(Gerea et al., 2021).

Our study enriches the existing body of research by examining the transferability of service quality (SQ) dimensions commonly employed in SQ evaluations across diverse sectors to omnichannel retail. Through rigorous analysis, we aim to ascertain whether these established dimensions, previously validated in other service contexts, maintain relevance and discernibility within the landscape of omnichannel retail. This investigation seeks to address the following question:

How do SQ dimensions manifest in omnichannel retail?

We investigate this question through a seamless approach to measuring SQ by analyzing user-generated content (UGC). Customer reviews are shared on various platforms such as social media, online forums, and reviewing apps. Analyzing such information can validate the dimensions and subdimensions of service quality in omnichannel retail, providing valuable insights into customers' interactions with companies across different channels (Rasool & Pathania, 2021). The proliferation of Internet usage and widespread smartphone access has recently prompted businesses to adopt omnichannel strategies. This shift has created an environment where the transition from service quality (SQ) expectations in single retail channels to omnichannel models can be readily observed. The question arises: How do these dimensions contribute to generating positive or negative reviews? Lastly, we explored whether these dimensions have changed by answering the research question: How did the perception of SQ dimensions change in recent years?

Many approaches for evaluating service quality in brick-and-mortar retail emerged

during the 1980s, 1990s, and early 2000s. A reduction in the creation of novel service quality models became apparent in the early 2000s, during which a more pronounced shift towards models around measuring satisfaction in e-commerce began to emerge (Lin, 2007; Boyd, 2002; Liu et al., 2008). Numerous studies explored how the dimensions of service quality initially identified for physical retail could be applied within the online context (Cox & Dale, 2001). Previous research indicates that the effectiveness of omnichannel retailing strategies often depends on how consumers perceive and utilize the provided omnichannel services (Mishra et al., 2021). As evident from the literature, most research has focused on investigating specific aspects of omnichannel rather than examining it comprehensively. According to the data gathering methodology, nearly two percent of the research has used online reviews. For omnichannel-related research, methods like questionnaires or focus groups are used in most research (Mishra et al., 2021). Omnichannel retailers can employ various approaches to make a lasting impact on each target demographic. Although some segments may be approached similarly to historical methods, others will necessitate a higher level of creativity and innovative thought (Rigby, 2011).

The remainder of the paper is structured as follows: The background of service quality publications in the omnichannel area is explored in the second section. Next, a description of the selected case study is provided. Section three explains the text mining approach and describes data characteristics in detail. The results are discussed in section four. Finally, the conclusion and limitations are provided in section five.

2. RESEARCH BACKGROUND

In the preceding decades, e-commerce and increased competition in the retail market have prompted market participants to operate more efficiently than in earlier periods. Retailers are now compelled to prioritize customer satisfaction matters more than before. Within service-related discussions, customer satisfaction and service quality represent two of the four primary focal points over the past two decades (Donthu et al., 2022).

Service quality is commonly characterized as a perspective that develops through performance assessment about expectations. Nonetheless, uncertainty exists in how service quality is defined and conceptualized. While scholars recognize that customers' perception of service quality is strongly connected to the concept of disconfirmation, they also posit that service quality and satisfaction are separate concepts. The primary distinction between these two is that service quality entails a comprehensive, enduring evaluation, whereas satisfaction pertains to a measurement specific to an individual transaction (Cronin & Taylor, 1992).

As an initial method for evaluating service quality, the Gap model was formulated by Parasuraman et al. (1985). They articulated that "the variations between expectations and actual performance across quality dimensions determine service quality." In greater detail, they introduced five distinct gaps: first, the disparity between consumers' expectations and management's perception; second, the contrast between management's perception and the specification of service quality; third, the discrepancy between service quality specification and service provision; fourth,

the differentiation between service provision and external communications; and finally, the distinction between anticipated service and perceived service (Parasuraman et al., 1985).

Many approaches for evaluating service quality in brick-and-mortar retail emerged during the 1980s, 1990s, and early 2000s. A reduction in the creation of novel service quality models became apparent in the early 2000s, during which a more pronounced shift towards models measuring satisfaction in e-commerce began to emerge (Boyd, 2002; Lin, 2007; Liu et al., 2008). Numerous studies explored how the dimensions of service quality initially identified for physical retail could be applied within the online context (Cox & Dale, 2001). To the best of our knowledge, we have yet to identify any scholarly papers assessing Service Quality (SQ) within omnichannel retail.

The term Omnichannel retail appeared first in Rigby (2011). In the business context, he described omnichannel as "integrating disparate channels into a single seamless omnichannel experience." At the same time, Bodhani (2012) introduced Omni-retailing: "how retailers can connect with their consumers across multiple traditional and non-traditional 'channels' " in one of the most seminal works Brynjolfsson et al.)2013) mentioned in the omnichannel age "the distinctions between physical and online will vanish, turning the world into a showroom without walls" they tried to find out what are the successful omnichannel strategies. They offered a shared long-term strategy in the omnichannel market using analytical techniques. In another definition, Verhoef et al. (2015) defined omnichannel management as "the synergetic management of the numerous available channels and customer touchpoints, in such a way that the customer experience across channels and the performance over channels are optimized." Many studies have targeted customer behavior in the omnichannel market. Customer journey in omnichannel retail has been investigated by Fulgoni (2014). Analytical systems should be capable of assessing consumer behavior across every interaction point and providing management with a thorough, cohesive grasp of the elements that impact consumer decisions. Consumer purchase intention has been investigated by Kazancoglu & Aydin (2018). They have extended the well-known unified theory of acceptance and use of technology (UTAUT2). Their findings show that the six new dimensions are common in the intention of the customer to purchase from omnichannel service, including "perceived trust," "situational factors," "perceived risk," "anxiety," "need for interaction," and "privacy concern." On the other side, customer complaints have been targeted by Rosenmayer et al. (2018). They have classified the main service failures in the omnichannel department, including shopping experiences, delivery, communication and pricing, quality, customer service problems, website design, unethical practices, payment, and security. Based on the findings from the last two references, it is evident that both intention and service failure may shed light on the dimensions of Service Quality (SQ) within the context of omnichannel. However, it is worth noting that these studies are conducted in settings quite distinct from supermarket retail. The Omnichannel service dimension can generally be clustered into Physical, Online, and Integrating channels (Chris & Adam, 2014).

