Quality of channel integration and customer loyalty in omnichannel retailing: The mediating role of customer engagement and relationship program receptiveness

Gao, Mengjia

Huang, Lin

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The mediating role of customer engagement and relationship program receptiveness

*Mengjia Gao 1a; Lin Huang 2b

aAuthor 1 Affiliations: Graduate School of Business Administration, Kobe University, Kobe, Japan

bAuthor 2 Affiliations: Graduate School of Business Administration, Kobe University, Kobe, Japan

*Corresponding author.

Address: Graduate School of Business Administration, Kobe University, 2-1, Rokkodai, Nada, Kobe, 657-8501, Japan.

E-mail addresses: gaomengjia0000@gmail.com (M. Gao), koulin@kobe-u.ac.jp (L. Huang).

Abstract

The aim of this study was to understand how omnichannel integration quality affects customer loyalty through customer engagement and relationship program receptiveness and to verify the relationship between customer engagement and relationship program receptiveness in omnichannel retailing. Data was collected through a questionnaire with 378 available respondents. PLS-SEM was exerted to examine the model. The results disclosed the positive influence of omnichannel integration quality on customer engagement and relationship program receptiveness, which consequently impacted customer loyalty. Also, the positive influence of customer engagement on relationship program receptiveness was proved. Further, the role as mediators of customer engagement and relationship program receptiveness was explored. This study contributed to the omnichannel literature by confirming that psychological and behavioral customer engagement plays a vital role in omnichannel retailing. This study also helped omnichannel retailers understand that providing a seamless, consistent and reassuring environment can facilitate customer engagement and thereby gain customer loyalty.

Keywords Omnichannel integration quality; Customer engagement; Relationship program receptiveness; Customer loyalty

1. Introduction

In this digital age, retailers will interact with customers not only through conventional channels such as brick-and-mortar, kiosks, direct mail, and websites, but also across new channels such as social media, mobile applications, location-based services, gaming consoles (Hsia et al., 2020; Rigby, 2011; Shi et al., 2020). Earlier research concluded that a multiple channel strategy commensurate with customer expectations can be effective in gaining customer loyalty (Berman and Thelen, 2018; Hussein and Kais, 2020; Mainardes et al., 2020; Wallace et al., 2004). Consequently, numerous companies have integrated offline channels with online channels to provide a seamless experience for their customers (Lee and Lim, 2017). Even traditional retailers (e.g., Rakuten, Walmart) or pure e-commerce companies (e.g., Alibaba, Amazon) that already have a significant market share are struggling to transform and adopt an omnichannel marketing strategy to stabilize their position.

In the omnichannel literature from a customer perspective, customer loyalty is generally viewed as the end result of integration quality (Quach et al., 2020). Omnichannel integration quality (OCIQ) is the basis for providing a seamless customer experience (Cao and Li, 2015). Most studies have identified channel-service configuration and interaction consistency as the two essential components of OCIQ (e.g., Le and Nguyen-Le, 2020; Lee et al., 2019). This raises privacy concerns as omnichannel retailers require private information about their customers to provide a customized and personalized shopping experience (Cui et al., 2021). It appears necessary for omnichannel retailers to provide customers a reassuring environment for customers as channel integration relies on various customer touchpoints (Cheah et al., 2020). Accordingly, this study adds the assurance quality of security and privacy to the essential components of OCIQ (Hossain et al., 2019).

Many omnichannel studies have identified customer experience as a mediation mechanism between omnichannel factors and customer loyalty (Le and Nguyen-Le, 2020; Quach et al., 2020; Tyrväinen et al., 2020). However, customer engagement (CE), which is different from customer experience, has attracted extensive academic attention. CE is measured by the customers' responses and actions, whereas customer experience is the perception of a company's actions (Pansari and Kumar,

2017). In omnichannel retailing, the integrated channels allow customers to engage in all aspects of the retailer's activities beyond the purchase. When customers invest more time and energy into the retailer, their high level of engagement helps maintain an ongoing relationship with the retailer. Consequently, this study proposes that CE can mediate the relationship between OCIQ and customer loyalty. Nevertheless, the literature focusing on CE in omnichannel retailing is far from sufficient. Therefore, it is of interest to contribute to this growing domain by examining the mediating role of CE in the omnichannel field.

There is no consensus in the literature on the definition of CE (Wang and Lee, 2020). It has become mainstream to separate the behavioral level from the psychological state to make CE easier to predict consumer behavior and provide tangible benefits (Harmeling et al., 2017). In the retail industry, especially for retailers in the grocery sector, it is difficult to elicit spontaneous customer interaction and engagement behaviors due to low-involvement products. Therefore, this study believes that CE behaviors in the retail sector are best initiated by retailers. Correspondingly, relationship program receptiveness (RPR), which measures the willingness of customers to engage in a firm's relationship strategies, can be addressed as a behavioral aspect of CE initiated by the firm (Ashley et al., 2011). Furthermore, the psychological aspect of CE reflects engagement and commitment, which represents a strong desire to establish and maintain a relationship with a particular firm (Brodie et al., 2011). Consequently, this study proposes that psychological CE may act as an antecedent of RPR, although it remains under-explored. It can be inferred that customers will be willing to participate in relationship programs that are highly integrated and secure across all channels. Additionally, the benefit derived from relationship programs can then increase customer loyalty. Therefore, this study also aims to provide empirical evidence to prove that RPR acts as a mediator between OCIQ and customer loyalty.

In summary, this study will address the following questions: (1) How does OCIQ affect customer loyalty through CE and RPR? (2) Does CE help to improve RPR? The rest of this paper is structured following. Literature is reviewed in Section 2. This is followed by hypotheses in Section 3. Section 4

then describes the methods and procedures used to collect the data. The results are listed in Section 5. Finally, this study elucidates contribution and conclusions in Section 6.

