



The quality of physical–electronic hybrid services and its impact on customer loyalty

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Abstract

The hybridization of in-person service and e-service has become increasingly prevalent in the marketplace during the past decade, but its consequences on consumer behavior are still underexplored in academic research. This paper examines the impacts of physical and electronic service quality on customers' offline and online loyalty. Results from an experimental study suggest that service quality affects customer loyalty within and across channels. In addition, we find cross-channel quality inconsistency of the provider and consumers' channel use pattern moderate the impact of physical and electronic service quality in different ways. The findings provide implications on customer relationship management for increasingly digitalized service providers.

Keywords Physical–electronic hybrid service · Service quality · Electronic service · Customer loyalty

1 Introduction

Advances in information technology have drastically changed the form of service delivery (Pinto 2015). One key feature of this change is the replacement of interpersonal interactions in service encounters with the frequent use of technology (Lee and Lee 2020). Human–human interactions are increasingly substituted by human–technology interactions, although the degree of the shift varies across different industries. Today, many experience-based services still heavily rely on face-to-face communication in the creation and delivery of services, such as school

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education, barbershops, and bars. In some information-based service operations, however, the production and consumption of services can be facilitated entirely by interacting with electronic devices. For instance, the smartphone has become a more convenient means of paying utility bills or purchasing music than a local service center or music store. At the same time, a hybridized version of service that relies on both human–human interactions and human–technology interactions has emerged in recent years. In hybrid services, human–human interactions and human–technology interactions may occur synchronously or asynchronously along the service value chain (Nasr et al. 2012) and are complementary and indispensable (Ganguli and Roy 2010). Examples of hybrid services include in-restaurant digital menus and mobile ordering and ride-sharing services such as Uber and Lyft.

Service providers nowadays take advantage of combining different means to connect with customers, including branch offices, retail stores, telephones, call centers, ATMs, and websites (Seck and Philippe 2013). The Internet, given its advantages of searching and communicating information and increased mobility, has been increasingly popular and has become a decisive factor in enhancing service efficiency (Kim et al. 2019). Integrating with traditional channels, the Internet creates even more business opportunities, which drives the service industry’s online and offline fusion. As a result, marketers have witnessed changes in customer behavior caused by the incorporation of human- and technology-dominant service channels. “Hybrid customers” expect a consistent and seamless experience between physical and electronic environments. Accordingly, they form an overall assessment of the service provider, which draws attention to the development of physical–electronic hybrid service quality. Thus, it is beneficial for service providers to understand how the service quality of hybrid experiences affects customer perception of the brand and product and identify strategies for improving services in both online and offline operations (White et al. 2013).

In a multichannel context, each independent channel influences the user’s attitude toward the service provider (Kwon and Lennon 2009). Any discrepancy in service quality across channels may affect the link between service quality and customer relationships (Liao et al. 2011). Despite the theoretical frameworks proposed in conceptual papers (e.g., Sousa and Voss 2006; Banerjee 2014; Gao et al. 2020), there is limited empirical research on whether and how physical and electronic channel integration affects marketing outcomes (Gao et al. 2020). Among the limited studies, Herhausen et al. (2015) studied how online–offline channel integration affects perceived service quality and perceived risk of an Internet store and subsequent influences on consumers’ search intention, purchase intention, and willingness to pay on the Internet and at physical stores. Rizwan and Ahmad (2020) examined the impact of offline service quality, satisfaction, and trust on online repurchase intention with online service quality, satisfaction, and trust as mediators and channel integration as a moderator. However, the existing research on service quality in multichannel integration lacks consideration of consumer heterogeneity and critical constructs of consumer psychology, such as customer loyalty, in the cross-channel context. To better understand the impact of service quality in the context of physical–electronic hybrid service, in this paper, we identify the customer perceived value and relationship quality as mediating variables in the process of physical–electronic hybrid service

quality affecting online and offline customer loyalty and propose the moderating effect of multichannel characteristics (cross-channel quality inconsistency) and customer heterogeneity characteristics (channel usage pattern). We not only develop a theoretical model of the psychological mechanism of physical–electronic hybrid service quality but also provide managerial implications for physical–electronic hybrid service enterprises to improve the customer loyalty.

The rest of this paper is organized as follows: Sect. 2 describes the theoretical background of the research model and presents the research model and proposes relevant research hypotheses. Section 3 addresses the research methodology and discusses the analysis results. Section 4 concludes with a discussion on theoretical and practical implications and describes limitations and avenues for future research.

2 Theoretical framework and hypotheses development

2.1 Hybrid service quality and customer loyalty

Physical–electronic hybrid service is essentially a combination of human- and technology-dominant services provided by the same firm. It refers to the overall service quality that customers experience via human–human interactions and human–technology interactions. Given the definition, we decompose physical–electronic hybrid service quality into three aspects: physical service quality, electronic service quality, and integrated service quality (Sousa and Voss 2006; Gao et al. 2020). First, physical service quality is the quality perception generated through face-to-face interactions with service personnel in physical settings. The service encounter is characterized as "more contact and less technology" (Bitner et al. 2000). Second, electronic service quality reflects the consumer experience of human–technology interactions, typically through mobile apps, websites, and other user interfaces. Lastly, integrated service quality represents the ability to deliver a seamless customer experience through physical and electronic channels. In this study, we consider the physical and electronic service quality serves as the primary influencer of customer loyalty, and integrated service quality (reflected by cross-channel quality inconsistency) plays a moderating role.