Physical channel dimensions have been

examined across various industries; however, our focus lies primarily within the service sector. One prevalent model employed for service quality assessment is SERVQUAL, initially introduced by Parasuraman et al. (1988) and is based on Tangibles, Reliability, Responsiveness, Assurance, and Empathy measures. SERVQUAL model relies on customer perceptions rather than expectations (Parasuraman et al., 1988). SERVQUAL has gained substantial renown and widespread adoption as a model extensively employed to evaluate service quality. Following that, in terms of conceiving and gauging SERVQUAL, a separate method known as SERVPERF was introduced by Cronin & Taylor (1992). This alternative approach underscores service quality as a form of consumer sentiment, where the exclusive assessment of service quality through performance is deemed an enhanced means of evaluation (Cronin & Taylor, 1992). Unlike SERVQUAL, SERVPERF exclusively evaluates customers' perceptions of the actual service provision, omitting the consideration of the disparity between expectations and perceptions (Cronin and Taylor, 1994).

A different framework for assessing service quality in technology-driven self-service alternatives was proposed. This model's dimensions encompass physical attributes, reliability, interpersonal engagement, and proficiency in addressing issues and adhering to policies (RSQS). It was emphasized that RSQS emphasizes customers' perceptions of service more than their initial expectations (Dabholkar et al., 1996). Other studies added convenience to the previous dimensions of RSQS (Chen et al., 2018). This method has remained practical in the service sector, such as medical services (Jonkisz et al., 2022) and educational systems (Mannuggal & Afriadi, 2023).

In Practice Using Flow Theory, Quach et al. (2022) examined the effect of service quality on customer loyalty by considering two dimensions, “service consistency” and “service transparency.” Their findings show that consistency in retail directly affects customer loyalty. Another study by Omar et al. (2021) targeted service quality in mobile stores and attempted to analyze the effect of customer satisfaction on customer loyalty based on mobile-store quality assessment. They stated that social media could drastically improve customer perception and increase satisfaction. Shubham et al. (2021) introduced a new holistic shopping experience model named “mixed reality” to determine customer attitudes toward using technologies in an omnichannel purchase. Their findings revealed that customers’ perceptions of service persuasion significantly influence their adoption of new technology. Cotarelo et al. (2021) focused on Buy Online, Pick-Up in Store (BOPIS) service in omnichannel retail. They observed that while logistics is essential in omnichannel, it cannot be assumed to bring customer satisfaction, as the customer expects it to be a standard service. In another study, Lee (2020) attempted to illustrate the significance of the integration level in overall retail functions. Initially, the study stated that customer satisfaction awareness could significantly impact service quality. While many researchers believe that omnichannel could increase customer satisfaction, it is not considered its primary source. According to the author, this method is more effective for the transparency of the business owner. For instance, it is mentioned that some integrated strategies, such as

integrated pricing, eliminate customer bargaining opportunities. They indicated the impact of coupons on integrating the different channels, which can positively increase profit (Zhang et al., 2021). Three different channels of quality, including transparency, convenience, and seamlessness, have been investigated; findings revealed that customer dissatisfaction could hurt customer retention (Gao & Huang, 2021).

The next explored channel has been the online channel. Like other channels, different dimensions are introduced for the online channel. In literature, the number of SQ dimensions for this channel ranges from two to fourteen, with the majority ranging from four to six (Kalia, 2017). Among these dimensions, "privacy/security," "design," "responsiveness assurance," "reliability," and "provided information" are the most common in the literature. The most well-known models are E-S-Qual (Parasuraman et al., 2005) and E-RecS-QUAL (Ulkhaq et al., 2017). The E-S-Qual model divides service quality into four dimensions: "efficiency," which indicates the ease of use of the website, how well-organized the website is, and whether the customer can complete the purchase on the website. The "fulfillment" dimension specifies the delivery function and its correctness, for example, if the products have been delivered on time or in the same order that was promised. The third dimension is "availability," which stipulates the percentage of run time, response rate, and other aspects showing the website is working correctly. The last dimension is "privacy," which shows whether the service provider is conscious of protecting personal data and the level of security when the customer uses such a service. The E-RecS-QUAL model categorizes the service quality dimensions into three groups. The first dimension is "responsiveness," which refers to the guarantee of returning goods or the ability to follow up on an incomplete transaction. The second describes "compensation," which describes how indemnification has occurred and relates to when a customer makes an error in order, if there is a problem with the delivery process, or if the product is not delivered as ordered. The final dimension is "contact," which investigates the extent to which the website is reachable by the customer by providing a real-time agent to respond to problems or an online service representative as well as an emergency phone number.

To have meaningful omnichannel retail, all the individual channels must be integrated. Integration creates a new series of related dimensions, representing the retailer's performance in merging their service outlets to deliver seamless service across multiple channels (Zhang et al., 2019). This overall integrated service creates an experience for the customer that encompasses all channels. Integrated characteristics can be defined in different models, integrated information and promotions (Gao & Huang, 2021) using integrated logistics systems (Rosenmayer et al., 2018), integrated coupons (Zonghuo et al., 2021), integrated loyalty programs, and customer clubs.

Upon an exhaustive review, it became evident that there needs to be a model explicitly addressing the dimensions of omnichannel service quality (SQ) in the existing literature. To fill this gap, we thoroughly searched articles related to omnichannel and integrated services. The outcomes of this exploration are presented in Table 1, which highlights a significant misalignment between the identified

Table 1. distribution of SQ dimensions in Omnichannel retail

Article	Industry	Scope	Assurance	Content	Consistency, Responsiveness service Configuration	Responsiveness, Contact, Access	Promotion	Product	Price	Fulfillment	Enjoyability	Privacy	Return	Coupons and loyalty	Transparency	Personalization	Perceived Risk	Ease of use aesthetics
(Hossain et al., 2020)	Banking	Multichannel	*	*	*	*	*											
(Lee, 2020)	Retail	omnichannel			*			*	*	*	*							
(Omar et al., 2021)	Fashion retailing	M-commerce			*	*	*				*							
(Shubham et al., 2021)	Mixed-Reality	Mixed-reality					*					*	*					
(Cotarelo et al., 2021)	Pick-up-in-Store	Pick-up service									*		*	*				
(Quach et al., 2022)	Retail	Retail			*										*			
(Zhang et al., 2023)	Retail	M-shopping		*	*											*	*	*	*

dimensions and those established in well-known models. Notably, these dimensions differ from those commonly acknowledged in the literature and exhibit variations from those delineated in related articles.