2. Literature review

2.1. Omnichannel integration quality

Omnichannel retailing is a prevalent retail strategy that integrates all channels and customer touchpoints through various digital technologies to deliver a seamless customer experience (Cai and Lo, 2020; Mishra et al., 2021; Yurova et al., 2017). Omnichannel retailing is a development of multichannel retailing and there have been numerous studies about the comparison of multichannel retailing and omnichannel retailing, such as Verhoef et al. (2015), who argued that whereas multichannel considers online and offline channels separately, omnichannel focuses on consistent goals across channels, and Beck and Rygl (2015), who identified the degree of channel integration and interaction to categorize multichannel and omnichannel retailing. Additionally, Shen et al. (2018) claimed that full channel integration is considered to be at the heart of omnichannel marketing compared to multichannel. It is widely accepted that the customer acquisition and retention through channel integration is a major challenge for omnichannel retailers (Li et al., 2018).

OCIQ refers to the quality of channel integration as perceived by customers in an omnichannel setting. OCIQ is defined as the seamlessly integrated performance of all channels of a retailer (Hyun-Hwa and Kim, 2010; Sousa and Voss, 2006; Wu and Chang, 2016). Channel-service configuration and interaction consistency are two critical components of integration quality (Banerjee, 2014; Le and Nguyen-Le, 2020; Shen et al., 2018). Channel-service configuration refers to the ability to provide customers with all channels in lieu of or in addition to the channel receiving services. This dimension is measured by channel-service choice breadth and channel-service configuration transparency (Sousa

and Voss, 2006). Channel-service choice breadth is defined as the range of alternative channels available to the customer. Whereas channel-service configuration transparency is described as the extent to which customers understand the differences between services and channels on all channels (Lee et al., 2019).

Interaction consistency refers to the ability to achieve an integrated service experience for customers by maintaining consistent interactions within different channels (Sousa and Voss, 2006). Unlike conventional retailing, only the consistency of interaction with the service providers needs to be considered. In omnichannel retailing, interaction with a single channel and across channels needs to be consistent due to the complementary nature of the channels (Falk et al., 2007). Accordingly, interaction consistency is measured by content consistency and process consistency. Content consistency means the degree to which customers perceive product information, prices and promotional information to be consistent across all channels. And process consistency is defined as the degree of consistency in the level, image, feel and speed of service perceived by customers across channels (Lee et al., 2019). Seamlessness and consistency are distinctive features of integration in omnichannel retailing, and as customer-oriented counterparts (Huré et al., 2017), channel-service configuration can indicate seamlessness, while interaction consistency can denote consistency.

In addition, assurance quality is a new dimension of OCIQ proposed by Hossain et al. (2019). Assurance quality refers to the trustworthiness of multiple channel attributes, including the privacy and security of customers' personal information across channels as well as the accessibility of service recovery (Hossain et al., 2019; Hossain et al., 2020). Previous studies have shown that sharing consumers' personal information and purchase history between online and offline channels will lead to concerns about security and privacy, which are the main determinants of omnichannel shopping intention (Kazancoglu and Aydin, 2018; Zhang et al., 2010). Moreover, Chen et al. (2018) underlined that tight channel integration will trigger privacy leakage and data security concerns. Therefore, assurance quality related to the protection of customers' private information and the safe use of

different channels (Hossain et al., 2020) is necessary for omnichannel retailing. Channel-service configuration, interaction consistency, and assurance quality differ from each other and collectively reflect the concept of OCIQ. Therefore, all these concepts are used in this study into the conceptual model.

2.2. Customer engagement

CE emerges through the interaction between customers and a specific brand or firm (Hollebeek et al., 2021; Nardi et al., 2020). Many studies from a psychological viewpoint pointed to CE as a multidimensional concept with specific expressions of cognitive, emotional, and behavioral dimensions (Bowden, 2009; Hollebeek, 2011a). In this regard, CE is defined as "a psychological state that occurs by virtue of interactive, co-creative customer experience with a focal object in focal service relationship" (Brodie et al., 2011, p.260). Other studies considered CE from a behavioral perspective (Jaakkola and Alexander, 2014; Verhoef et al., 2010). As a behavioral concept, CE refers to the spontaneous behavior of customers caused by motivational drivers other than purchase (Kang et al., 2021; van Doorn et al., 2010). Regarding the conceptualization of CE psychologically or behaviorally, Harmeling et al. (2017) argued that defining CE behaviorally, rather than psychologically, better captures its intrinsic and extrinsic meaning.

Moreover, CE can be initiated by customers or companies (Alvarez-Milán et al., 2018; Kunz et al., 2017). Customer-initiated CE is driven internally by customers and usually occurs on online channels, such as blogging and interacting with other customers in online communities (Beckers et al., 2017; Vivek et al., 2012). Firm-initiated CE will be stimulated by firm strategies, such as organizing events or programs (Beckers et al., 2017). While past research has mostly integrated customer-initiated CE and firm-initiated CE into a single concept, the current studies distinguish between them (Beckers et al., 2017; Perez-Vega et al., 2020).

The content, manifestations, causes and benefits of CE vary depending on the specific contexts (Hollebeek et al., 2019). Many studies discuss the determinants of CE in the context of social commerce platforms (Molinillo et al., 2020; Quach et al., 2019; Rietveld et al., 2020; Ting et al., 2021), or tourism and hospitality sector (Islam et al., 2019; So et al., 2016). Meanwhile, there are few CE studies in the multichannel or omnichannel space (Bravo et al., 2019; Manser Payne et al., 2017; van Heerde et al., 2019), as summarized in Table 1. It is clear that CE in these studies remains fragmented. For the purpose of understanding the role of cognitive and emotional CE in omnichannel retailing, this study defines CE as a psychological state that appears through a customer interaction with a specific brand or firm to achieve co-creation (Brodie et al., 2011; Hollebeek et al., 2021; Nardi et al., 2020).