Reviewing the background of the related literature, we identified the following research gaps. First, we were unable to locate any literature about omnichannel retail. While a plethora of research has investigated the service quality dimension in online stores or physical service providers, we could not find any paper related to SQ dimensions in omnichannel supermarket stores. We observed a lack of analogies or comparisons among research studies focusing on omnichannel service quality dimensions. Each of these studies targets specific areas and conducts investigations within those domains. Second, most studies utilized traditional data collection methods, such as questionnaires and interviews, to analyze service quality dimensions for online or offline channels or to examine the integration of the two channels. We conducted a text mining analysis of user-generated content (UGC), where customers express their opinions without supervision. This method could bring unbiased results from the traditional techniques. We undertook this research because of the immaturity of Omnichannel services in omnichannel supermarkets. The transition from small merchants to omnichannel businesses has occurred in less than a decade, and business owners grapple with conflicting values. To address the research Gap, we summarized the different SQ models and merged similar dimensions to evaluate the most relevant dimensions. We also investigate if the ratio of the dimensions remains the same over time.

3. MATERIALS AND METHODS

Text mining facilitates the extraction of valuable insights from customer reviews and feedback, thereby enabling businesses to gain a deeper understanding of consumer opinions and preferences. (Eachempati et al., 2022). These methods exhibit usefulness in the business landscape, as they can be effectively implemented with diverse algorithms to cater to different analytical and operational requirements (Guha Majumder et al., 2022). Topic modeling is a sophisticated and practical approach for analyzing large text documents in natural language processing (NLP). It is an unsupervised machine-learning technique that can uncover a set of word distributions for each topic and the link between themes and documents (Lee et al., 2010). For instance, Topic modeling in determining customer satisfaction has been investigated in music streaming by Chung et al. (2022). They mentioned that factors related to content can significantly impact customer satisfaction. Topic modeling has also been applied in airlines (Lucini et al., 2020) or the Banking system (Shankar et al., 2022). Semantic network analysis is another text-mining algorithm that has been used in the hotel industry (Kim & Kim, 2022). Topic modeling facilitates the examination of word distributions within defined topics across collections of text, enabling the identification of how these topics are related to individual documents. A topic model, such as Latent Dirichlet Allocation (LDA) (Li et al., 2016), assigns text in a document to a particular subject and creates a Dirichlet distribution-based topic per document and word per topic model. LDA can automatically categorize words into subjects and find connections between texts in a dataset. LDA can be applied to categorize the content of documents into specific subject areas. In recent years, LDA has found utility in various domains, including retail for tasks like product enhancement and sales planning (Park et al., 2023) and online fashion rental experiences (Lang et al., 2020). Also, it is used to analyze customer satisfaction in supermarket retail (Falatouri et al., 2024). In software engineering, it is used for analyzing key themes in computer forums (Chatterjee et al., 2020), It has been used for conducting literature reviews (D. Yu & Xiang, 2023) and performing sentiment analysis on social media posts, such as those on Twitter (Uthirapathy & Sandanam, 2023) it has also been used for motivation analysis and risk identification (Lang et al., 2020).

To perform our analysis, we ran our research on a specific omnichannel supermarket store in Iran named Ofoq Koroush (OK). OK is one of the most popular supermarket chains in Iran. It began operations in 2013 and is now the nation's largest physical discount supermarket chain, with over 3,100 stores in 460 cities. In 2018, it launched its online shop service (website and mobile application) with over 3 million active users and 60,000 daily deliveries. They developed their omnichannel strategy in 2020. OK offers its service through physical stores, an online shop website, and a mobile application. Their business model utilizes distributed facilities as micro-warehouses to supply their last-mile distributors. The OK app accesses the user's location to determine the closest store to provide service.

Moreover, they utilize their physical locations as return stations. This company uses other channels, such as social media, to connect with customers; they have over 2 million Instagram followers and are active on Twitter and Telegram.

After implementing an omnichannel service, OK introduced a customer club system. This service allows users to store and use cards as member identifiers. Customers can use these cards to purchase at all retail locations and receive loyalty rewards. In addition, customers can earn club points by participating in daily roulette games.

Numerous researchers have analyzed customer expectations and satisfaction in various OK stores based on their high penetration rate. Barzegarloo & Kazemi (2021) compared the dimensions of OK customer expectations in multicultural cities in Iran. They prioritize the dimensions from the customer perspective in physical stores, where the price was deemed the highest priority. Product quality, variety, personal interactions, and shop locations are the following dimensions. Eventually, store environment and brand image were revealed as the least significant dimensions. They believed that the store environment was not a priority in OK. Esfidani et al. (2022) tested the hypothesis of playing music in stores to compare customer expenditure and attendance time with and without music. To this end, their research indicated that the store environment influences the attendance time and customer basket value.

The dataset was collected from Cafebazaar.ir, the most popular Android AppStore for free and paid apps in Iran. The OKALA and OK Club app user reviews were extracted from Cafebazaar; 8562 reviews were collected for OKALA, and 1237 reviews were collected for OK Club. The data set was downloaded in February 2022 and covered the period from April 2019 to the download date. The length of downloaded reviews was up to 300 characters, an application limitation. The language of the reviews was Persian.

R language and natural language processing-related packages (tm, NLP, PersianStemmer, tidytext, topicmodels, dplyr) have been used to perform Topic modeling analyses.

We have used the LDA technique to assign words to topics and topics to documents; our LDA implementing procedure for analyzing customer reviews is summarized in Figure 1.

Our LDA implementation involved four sequential steps, illustrated in Figure 1. Stage I consists of steps 1 and 2, which have been previously described. Following this, we used the output from the first two steps as the input dataset for the third step, where we applied LDA. To prepare the dataset for LDA, we utilized the TM library in R, which included a stop word list and a word stemmer. Finally, we fixed the number of topics with the Gibbs sampling method (Grün & Hornik, 2011).

Using LDA, Words can be automatically grouped into topics and connections between documents in a dataset can be uncovered. For example, we can assume a two-topic model of a customer review dataset, including

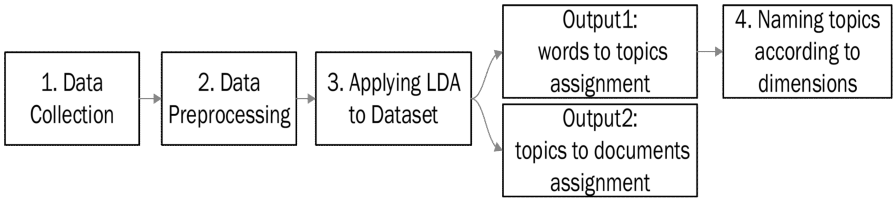

Figure 1. LDA implementing procedure.

"Features," "election," "defect," "cost," "payment," "coverage," "address registration," internet volume," "purchase," "speed," "Points, Top Club," "Bronze User," "Biggest Club," "Award," "Purchase Details," "Card," "Coupon" have been used to describe figurative topic modeling techniques work in Figure 2.