Table 1 Literature review on CE in multichannel-omnichannel retailing

Author	Context	Content	Antecedents	Outcomes	paper type
Bravo et al. (2019)	multichannel retail banking	CE (own purchases, social influence, knowledge sharing)	offline service perceptions; online service perceptions; brand trust; brand commitment.	–	empirical
Chen et al. (2019)	multichannel service	continued engagement intention (customer loyalty, behavioral intentions)	information transparency and accessibility; channel integration; customer experiences.	–	empirical
van Heerde et al. (2019)	mobile apps of multichannel retailers	digital engagement (app accesses)	customer location, current channel usage; promotions; social posts; online advertising; offline advertising.	purchase	empirical
Manser Payne et al. (2017)	omnichannel environment	Brand engagement	customer touchpoints.	customer profitability	conceptual
Lee et al. (2019)	omnichannel retailing	CE (conscious attention, enthused participation, social connection)	channel service configuration; integrated interactions.	repurchase intention; positive word-of-mouth	empirical

2.3. Relationship program receptiveness

RPR refers to the specific type of relational behavior that a customer desires to engage with a business and the benefit outcomes associated with the customer's intention to engage (Ashley et al., 2011). Based on Berry's (1995) financial and social relationships, relationship marketing tactics have been developed to the detailed practices (Noble and Phillips, 2004). Ashley et al. (2011) then concluded that relationship programs are marked by five behaviors such as joining a firm's postal mailing list, joining a firm's e-mail list, applying for loyalty cards, signing up for a firm's credit card, and mailing in rebate offers. These five behaviors constitute the RPR and therefore the RPR is considered to be a behavior-oriented construct. The RPR offers a firm-initiated view of engagement and complements the concept of CE (Vivek et al., 2012). Therefore, this study addresses RPR as the behavioral aspect of CE initiated by the firm and regards it as a formative construct, following Ashley et al. (2011).

3. Hypothesis development

3.1. Omnichannel integration quality as the antecedent of CE and RPR

Multiple channels can complement each other in providing provide services to customers, thereby customers are inclined to use multiple channels in their interactions with the same company (Kumar et al., 2019). In an omnichannel setting, the availability of multiple channels can also increase the benefits of convenience and seamlessness (Hsieh et al., 2012). When customers sense these benefits from service providers, they will be satisfied with these providers and return some of the benefits such as psychological and behavioral engagement (Lee et al., 2019; Madaleno et al., 2007). For example, customers may learn about the reviews of the company's clothes from social platforms, then proceed to a physical store to try them on and place an order online. This will increase the time customers spend

at the company and increase their attachment to the company. Furthermore, in order to make this series of actions on social platforms, physical stores and online stores unhindered, they will tend to open the company's member account. Customers contacting companies through various channels are likely to engage in relationship programs to establish sturdy relationships with the companies (Kang, 2018; Simone and Sabbadin, 2017). Correspondingly, this study posits that:

H1a. Channel-service configuration positively affects CE.

H1b. Channel-service configuration positively affects RPR.

When customers receive a consistent experience from different channels of a company, it becomes easier to switch channels (Hsieh et al., 2012). The consistency across channels can alleviate customers' worries about different prices or quality of products and save the costs of time and money (Hsieh et al., 2012; Quach et al., 2020). These benefits from interaction consistency lead to satisfaction and customer engagement (Lee et al., 2019; Madaleno et al., 2007). For example, when customers find a product they favor while shopping offline, they can share the product links directly with their friends through the company's online channels without fear of providing wrong information. Furthermore, customers prefer to join the brand community of companies that provide a consistent service experience. Therefore, customers' perceived value of consistency in an omnichannel setting can facilitate the assessment of the total strength of the relationships between customers and the company, thus facilitating customers' acceptance of relationship programs (Ashley et al., 2011; Itani et al., 2019). This study hypothesizes:

H2a. Interaction consistency positively affects CE.

H2b. Interaction consistency positively affects RPR.

Customers will feel uncomfortable if an untrusted environment wants to seek their permission to provide personal information. Ensuring assurance quality is therefore vital for omnichannel retailers, where customers can gather timely feedback through any channel (Hsieh et al., 2012). Assurance or trust is an essential dimension of service quality and is key to building an ongoing relationship within

the CE process (Bowden, 2009; Pitt et al., 1995; VO et al., 2020). Past research has shown that trust is a critical factor influencing CE or CE behavior (Roy et al., 2018; Thakur, 2018). For example, it is only when personal information is protected that customers can log in to their account, freely express their opinions and post suggestions about products or companies through online channels. Therefore, it can be expected that when customers perceive the assurance quality of an omnichannel setting, they will be more willing to engage psychologically and behaviorally with the company and relationship programs. This study assumes:

H3a. Assurance quality positively affects CE.

H3b. Assurance quality positively affects RPR.

3.2. CE and RPR

CE behavior results from psychological motivation (van Doorn et al., 2010). As psychology is the predictor and controller of behavior (Watson, 1994), the psychological state of customers should be understood before investigating whether they want to engage in relationship program tactics. In omnichannel retailing, customers can interact with companies through various channels and touchpoints, especially digital channels, even if they do not make a purchase (Manser Payne et al., 2017). Psychological engagement through the customer experience of interacting with the retailers will trigger customer participation in non-transactional behaviors (Aluri et al., 2019; Brodie et al., 2011). For instance, if customers are concerned about the company and actively participate in discussions about the company on social platforms, they are likely to register to accept promotions from the company. Moreover, Nammir et al. (2012) concluded that the higher CE, the higher the relationship quality. Therefore, customers who are psychologically engaged with the retailer are more apt to participate in the retailer's relationship programs. This study posits:

H4. CE positively affects RPR.

3.3. Customer loyalty as the consequence of CE and RPR

In the literature of omnichannel, customer loyalty is addressed as the outcome of cognition between customers and retailers (Lewis and Soureli, 2006; Mainardes et al., 2020). Customer loyalty is defined as long-term compliance with the commitment of repurchase or revisits in the future (Oliver, 1999). Customer loyalty is widely measured in terms of repurchase and recommendation intention (Chan et al., 2014; Kitapci et al., 2014; Yi and La, 2004; Zeithaml et al., 1996).

A lot of studies have explored the outcomes of CE from theoretical and empirical perspectives, focusing on loyalty, customer value, and financial results (Cambra-Fierro et al., 2013; Hollebeek, 2011b; Islam and Rahman, 2016; Hapsari et al., 2017). Pansari and Kumar (2017) argued that, CE can produce tangible and intangible benefits for the firm, such as continuous purchases and recommendations, which are components of customer loyalty (Sprott et al., 2009). CE aims to stimulate customers' voluntary and autonomous contributions (Harmeling et al., 2017). Engaged customers who have an emotional attachment to the firm will bring great value (Bowden, 2009; Sashi, 2012). For example, customers who are passionate about the company are more likely to use this company as their first choice for shopping and recommend it to those around them. Therefore, this study speculates:

H5. CE positively affects customer loyalty.

The five behaviors of RPR can be divided into loyalty programs and mailing list programs (Berry, 1995). Loyalty programs that are positively related to customers' satisfaction and loyalty can lead to lasting economic firm performance (Anderson et al., 1994; Bolton et al., 2000). Mailing list programs linked to direct marketing and permission marketing contribute to customer retention (Tezinde et al., 2002). If customers grant permission to receive promotions, this means that they find the firm trustworthy, and become more loyal to it (Kent and Brandal, 2003). The tactics of relationship programs are vital for omnichannel retailers to achieve performance from long-term relationships (Ashley et al., 2011). For instance, if customers apply for a loyalty card, they will be more inclined to

spend in the company to accumulate membership points. And if customers receive coupons from the company, they will also be willing to share them with friends. Hence, this study hypothesizes:

H6. RPR positively affects positive customer loyalty.

3.4. The mediating role of CE and RPR

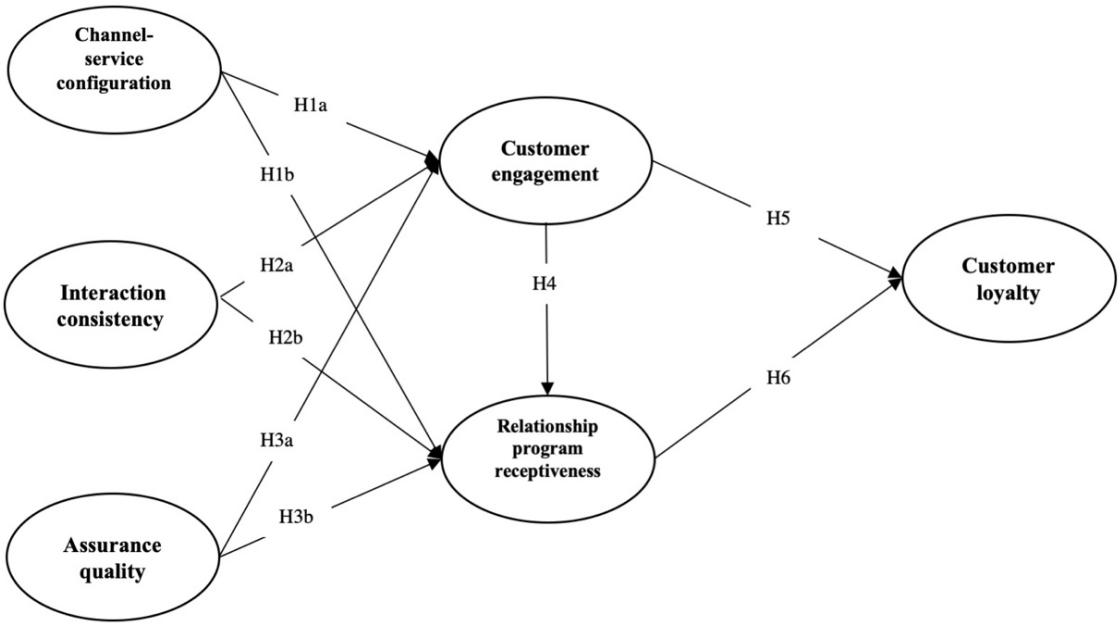
Different from the one-way contact between traditional retailers and their customers, omnichannel retailers can interact with their customers in a holistic manner through various a variety of channels and allow customers to interact with other customers. These interactions will stimulate CE and make customers enthusiastic about the company. As a psychological state, CE often plays the mediating role between customer perception and loyalty (Hapsari et al., 2017; Yen et al., 2020). When faced with retailers with high channel integration, the higher the willingness of customers to engage, the higher the intention of repeat purchase and recommendation in the post-purchase stage. Hence, this study presents the hypothesis:

H7. CE mediates the effect between OCIQ (channel-service configuration (a), interaction consistency (b), assurance quality (c)) and customer loyalty.

The willingness to participate in the relationship programs can be used to predict the positive relationship between customers and companies (Ashley et al., 2011). For some retailers, such as supermarkets and convenience stores, it is not easy to keep long-standing relationships with customers due to the low switching costs. When these retailers become omnichannel retailers, the improvement of channel integration can strengthen customers' impression of the retailer, thereby motivating consumers to participate in the relationship programs. The benefits of the relationship programs are predicted to keep customers loyal to the retailer. Hence, this hypothesis is presented in this study:

H8. RPR mediates the effect between OCIQ (channel-service configuration (a), interaction consistency (b), assurance quality (c)) and customer loyalty.

Figure 1. Conceptual model.



4. Methodology

4.1. Research setting

Selecting an omnichannel retailer that integrates various channels is appropriate to verify the proposed model (Figure 1). Consequently, this study targeted customers from Alibaba's Hema in China. Hema is a supermarket chain owned by Alibaba that merges online and offline shopping experiences (Doctoroff, 2018; Najberg, 2017).

Hema was chosen primarily for its harmonious channel integration. Customers may use the Hema mobile application to scan QR codes for source information on products and pay on Alipay, the payment platform from Alibaba-affiliated Ant Financial (Saiidi, 2018). Another reason for this is that Hema is a representative omnichannel business in the fresh food e-commerce market (Lingyu et al., 2019). The rapid expansion of omnichannel marketing has brought opportunities and challenges to

retailers (Bell et al., 2014; Chen et al., 2018), particularly fresh food e-commerce retailers. With the impact of the COVID-19 outbreak, fresh food e-commerce has gained many new customers who realize the benefit of buying fresh food online-offline. And the retailers hope that these customers will remain after the outbreak is over (Deloitte Research, 2020). Correspondingly, these omnichannel businesses can set up lasting relationships with customers through CE and RPR in the emerging fresh food e-commerce market.