Initially, we utilized R's TM library to build a dataset for LDA implementation. "Persian Stemmer for Text Analysis" was used to clean the data; this library supports the Persian language and follows the text cleaning steps in a series of actions, first removing English characters and only retrieving non-number characters; this library has a reliable Persian stop words dictionary (Mokhtaripour & Jahanpour, 2006) that removes all words with no valuable meanings; in Persian, this library stems the verbs into their roots. Upon completion of the cleaning phase, 7216 reviews remained relevant.

The next step in text mining is tokenizing, splitting a phrase, sentence, paragraph, or an entire text document into smaller units, such as individual words or terms (Kwartler, 2017). To improve tokenization, we utilized the tidytext N-gram analysis package. Consequently, 2107 unigrams and 39524 bigrams were identified.

We merged bigram words and utilized them as a single unit. Following this, we selected the words with the most significant variation in per-topic-per-word probabilities between subjects to determine the major features of topics and compare all topics simultaneously. One of the outcomes of LDA Analysis is "beta," which is the probability of each topic per word. Subsequently, using this approach, we calculated the critical characteristics of themes and correlated them to the SQ dimensions with formula 1.

$$\log_2 \frac{beta_i}{average\ of\ other\ topics\ beta} \quad (1)$$

This formula uses a log ratio to make the difference symmetrical. We filter for relatively common terms by examining only words with a beta value more significant than 1/1000 across all themes to limit the comparison to a small set of exceptionally relevant phrases. Consequently, we adopted human reading comparison to evaluate the topic generation. After assigning each document a specified topic with the highest affinity, we randomly selected 2% of the reviews and manually tested test the assigned topic. Then, we calculated the inter-rater

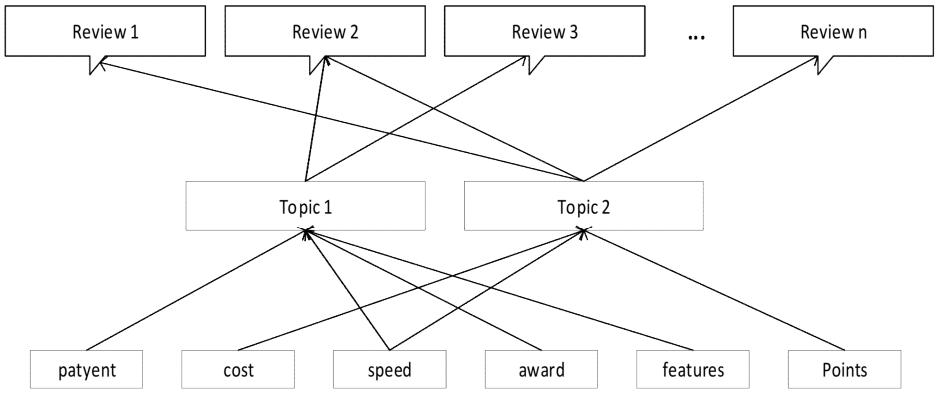

Figure 2. Overview of basic functions of topic modeling techniques

reliability (IRR) with Cohen's Kappa coefficients (Wongpakaran et al., 2013) between the computer topic selection and human topic selection with different numbers of clusters formula 2.

$$IRR = \frac{1 - e(K)}{1 - e(K)} \quad (2)$$

p is the overall percent agreement, and e(K) is the chance agreement probability. We experienced the highest rate of IRR with six groups, using the Gibbs sampling method for memory efficiency and speed.

We can infer which words make up a subject. The result of our topic modeling is shown in Figure 3. Term for the topic is available in Table 2.

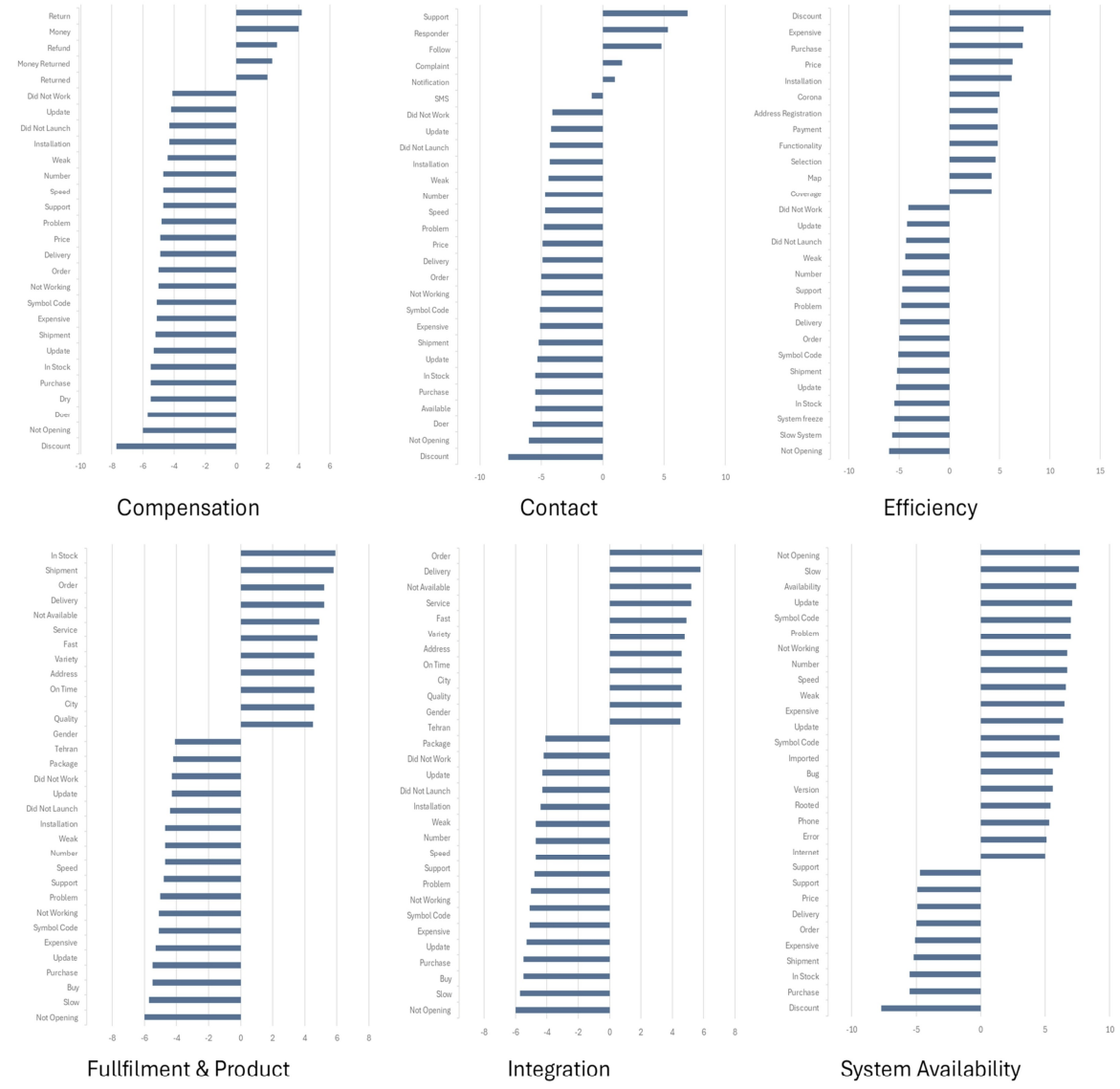

Figure 3. Topics Terms

Table 2. Selected Terms to Topic

Topic	Translated terms
Efficiency	Features, selection, defect, cost, payment, coverage, address registration, purchase, speed, economy, capacity, functional, card, goods, complete, corona, canceled, option, location, Products, card management, problem, locator, missing, role, map, easy, disconnect
Compensation	The money is back, Return, Money back, Return, Reference, cost
Contact	Support, Follow up, announcement, Responsive, Message, Complaint
Fulfillment & Products	Delivery, on time, courier, delay, delivery, goods, shipping, home, at home, late, on time, service, fast, city, goods, rent, product, location, areas, area
Integration	Points, Top Club, Bronze User, Biggest Club, Award, Purchase Details, Card, Coupon, Be One, Be One
System availability	Code does not come, update, run, error, SMS, usage, bug, internet, opens, does not open, bug, does not go up, update, comes out, register, leaves, broken, Gives error, rooted, system, does not work, code, verification code, verification code does not come, does not code, does not slow down, hangs, stops, version, install, not installed, log in, connect, not connected, logged

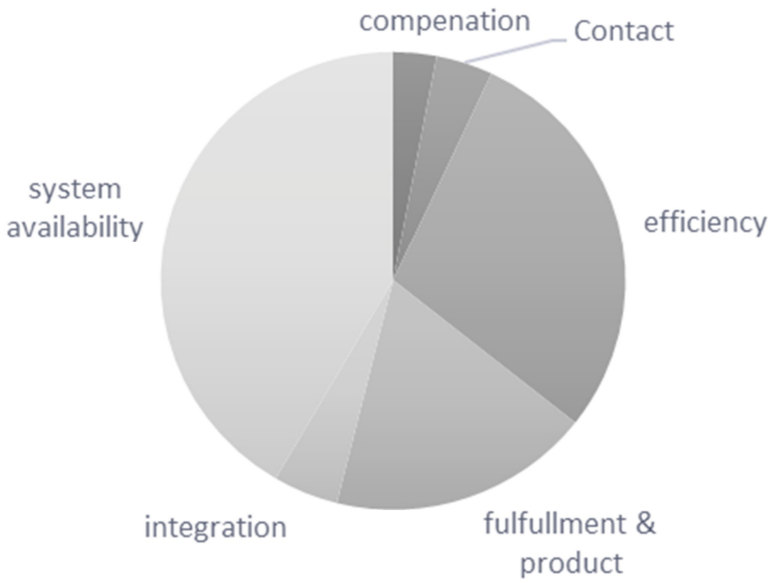

Figure 4. Distribution of the topics

4. RESULTS

We utilized LDA clustering to investigate how SQ dimensions manifest in Omnichannel supermarkets by grouping the reviews into six clusters. The final clustering illustrates the most repeated topic among the user-generated content. Figure 4 illustrates the distribution of topics, where the System Availability had the highest occurrence. It individually revealed that customers expect uninterrupted service from an omnichannel service provider. The second rank of this area showed that the core business of retailers in omnichannel remains the same as that of traditional retailers (providing a complete range of products), which is still highly important for customers.

We used rating fields in our data to determine the satisfaction levels of the reviewers. We transformed the original five-star rating system into a three-level system to make the results more understandable. Specifically, we categorized ratings of one and two as indicating dissatisfaction, three as neutral, and four and five as indicating satisfaction (Brandtner et al., 2021). In this model, if one or two-star ratings accompany more than 51% of the comments related to a dimension, we consider it an indicator of dissatisfaction. Conversely, if many of the comments related to a dimension are in the positive cluster, we consider it an indicator of satisfaction Table 3.

The trend of the importance of SQ dimensions is displayed in Table 4.

The number of comments was distributed in different ways among the topics. We conducted a Z-test formula 3 to compare the proportion of each dimension where the sum of proportion per year equals one.

$$z = \frac{p_1 - p_2}{\sqrt{p(1-p)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad (3)$$

Based on a Chi-squared value of 203.366, the distribution of service quality dimensions across different years is not similar.

5. DISCUSSION AND CONCLUSION

This study used text-mining topic modeling to focus on how SQ dimensions manifest in omnichannel supermarkets. We extracted review topics from online applications about omnichannel supermarkets.

The results indicate that while system availability was the most critical concern among users, it was primarily associated

Table 3. Dimension star rating (distribution of the satisfactions among the topics)

Dimension	1&2	3	4&5
Compensation	37.33%	4.15%	58.53%
Contact	68.78%	4.91%	26.32%
Efficiency	46.17%	9.32%	44.52%
Fulfillment & Product	58.82%	10.26%	30.93%
Integration	42.81%	5.81%	51.37%
System availability	71.26%	8.63%	20.10%

Table 4. SQ Expectation changes

Dimension	2019	2020	2021	2022
Compensation	1.5%	1.8%	2.8%	3.7%
Contact	3.3%	5.1%	4.3%	3.4%
Efficiency	26.9%	25.4%	23.6%	35.0%
Fulfillment & Product	12.3%	27.4%	18.8%	16.4%
Integration	8.2%	3.7%	3.7%	5.1%
System availability	47.7%	36.6%	46.9%	36.3%

with negative feedback. This implies that providing uninterrupted service is essential in omnichannel retail to avoid unsatisfied customers. However, this finding contradicts the assertion made by Cotarelo et al. (2021), who introduced delivery as the primary concern of omnichannel service.

The second major cause of dissatisfaction was providing unsuitable customer contact. Therefore, improving the quality of connection points is crucial to avoid customer dissatisfaction. The Next disappointing dimension is fulfillment, which indicates that unfulfilled orders lead to dissatisfaction. On the other hand, compensation can bring more satisfaction, which could be highly related to the market where traditional stores mainly reject returns or exchanges conveniently. This service works as a new attraction for customers.