4.2. Data collection

Data for this study was collected through an internet-based questionnaire. Before initiation of data collection, five doctoral students were first asked to comment on the clarity, fluency, and readability of the questionnaire. A pilot test was then conducted with 95 customers who had been excluded from the main survey. The pilot test examined reliability and validity.

The main questionnaire was distributed through Baidu Company, a leading Chinese internet company. Baidu's sampling service can accurately screen out eligible respondents and help avoid potential non-response bias (Gao and Huang, 2019). Baidu sent the questionnaire to 841 real-name members. 406 respondents who had used both the online and offline channels of Hema were screened out and answered the questionnaire. Participants who responded faster than the rate of 2s per item or 52s per page should be eliminated (Huang et al., 2012), thereby according to the response time, 18 responses were deleted. Two respondents aged below 18 years were eliminated, and eight responses were deleted for providing the same rating of all items. Finally, 378 responses were retained. Table 2 presents participants' demographic characteristics.

Table 2 Demographic statistics.

Item	Type	Frequency	Percentage
Gender	Male	162	42.9%
	Female	216	57.1%

Age	18-24	70	18.5%
	25-34	217	57.4%
	35-44	73	19.3%
	45-54	15	4.0%
	55≥	3	0.8%
Education	High school or below	23	6.1%
	Undergraduate degree	338	89.4%
	Graduate degree	17	4.5%
Annual income (RMB)	≤ 49.999	76	20.1%
	50,000 - 99,999	133	35.2%
	100,000 -149,999	104	27.5%
	150,000 - 199,999	36	9.5%
	200.000 - 249.999	15	4.0%
	250.000 - 299.999	9	2.4%
	≥ 300,000	5	1.3%

4.3. Measures

The measurement items of all variables were adapted from the existing relevant literature. Minor modifications were made to suit the context of our study. To measure channel-service configuration and interaction consistency, the items were sourced from Shen et al. (2018) and Lee et al. (2019), and the items of assurance quality were sourced from Hossain et al. (2020). The measurement items for CE and RPR were adopted from Vivek et al. (2014) and Ashley et al. (2011), and measurement items for customer loyalty from Gefen (2002) and Lee et al. (2019). All items were scored on a 7-point Likert scale. The content of each item can be seen in Appendix A.

5. Data analyses

This study considered channel-service configuration and interaction consistency as second-order constructs that were reflected by their constituent dimensions (Lee et al., 2019). As stated by Byrne and Stewart (2006), the estimated factor loadings are constrained to equal at both the first- and second-

order levels. Thus, the second-order constructs were measured by repeating the items of their constituent dimensions.

This study applied partial least squares structural equation modeling (PLS-SEM) to examine the measurement and structural models using SmartPLS3 (Ringle et al., 2015). SmartPLS3 is professional statistical software that can handle all PLS-SEM analysis, including bootstrapping routines that will be carried out in the subsequent analysis (Hair et al., 2017). PLS-SEM allows both reflective and formative variables to appear in the model and is suitable to both normal and non-normal data, making PLS-SEM applicable to this study (Hair et al., 2011).

5.1. Common method bias

As our data were from a sole source, Harman's (1976) single-factor test was carried out to inspect common method bias (CMB). All the items were incorporated in the unrotated exploratory factor analysis. The results displayed that the first factor explained 40.81% of the variance, below 50% (Podsakoff et al., 2003). In addition, there were no exceedingly high correlation values in Table 4, all being below the threshold of 0.90 (Pavlou et al., 2007). Overall, the CMB was improbable in this study.

5.2. Measurement model

The estimations of the measurement model involved reliability and validity, as shown in Table 3 to Table 6. Internal consistency was checked by Cronbach's alpha. All reflective variables transcended the threshold level of 0.70, as advised by Nunnally (1978). The reliability of formative variable was evaluated by examining multicollinearity among the items (Petter et al., 2007) and the variance inflation factor (VIF) values in Table 6 were all beneath 3, which is ideal (Hair et al., 2019). Therefore, our data are reasonably reliable.

Confirmatory factor analysis was applied to verify the convergent and discriminant validity of reflective variables. Item loadings for all reflective variables in Table 3 exceeded 0.70, meeting the

minimum criteria of 0.70 (Hair et al., 2010). Since the scales were adopted from previous literature, content validity was ensured. A composite reliability (CR) of all reflective variables, which was no less than 0.70, and average variance extracted (AVE) above 0.50 were used to confirm the convergent validity in Table 3 (Hair et al., 2010). The square roots of AVE of the latent variables then surpassed all the cross-correlations (Fornell and Larcker, 1981) in Table 4 and the values of the heterotrait-monotrait ratio of correlations (HTMT) in Table 5 were less than 0.85 recommended by Henseler et al. (2015), thereby the discriminant validity of reflective variables was confirmed. According to Petter et al. (2007), the validity of formative variables requires assessment of construct validity. Table 6 illustrated the weights of five items on RPR were significant, confirming the construct validity of the formative variable. In summary, the scales in this study were valid.

Table 3 Measurement model.