We realize that integration is one of the main issues related to omnichannel retail that can bring customer satisfaction, but there is still room for improvement.

The results show few comments related to facilities and equipment mentioned by customers, which can indicate that this dimension is not the primary concern of customers anymore in the age of modern businesses. The main reason for the absence of such elements in the results could be related to the configuration of omnichannel retail, where customers use different channels rather than only physical stores, and equipment may be more meaningful in the digital format than in traditional models where the customers pay more attention to the features of the app or options of the websites.

Reliability has been reflected in two other dimensions: efficiency and system availability, which are the most mentioned comments by customers. This indicates that reliability is still relevant and significant for customers, albeit in new forms, in line with Ulkhaq et al. (2017). In contradiction with Kalia (2017), Security issues have not been mentioned in the omnichannel users' content, which shows that they are less critical in this area.

Responsiveness has taken on a new form in terms of contact, where customers expect to be able to reach service providers through various touchpoints and even follow up on their complaints from one touchpoint to another channel. This dimension is one of the significant challenges in omnichannel, as it has been frequently mentioned in a negative context.

The LDA model was unable to identify assurance-related topics. We manually searched for assurance-related reviews and found only one, which stated: "*I wish it had a delete account option. If we need to change our SIM card for any reason, the new owner will have access to our profile and information, as well as our address and history.*" The small number of assurance-related reviews indicates that this dimension is not a significant concern for omnichannel customers. Customers did not mention empathy in a way that creates a separate cluster in the comments and appears to be a minor concern among omnichannel users. Again, omnichannel users pay more attention to reliable contacts rather than empathy.

The results indicated a significant increase in the importance of efficiency by 2022. Initially, when omnichannel service was introduced, integration was a top priority, but it significantly decreased in 2020 and 2021 due to the impact of COVID-19. However, the importance of integration increased again in 2022. fulfillment was a significant concern in 2020. Cross-

referencing our data with another field, we categorized reviews by year and compared the frequency of topics mentioned across different periods Table 4.

Price was identified as the most dominant topic in physical stores. Surprisingly, our data did not identify price-related topics as a separate cluster. Although we expected many reviews to be price-related, we manually extracted price-related reviews. We found that only 4.1% of reviews mentioned price, 0.5% mentioned the term "expensive" (and its synonyms), and 1% mentioned the word "cheap" (and its synonyms). This contradicts previous research, which mentions the price of products as the primary customer concern in supermarket retail by Barzegarloo & Kazemi (2021). In other cases, the price-related topic was mixed with other expenses, such as delivery costs, and categorized as "fulfillment." Overall, only 5.6% of the reviews were price-related content, whereas other issues, such as system availability and efficiency, received more attention in the omnichannel context than in physical stores.

While Gao & Huang (2021), Zhang et al. (2022), and Zonghuo et al. (2021) have introduced different types of integration, we found that most price-related comments were clustered in integration, where customers compared prices across different channels or discussed integrational discounts that affected prices. This proves that the initial idea of omnichannel retail, which allows customers to compare, is relatively correct and highlights the importance of having a clear price strategy.

Having a separate group related to fulfillment with the third most significant share shows that delivering products at the right time and in the correct order is among the most essential tasks of the business. This finding complements the ES-Qual model (Parasuraman et al., 2005) and (Ulkhaq et al., 2017), highlighting the critical role of timely and accurate fulfillment in overall service quality.

To conclude, this study made two scientific and practical contributions. From the scientific point of view, by the first research question, we concluded that six service quality dimensions (compensation, contact, efficiency, fulfillment & product, integration, and system availability) do manifest in omnichannel retail; our research also shows that customer expectations have evolved over the past years. These changes could be related to technological maturity or customer expectation changes related to access to this new paradigm (Omnichannel).

The first practical contribution is the dependency of satisfaction and dissatisfaction to dimensions where the share of bringing satisfaction and unsatisfaction is not the same among them Table 3. Comparing the effect of the omnichannel SQ dimension reveals that the contact and system availability dimensions bring more satisfaction, and a deficiency in either could result in significant dissatisfaction. In contrast, compensation as an independent factor can result in an unforgettable experience.

The second Practical contribution of our research is that omnichannel users do not prioritize privacy. Similarly, omnichannel service users are not price-driven, which could lead business owners to pay more attention to other aspects of the service.

The main limitation of this research is the service provider's access to the customer-generated reviews. Some valuable comments, including offensive words, were eliminated from the database. Besides that, Persian language difficulty was also a limitation in our research, as the Persian

stemmer could not prepare understandable words from the text. This resulted in more manual research, as it is based on the Iranian market and cannot be generalized to other regions. Future researchers might first translate the text into English and analyze the translated version. The absence of customer reviews about a particular dimension might not necessarily mean that the dimension is unimportant in the omnichannel context.

Another limitation of our work was the synchronicity of omnichannel retail development and Covid emergence. This might have influenced the reviews given during this time.

Acknowledgment

Parts of this research were funded by the Christian Doppler Research Association as part of the Josef Ressel-Centre PREVAIL and the Government of Upper Austria as part of Logistikum.RETAIL.

References

Akter, S., Hossain, M.I., Lu, S., Aditya, S., Hossain, T.M.T., & Kattiyapornpong, U. (2019). Does service quality perception in omnichannel retailing matter? A systematic review and agenda for future research. Exploring Omnichannel Retailing, 71–97.

Barzegarloo, D., & Kazemi, A. (2021). Prioritizing Factors Affecting Retail Success in Multicultural Communities Case Study: Ofogh Kourosh Stores in Shiraz. Journal of Marketing Management, 16 (50), 121–133.

Bodhani, A. (2012). Shops offer the e-tail experience. Engineering & Technology, 7 (5), 46–49.

Boyd, A. (2002). The goals, questions, indicators, and measures (GQIM) approach to measuring customer satisfaction with e-commerce Web sites. Aslib Proceedings, 54 (3), 177–187.

Brandtner, P., Darbanian, F., Falatouri, T., & Udokwu, C. (2021). Impact of COVID-19 on the Customer End of Retail Supply Chains: A Big Data Analysis of Consumer Satisfaction. Sustainability, 13 (3), 1464.

Brynjolfsson, E., Jeffrey Hu, Y., & S. Rahman, M. (2013). Competing in the Age of Omnichannel Retailing. MIT Sloan Management Review. https://sloanreview.mit.edu/article/competing-in-the-age-of-omnichannel-retailing/

Chatterjee, P., Kong, M., & Pollock, L. (2020). Finding help with programming errors: An exploratory study of novice software engineers' focus in stack overflow posts. Journal of Systems and Software, 159, 110454.