Variable	Item	Skewness	Kurtosis	loading	Cronbach's α	CR	AVE
Channel-service choice	CCB1	-0.999	1.622	0.796	0.709	0.837	0.632
breadth	CCB2	-0.461	0.132	0.796			
(CCB)	CCB3	-0.641	0.171	0.793			
Channel-service	CCT1	-0.385	-0.287	0.775	0.712	0.839	0.635
configuration transparency	CCT2	-0.387	-0.285	0.828			
(CCT)	CCT3	-0.504	-0.064	0.787			
Content consistency	CC1	-0.647	0.068	0.808	0.705	0.836	0.629
(CC)	CC2	-0.704	0.373	0.798			
	CC3	-0.816	0.679	0.773			
Process consistency	PC1	-0.671	0.391	0.830	0.836	0.891	0.671
(PC)	PC2	-0.716	0.088	0.829			
	PC3	-0.509	-0.251	0.824			
	PC4	-0.655	0.073	0.792			
Assurance quality	AQ1	-0.846	0.822	0.818	0.811	0.869	0.570
(AQ)	AQ2	-0.755	0.186	0.775			
	AQ3	-0.831	0.445	0.767			
	AQ4	-0.675	0.405	0.702			
	AQ5	-0.568	-0.052	0.708			
Customer Engagement	CE1	-0.762	0.365	0.788	0.934	0.945	0.656
(CE)	CE2	-0.747	0.335	0.823			
	CE3	-0.761	0.309	0.841			
	CE4	-0.750	0.120	0.842			
	CE5	-0.507	-0.036	0.825			
	CE6	-0.668	0.315	0.795			
	CE7	-0.623	-0.210	0.781			
	CE8	-0.927	0.654	0.785			
	CE9	-0.861	0.505	0.806			
Relationship Program	RPR1	-0.735	-0.129	0.820	–	–	–
Receptiveness	RPR2	-0.677	0.139	0.731			
(RPR)	RPR3	-0.628	0.089	0.684			
	RPR4	-0.478	-0.173	0.773			
	RPR5	-0.661	0.394	0.749			
Customer loyalty	CL1	-0.897	0.594	0.801	0.794	0.879	0.708
(CL)	CL2	-0.752	0.529	0.874			
	CL3	-0.926	0.823	0.847			

Table 4 Correlation matrix.

	CCB	CCT	CC	PC	AQ	CE	RPR	CL
CCB	**0.795**							
CCT	0.604***	**0.797**						
CC	0.458***	0.469***	**0.793**					
PC	0.501***	0.464***	0.548***	**0.819**				
AQ	0.552***	0.468***	0.627***	0.550***	**0.755**			
CE	0.499***	0.534***	0.556***	0.555***	0.551***	**0.810**		
RPR	0.546***	0.517***	0.581***	0.600***	0.604***	0.731***	**N/A**	
CL	0.564***	0.512***	0.633***	0.501***	0.666***	0.715***	0.670***	**0.841**

Note: 1. ***: $p < 0.001$

2. The bold values on the diagonal are square roots of AVE.

Table 5 HTMT.

	CCB	CCT	CC	PC	AQ	CE	CL
CCB							
CCT	0.846						
CC	0.648	0.662					
PC	0.646	0.602	0.713				
AQ	0.722	0.613	0.830	0.664			
CE	0.609	0.655	0.683	0.627	0.627		
CL	0.752	0.679	0.845	0.615	0.832	0.824	

Table 6 Reliability and validity of relationship program receptiveness.

	Weights	P-value	VIF
RPR1	0.390*	0.000	1.645
RPR2	0.186**	0.001	1.684
RPR3	0.305***	0.000	1.588
RPR4	0.144**	0.009	1.570
RPR5	0.280***	0.000	1.530

Note: ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

5.3. Structural model

Bootstrapping with 5000 bootstrap samples was applied to examine the structural model (Hair et al., 2011). As illustrated in Table 7, all the reflective paths from the second-order variables to their relevant first-order variables were statistically significant, indicating that these first-order constructs were essential components of their second-order constructs.

Table 7 Second-First order relations.

Second-order	First-order	loading	P-value
Channel-service configuration (CSC)	CCB	0.894***	0.000
	CCT	0.897***	0.000
Interaction consistency (IC)	CC	0.827***	0.000
	PC	0.923***	0.000

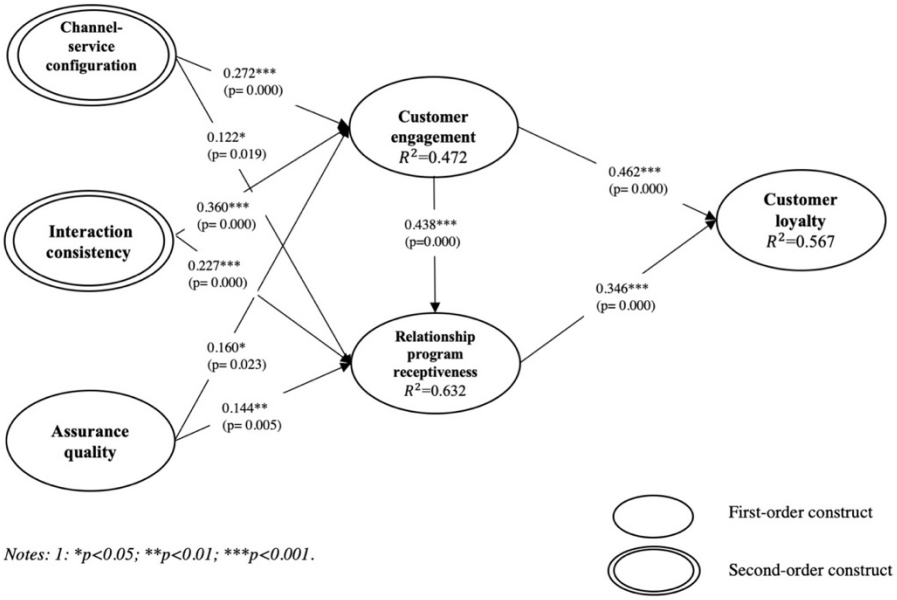
Note: ***: $p < 0.001$.

Figure 2 illustrates the PLS-SEM results. The coefficient of determination (R^2) is a valuable tool for evaluating the predictive accuracy of a structural model, with its value of 0.50 being characterized as moderate, and 0.75 as substantial (Hair et al., 2019). Therefore, the overall variance was explained by R^2, with CE of 0.472, RPR of 0.632, and customer loyalty of 0.567, all close to or greater than 0.50, indicating that our model has moderate explanatory power.