Chen, Y., Cheung, C.M.K., & Tan, C.-W. (2018). Omnichannel business research: Opportunities and challenges. Decision Support Systems, 109, 1–4.

Chris, L., & Adam, V. (2014). From Multichannel to "Omnichannel" Retailing: Review of the Literature and Calls for Research. In 2nd International Conference on Contemporary Marketing Issues, (ICCMI), 18-20 June 2014.

Chung, J., Lee, J., & Yoon, J. (2022). Understanding music streaming services via text mining of online customer reviews. Electronic Commerce Research and Applications, 53, 101145.

Cotarelo, M., Calderón, H., & Fayos, T. (2021). A further approach in omnichannel LSQ, satisfaction and customer loyalty. International Journal of Retail & Distribution Management, 49 (8), 1133-1153.

Cox, J., & Dale, B.G. (2001). Service quality and e-commerce: an exploratory

КВАЛИТЕТ УСЛУГА У ОМНИКАНАЛНОЈ МАЛОПРОДАЈИ СУПЕРМАРКЕТА

Taha. Falatouri, Felicita Chromjaková

Извод

Предузећа све више усвајају омниканалне стратегије малопродаје како би обезбедила беспрекорне услуге и унапредила искуства купаца кроз различите канале. Ипак, многе компаније приступају овом моделу без потпуног разумевања очекивања купаца на глобално интегрисаном тржишту. Упркос појави нових очекивања купаца у односу на традиционалне услуге, истраживања о квалитету услуга у оквиру омниканалне малопродаје и даље су оскудна. Ова студија настоји да попуни тај јаз испитујући како се димензије квалитета услуга манифестују у омниканалним супермаркетима. Коришћењем приступа текстуалног рударења анализирано је 7.216 онлајн рецензија купаца омниканалних супермаркета. Налази показују да, иако традиционалне димензије, као што су лична интеракција, ефикасност и испуњење, и даље имају вредност за купце, у омниканалној малопродаји се појављују нове, критичне димензије као што су интеграција и компензација. Поред тога, резултати указују на то да су очекивања купаца еволуирала, стављајући приоритет на факторе који превазилазе цену у оквиру омниканалних услуга. Поузданост контакта и доступност система су од суштинског значаја, док су недостатак производа идентификовани као најнезадовољавајући аспект.

Кључне речи: омниканална малопродаја, текстуално рударење, квалитет услуга, ланци супермаркета

analysis. Managing Service Quality: An International Journal, 11 (2), 121–131.

Cronin, J. J., & Taylor, S. A. (1992). Measuring Service Quality: A Reexamination and Extension. Journal of Marketing, 56 (3), 55-68.

Cronin Jr, J. J., & Taylor, S. A. (1994). SERVPERF versus SERVQUAL: reconciling performance-based and perceptions-minus-expectations measurement of service quality. Journal of marketing, 58(1), 125-131.

Cui, X., Xie, Q., Zhu, J., Shareef, M.A., Goraya, M.A.S., & Akram, M.S. (2022). Understanding the omnichannel customer journey: The effect of online and offline channel interactivity on consumer value co-creation behavior. Journal of Retailing and Consumer Services, 65, 102869.

Dabholkar, P.A., Thorpe, D.I., & Rentz, J.O. (1996). A measure of service quality for retail stores: Scale development and validation. Journal of the Academy of Marketing Science, 24 (1), 3–16.

Donthu, N., Gremler, D.D., Kumar, S., & Pattnaik, D. (2022). Mapping of Journal of Service Research Themes: A 22-Year Review. Journal of Service Research, 25 (2), 187–193.

Eachempati, P., Srivastava, P.R., Kumar, A., Muñoz de Prat, J., & Delen, D. (2022). Can customer sentiment impact firm value? An integrated text mining approach. Technological Forecasting and Social Change, 174, 121265.

Esfidani, M.R., Rafiei Samani, S., & Khanlari, A. (2022). Music and consumer behavior in chain stores: theoretical

explanation and empirical evidence. The International Review of Retail, Distribution and Consumer Research, 32(3), 331-348.

Falatouri, T., Brandtner, P., Nasseri, M., & Darbanian, F. (2024). Service quality dimensions in Austrian food retailing – a text mining approach for physical retail stores. The International Review of Retail, Distribution and Consumer Research, 1–36.

Fulgoni, G.M. (2014). "Omni-Channel" Retail Insights and The Consumer's Path-to-Purchase. Journal of Advertising Research, 54 (4), 377–380.

Gao, M., & Huang, L. (2021). Quality of channel integration and customer loyalty in omnichannel retailing: The mediating role of customer engagement and relationship program receptiveness. Journal of Retailing and Consumer Services, 63, 102688.

Gerea, C., Gonzalez-Lopez, F., & Herskovic, V. (2021). Omnichannel customer experience and management: an integrative review and research agenda. Sustainability, 13 (5), 2824.

Grün, B., & Hornik, K. (2011). topicmodels : An R Package for Fitting Topic Models. Journal of Statistical Software, 40 (13), 1-13.

Guha Majumder, M., Dutta Gupta, S., & Paul, J. (2022). Perceived usefulness of online customer reviews: A review mining approach using machine learning & exploratory data analysis. Journal of Business Research, 150, 147–164.

Hossain, T.M.T., Akter, S., Kattiyapornpong, U., & Dwivedi, Y. (2020). Reconceptualizing integration quality dynamics for omnichannel marketing. Industrial Marketing Management, 87, 225–241.

Jonkisz, A., Karniej, P., & Krasowska, D. (2022). The Servqual Method as an Assessment Tool of the Quality of Medical Services in Selected Asian Countries. International Journal of Environmental Research and Public Health, 19 (13), 7831.

Kalia, P. (2017). Service quality scales in online retail: methodological issues. International Journal of Operations & Production Management, 37 (5), 630 - 663.

Kazancoglu, I., & Aydin, H. (2018). An investigation of consumers' purchase intentions towards omni-channel shopping. International Journal of Retail & Distribution Management, 46 (10), 959–976.

Kim, Y.-J., & Kim, H.-S. (2022). The Impact of Hotel Customer Experience on Customer Satisfaction through Online Reviews. Sustainability, 14 (2), 848.

Kwartler, T. (2017). Text mining in practice with R. Hoboken, NJ: John Wiley & Sons.

Ladhari, R. (2009). A review of twenty years of SERVQUAL research. International Journal of Quality and Service Sciences, 1 (2), 172–198.