The path coefficients and their statistical significance levels were investigated in hypothesis testing. As a result, channel-service configuration ($\beta = 0.272$, $p < 0.001$), interaction consistency ($\beta = 0.360$, $p < 0.001$), and assurance quality ($\beta = 0.160$, $p < 0.05$) had positive effects on CE, supporting H1a, H2a, and H3a. Furthermore, channel-service configuration ($\beta = 0.122$, $p < 0.05$), interaction consistency ($\beta = 0.227$, $p < 0.001$), and assurance quality ($\beta = 0.144$, $p < 0.01$) positively influenced RPR,

supporting H1b, H2b and H3b. CE significantly and directly affected RPR (β = 0.438, p < 0.001), which supported H4. Finally, CE positively influenced customer loyalty (β = 0.462, p < 0.001), while RPR positively influenced customer loyalty (β = 0.346, p < 0.001). Thus, H5 and H6 were confirmed.

Figure 2. PLS results.



The mediating effects of CE and RPR were checked by bias-corrected percentile bootstrapping at a 95% confidence interval. As the confidence interval does not contain zero (Preacher and Hayes, 2008), the testing results in Table 8 verified that the mediating effect of CE is significant between channel-service configuration (β = 0.126, p < 0.01), interaction consistency (β = 0.166, p < 0.001), assurance quality (β = 0.074, p < 0.05) and customer loyalty, respectively. The mediating effect of RPR between channel-service configuration (β = 0.042, p < 0.05), interaction consistency (β = 0.079, p < 0.01), assurance quality (β = 0.050, p < 0.05) and customer loyalty, respectively, was significant. Hence, H7 and H8 were supported.

Table 8 Indirect effects.

Indirect effect path	β	Lower	Upper	P-value
H7a: CSC → CE → CL	0.126	0.065	0.213	0.001**
H8a: CSC → RPR → CL	0.042	0.007	0.089	0.046*
H7b: IC → CE → CL	0.166	0.100	0.261	0.000***
H8b: IC → RPR → CL	0.079	0.040	0.131	0.001**
H7c: AQ → CE → CL	0.074	0.014	0.146	0.027*
H8c: AQ → RPR → CL	0.050	0.013	0.100	0.029*

Note: ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

6. **Discussion and implications**

The analysis results support all of our hypothesized relationships among the three dimensions of OCIQ, CE, RPR, and customer loyalty in omnichannel retailing. Channel-service configuration and interaction consistency positively influence CE and RPR, validating the proposition made by previous research that the firm-related factors of omnichannel retailing are responsible for the establishment of customer-initiated and firm-initiated CE (Kumar et al., 2019; Lee et al., 2019). The findings also demonstrate that assurance quality, as a crucial component of OCIQ, positively affects CE and RPR. This finding coincides with the proposition confirmed by the prior literature, that trust, as reflected in assurance quality, drives customer response (Kosiba et al., 2018; Roy et al., 2018; Thakur, 2018).

The findings also indicate that CE as a psychological state is suggested as an important antecedent for its behavioral aspects represented by RPR, which has not been explored in previous research to our knowledge. Furthermore, our findings reveal that CE and RPR are essential determinants of customer loyalty, supporting the findings of past studies (Anderson et al., 1994; Chan et al., 2014; Lee et al., 2019). And the findings of CE and RPR as mediators meet previous research (Ashley et al., 2011; Hapsari et al., 2017; Thakur, 2018). Therefore, these results advocate that omnichannel retailers should focus on improving channel integration quality and encourage customers to engage in their activities, which is conducive to keeping a lasting relationship with customers and penetrating customers' networks (Brodie et al., 2019).

6.1. Theoretical implications

This study has some theoretical contributions as follows. First, this study contributes to the literature on omnichannel retailing by adding assurance quality into OCIQ as a crucial antecedent of CE and RPR. Most previous studies on channel integration quality has focused on channel-service configuration and interaction consistency (Shen et al., 2018; Le and Nguyen-Le, 2020). Limited research in the context of banking services has confirmed that assurance quality is the primary dimension of OCIQ (Hossain et al., 2020). However, since omnichannel retailers use digital technologies to broaden their channels, customers' personal information is required in omnichannel retailing. It is essential to convey a sense of safety and trust for customers (Quach et al., 2020; Roy et al., 2018; Thakur, 2018), and therefore, this study takes assurance quality into account. The effects of assurance quality on CE and RPR was then underpinned. In addition, channel-service configuration and interaction consistency also directly affect CE and RPR. In this regard, this study supplements the gap in solving the impact of OCIQ on customer response by verifying the positive influence of OCIQ on CE and RPR.

Second, while previous studies have tested CE as a psychological state with multiple dimensions or from a behavioral aspect only (Chen et al., 2019; Lee et al., 2019), this study separates the behavioral aspect from CE as a new construct represented by RPR theoretically (Ashley et al., 2011; Bruneau et al., 2018). Furthermore, this study provides empirical evidence that CE is an important antecedent of RPR. The knowledge gained will help to better understand CE in the expanded domain of relationship marketing. It is also crucial to note that building and maintaining a long-term firm-customer relationship is the ultimate goal for retailers (Kang, 2018; Shen et al., 2018; Simone and Sabbadin, 2017). In this respect, this study highlights the importance of focusing on RPR as a firm-initiated CE. It is further proposed that future research can explore the relationship between CE and RPR in different contexts.

Third, this study advances insight into the roles of CE and RPR as drivers of customer loyalty in omnichannel retailing. Customer loyalty has always been regarded as a cognitive outcome in omnichannel literature, and much research has focused on the relationship between customer experience and customer loyalty (Mainardes et al., 2020; Quach et al., 2020; Tyrväinen et al., 2020). However, it should be noted that the difference between CE and customer experience is that CE is regarded as a continuous state (Brodie et al., 2011). Accordingly, this study expands the literature on consumer behavior in the post-purchase stage by emphasizing the impact of CE and RPR on customer loyalty. Furthermore, this study finds the CE and RPR act as mediators in the relationships between OCIQ and customer loyalty. In particular, this study fills the gap that the mediating role of RPR has not yet been explored. It is worth noting that both psychological and behavioral CE play a central role in omnichannel retailing.