Lang, C., Li, M., & Zhao, L. (2020). Understanding consumers' online fashion renting experiences: A text-mining approach. Sustainable Production and Consumption, 21, 132–144.

Lee, S., Song, J., & Kim, Y. (2010). An empirical comparison of four text mining methods. Journal of Computer Information Systems, 51 (1), 1–10.

Lee, W. (2020). Unravelling consumer responses to omni-channel approach. Journal of Theoretical and Applied Electronic Commerce Research, 15 (3), 37–49.

Li, Y., Zhou, X., Sun, Y., & Zhang, H. (2016). Design and implementation of Weibo sentiment analysis based on LDA and dependency parsing. China Communications, 13(11), 91-105.

Lim, X.-J., Cheah, J.-H., Dwivedi, Y.K., & Richard, J.E. (2022). Does retail type

matter? Consumer responses to channel integration in omni-channel retailing. Journal of Retailing and Consumer Services, 67, 102992.

Lin, H.-F. (2007). The Impact of Website Quality Dimensions on Customer Satisfaction in the B2C E-commerce Context. Total Quality Management & Business Excellence, 18 (4), 363–378.

Liu, X., Zeng, X., Xu, Y., & Koehl, L. (2008). A fuzzy model of customer satisfaction index in e-commerce. Mathematics and Computers in Simulation, 77 (5-6), 512–521.

Lucini, F.R., Tonetto, L.M., Fogliatto, F.S., & Anzanello, M.J. (2020). Text mining approach to explore dimensions of airline customer satisfaction using online customer reviews. Journal of Air Transport Management, 83, 101760.

Mannuggal, B., & AFRIADI, B. (2023). Servqual in higher education institutions. International Journal of Business, Law, and Education, 4 (1), 107–114.

Mishra, R., Singh, R. K., & Koles, B. (2021). Consumer decision-making in Omnichannel retailing: Literature review and future research agenda. International Journal of Consumer Studies, 45(2), 147-174.

Mokhtaripour, A., & Jahanpour, S. (2006, November). Introduction to a new Farsi stemmer. In Proceedings of the 15th ACM International Conference on Information and Knowledge management (pp. 826-827).

Omar, S., Mohsen, K., Tsimonis, G., Oozeerally, A., & Hsu, J.-H. (2021). M-commerce: The nexus between mobile shopping service quality and loyalty. Journal of Retailing and Consumer Services, 60, 102468.

Parasuraman, A., Zeithaml, V.A., & Berry, L.L. (1985). A Conceptual Model of Service Quality and Its Implications for Future Research. Journal of Marketing, 49 (4), 41–50.

Parasuraman, A., Zeithaml, V.A., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. 1988, 64 (1), 12–40.

Parasuraman, A., Zeithaml, V.A., & Malhotra, A. (2005). ES-QUAL: A multiple-item scale for assessing electronic service quality. Journal of Service Research, 7 (3), 213–233.

Park, J., Yang, D., & Kim, H.Y. (2023). Text mining-based four-step framework for smart speaker product improvement and sales planning. Journal of Retailing and Consumer Services, 71, 103186.

Qin, H., & Prybutok, V.R. (2009). Service quality, customer satisfaction, and behavioral intentions in fast-food restaurants. International Journal of Quality and Service Sciences, 1 (1), 78–95.

Quach, S., Barari, M., Moudrý, D. V., & Quach, K. (2022). Service integration in omnichannel retailing and its impact on customer experience. Journal of Retailing and Consumer Services, 65, 102267.

Rasool, G., & Pathania, A. (2021). Reading between the lines: untwining online user-generated content using sentiment analysis. Journal of Research in Interactive Marketing, 15 (3), 401–418.

Rigby, D. (2011). The future of shopping. Harvard Business Review, 89 (12), 65–76.

Rosenmayer, A., McQuilken, L., Robertson, N., & Ogden, S. (2018). Omni-channel service failures and recoveries: refined typologies using Facebook complaints. Journal of Services Marketing, 32 (5), 569 –582.

Shankar, A., Tiwari, A.K., & Gupta, M. (2022). Sustainable mobile banking application: a text mining approach to

explore critical success factors. Journal of Enterprise Information Management, 35 (2), 414–428.

Shubham, J., SchweissSimon, & BenderDirk Werth (Eds.) (2021). Omnichannel Retail Customer Experience with Mixed-Reality Shopping Assistant Systems. Springer.

Ulkhaq, M.M., Rabbani, M., Wibowo, A.T., & Rachmania, B.A. (2017). Assessing electrnic service quality using ES-QUAL and E-RecS-QUAL scales. ITMSOC Transactions on Innovation & Business Engineering, 2 (1), 20–26.

Uthirapathy, S.E., & Sandanam, D. (2023). Topic Modelling and Opinion Analysis On Climate Change Twitter Data Using LDA And BERT Model. Procedia Computer Science, 218, 908–917.

Verhoef, P.C., Kannan, P.K., & Inman, J.J. (2015). From Multi-Channel Retailing to Omni-Channel Retailing. Journal of Retailing, 91(2), 174–181.

Wongpakaran, N., Wongpakaran, T., Wedding, D., & Gwet, K. L. (2013). A comparison of Cohen's Kappa and Gwet's AC1 when calculating inter-rater reliability coefficients: A study conducted with personality disorder samples. BMC Medical Research Methodology, 13, 61.

Yu, D., & Xiang, B. (2023). Discovering topics and trends in the field of Artificial Intelligence: Using LDA topic modeling. Expert Systems with Applications, 225, 120114.

Zhang, M., He, X., Qin, F., Fu, W., & He, Z. (2019). Service quality measurement for omni-channel retail: Scale development and validation. Total Quality Management & Business Excellence, 30 (sup1), S210-S226.

Zhang, M., Li, Y., Sun, L., & Moustapha, F.A. (2022). Integrated store service quality measurement scale in omni-channel retailing. International Journal of Retail & Distribution Management., 50 (7), 839–859.

Zhang, R., Jun, M., & Palacios, S. (2023). M-shopping service quality dimensions and their effects on customer trust and loyalty: an empirical study. International Journal of Quality & Reliability Management, 40 (1), 169–191.

Zhang, Y., Tang, B., Yang, Q., An, D., Tang, H., Xi, C., ... & Xiong, F. (2021). BCORLE (λ): An Offline Reinforcement Learning and Evaluation Framework for Coupons Allocation in E-commerce Market. Advances in Neural Information Processing Systems, 34, 20410-20422.

Zonghuo, L., Wensheng, Y., Hyun, S. J., & Di,W. (2021). Omnichannel retailing operations with coupon promotions. Journal of Retailing and Consumer Services, 58, 102324.