6.2. Managerial implications

This study gives a few suggestions to the retailers interested in the development of omnichannel retailing. This study discovers that both psychological and behavioral CE are facilitated by integration quality in omnichannel, suggesting that retailers should adopt an omnichannel strategy to create seamless and fluent customer experiences. Retailers who manage an omnichannel strategy should broaden the scope of their channels and ensure transparency of services across multiple channels. Moreover, consistency of interactions should also be managed, as they are important elements of an omnichannel strategy. For retailers, highly integrated channels are not enough. They also should let customers know how many channels are available and how to operate multiple channels. In this regard, retailers need to do "channel promotion" to establish the link between channels. For example, have salespersons promote online store campaigns in physical stores, or use online stores to share QR codes of mobile applications or account links on social platforms.

In the process of informatization and digitization, retailers and customers are always faced with security and privacy issues. Especially in omnichannel retailing,

assurance of privacy, security and service recovery can help create a trustworthy environment in which customers are willing to give retailers access to their customers' personal information and track their movements. Alibaba is a great example of how to protect modern digital environments by providing a complete zero-trust security solution based on the principle of "never trust, always verify" (Kindervag, 2020). The high levels of channel integration facilitate customers to engage in all aspects of the retailer's business, and as a result, customers plan to buy back and recommend the retailer to others in their networks.

Furthermore, as the importance of CE and RPR in omnichannel retailing is confirmed in this study, it is recommended that retailers develop CE and RPR in customer management. In this regard, retailers can cultivate influencers on social platforms to increase CE through customer-to-customer interaction. Retailers should also support customer-initiated CEs by developing online communities, such as Sina Weibo, Facebook, or YouTube, to encourage customers to build blogs and share their experiences (Vivek et al., 2012). Besides, retailers should support firm-initiated CE by applying customer relationship marketing tactics. Since not all relationship programs can attract customers, retailers should use emerging technologies to develop more relationship programs and provide additional benefits through relationship programs. For example, sending coupons via mobile app notifications or providing a personalized service experience according to customers' browsing and shopping patterns in physical stores and on websites (Ashley et al., 2011).

6.3. Limitations and future research

Although this study contributes to the research on CE, RPR and omnichannel, it also has several limitations. First, the sample in this study was from China and focused on omnichannel retailing in fresh food supermarkets. The generalizability of this study to other cultures and retail formats (e.g., department stores and convenience stores) should be cautious. Future studies can assess other retail formats of omnichannel retailing. Second, this study only identified three dimensions of OCIQ as significant

antecedents of CE and RPR. In addition to OCIQ, future research should explore other antecedents, such as seamless customer experience or brand interaction. Third, this study did not discuss the effects of different types of customers on the theoretical model. However, customers are so complicated that this study suggests future research use demographic or psychographic factors to distinguish customers.

6.4. Conclusions

This study verified the relationships among three dimensions of OCIQ, CE, RPR and customer loyalty. The findings exposed the positive influences of channel-service configuration, interaction consistency and assurance quality on CE and RPR, which consequently impacted customer loyalty. The positive impact of CE on RPR was confirmed. Additionally, the mediating role of CE and RPR between OCIQ and customer loyalty was explored. These results provided theoretical and practical implications for clearly distinction between the customer-led and firm-led aspects of CE that are of great significance to an omnichannel strategy.

Appendix A

Channel-service choice breadth (Shen et al., 2018; Lee et al. 2019)

CCB1: I can buy products through multiple channels.

CCB2: I can acquire technical support through multiple channels.

CCB3: I can provide feedback about the products through multiple channels.

Channel-service configuration transparency (Lee et al. 2019; Shen et al., 2018)

CCT1: I know the differences in services through different channels.

CCT2: I am familiar with the services of all channels.

CCT3: I can complete the preferred tasks through various channels.

Content Consistency (Lee et al. 2019; Shen et al., 2018)

CC1: The product prices are consistent across different channels.

CC2: Hema provides consistent promotion information across different channels.

CC3: Hema provides consistent product information across different channels.

Process Consistency (Lee et al. 2019; Shen et al., 2018)

PC1: The levels of customer service are consistent across different channels.

PC2: The service images are consistent across different channels.

PC3: The feelings of service are consistent across different channels.

PC4: The channels have consistent performance in the speed of service delivery.

Assurance quality (Hossain et al., 2020)

AQ1: My personal information across different channels is protected.

AQ2: My personal information across different channels is not shared with others.

AQ3: My financial information across different channels is not shared with others.

AQ4: All the channels of Hema have enough security features.

AQ5: Hema provides the means whereby I can express my complaints.

Customer engagement (Vivek et al., 2014)

CE1: I pay much attention to anything about Hema.

CE2: Anything related to Hema catches my attention.

CE3: I enjoy spending time on Hema.

CE4: I spend a lot of discretionary time on Hema.

CE5: I try to fit Hema into my schedule.

CE6: My days would not be the same without Hema.

CE7: I am passionate about Hema.

CE8: I enjoy shopping in Hema more when I am with others.

CE9: I love talking about Hema with my friends.

Relationship Program Receptiveness (Ashley et al., 2011)

RPR1: How likely are you to obtain a credit card from Hema?

RPR2: How likely are you to add yourself to Hema's mailing list to receive an announcement, coupons, etc.?

RPR3: How likely are you to obtain a loyalty card from Hema?

RPR4: How likely are you to mail in a rebate offer to Hema?

RPR5: How likely are you to add yourself to Hema's e-mail list to receive announcements, coupons, etc.?

Customer loyalty (Gefen, 2002; Lee et al., 2019)

CL1: Unless there are any unexpected reasons, I plan to continue buying from Hema like always.

CL2: I encourage friends to shop in Hema.

CL3: I recommend Hema to everyone who seeks my advice.

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