Much of past research has shown that service quality leads to customer loyalty in a single-channel environment (e.g., Baker et al. 1994; Gotlieb et al. 1994; Parasuraman et al. 1985). The expansion and migration from a single channel to multiple ones can generate synergies, but only when different channels interact and reinforce each other to create a set of touchpoints that connect customers with the service provider (Fornari et al. 2016). Multichannel integration refers to the degree of coordinating goals, designs, and scheduling among different channels (Cao and Li 2015). Herhausen et al. (2015) show that online–offline channel integration can improve overall (retailer level) and electronic channel output. The joint effort of physical and electronic service operations from channel integration enriches the customer experience with retailers, enhances the retailer's brand image, and fosters customer loyalty in both channels (Kwon and Lennon 2009). Therefore, we expect that physical–electronic hybrid service providers' online service quality not only improves customers'

online loyalty but also spills over to offline loyalty enhancement and vice versa. Based on the discussion above, we propose the following hypotheses:

H₁: Physical service quality of physical–electronic hybrid service providers has positive impacts on both online and offline customer loyalty.

H₂: Electronic service quality of physical–electronic hybrid service providers has positive impacts on both online and offline customer loyalty.

2.2 The moderating effects of cross-channel quality inconsistency and channel use pattern

2.2.1 Cross-channel quality inconsistency

In a multichannel context, each channel has an impact on the user's attitude toward the service provider (Kwon and Lennon 2009). The physical and electronic channel user experiences are related to each other, which affects the user's attitude toward the service provider (Van Birgelen et al. 2006). Users transfer between channels to consider which channel can meet their needs better (Weisberg et al. 2011). In physical–electronic hybrid services, cross-channel quality inconsistency occurs when the consumer perception of physical and electronic service quality is different. A discrepancy in cross-channel quality may lead to customer disappointment and frustration with service providers (Van Birgelen et al. 2006) and affect electronic customer relationships (Liao et al. 2011). Rangaswamy and Van Bruggen (2005) also suggest that one of the challenges in multichannel marketing is the inconsistency across channels, including asymmetric information and responses. Few studies have examined the impact of cross-channel quality inconsistency on customer behavior. Although Liao et al. (2011) find that quality inconsistency has different influences on electronic services quality and customer relationships, it is still unclear how cross-channel quality inconsistency affects consumers' cross-channel loyalty toward hybrid service quality.

In this study, we suggest that the moderating effects of cross-channel quality are twofold. On the one hand, cross-channel quality inconsistency mitigates the spill-over effects of service quality in one channel on customer loyalty in another channel. This is because consumers take past experiences with the service provider as a reference point and expect similar ones through any other channels (Madaleno et al. 2007; Simons and Bouwman 2006; Van Birgelen et al. 2006). But consumers could not do so when they find a gap between the online and offline service quality, which leads to the following hypotheses:

H₃: (a) Cross-channel quality inconsistency negatively moderates the impacts of physical service quality on online loyalty.

(b) Cross-channel quality inconsistency negatively moderates the impacts of electronic service quality on offline loyalty.

On the other hand, cross-channel quality inconsistency strengthens the direct effects of service quality on customer loyalty within a single channel. In order to reduce uncertainty in their purchases, consumers would rely more on the channel they have a good experience with when there is a discrepancy in service quality between channels. Thus, we propose the following hypotheses:

- H₄:** (a) Cross-channel quality inconsistency positively moderates the impacts of physical service quality on offline loyalty.
(b) Cross-channel quality inconsistency positively moderates the impacts of electronic service quality on online loyalty.

2.2.2 Channel use pattern

Physical–electronic hybrid customers frequently switch between electronic and traditional channels to communicate their needs and receive services (Kumar and Venkatesan 2005). Studies show that online customers are highly heterogeneous (Boyer and Frohlich 2006). In hybrid services, customer heterogeneity in channel use patterns is often reflected by electronic channel dependence, i.e., the proportion of customers' online interactions within the whole service interactions (Sousa 2012), ranging from customers with limited use of electronic channels (highly dependent on traditional channels) to electronic-oriented customers (increasing reliance on electronic channels and reducing dependence on conventional channels).

In multichannel management, customer segmentation is largely based on different channel use patterns (Neslin and Shankar 2009), given the differences in customers' responses to various channels. Compared to others, customers with a high electronic channel focus have stronger preferences for online channels, as they regard other channels as complementary rather than an alternative. Therefore, we expect that when consumers are highly dependent on the e-channel, their offline loyalty is less sensitive to changes in service qualities, and thus we propose the following hypotheses:

- H₅:** (a) Electronic channel dependence negatively moderates the impacts of physical service quality on offline loyalty.
(b) Electronic channel dependence negatively moderates the impacts of electronic service quality on offline loyalty.

However, consumers' online loyalty is more sensitive to changes in service qualities as their electronic channel dependence increases, which leads to the following hypotheses:

- H₆:** (a) Electronic channel dependence positively moderates the impacts of physical service quality on online loyalty.
(b) Electronic channel dependence positively moderates the impacts of electronic service quality on online loyalty.

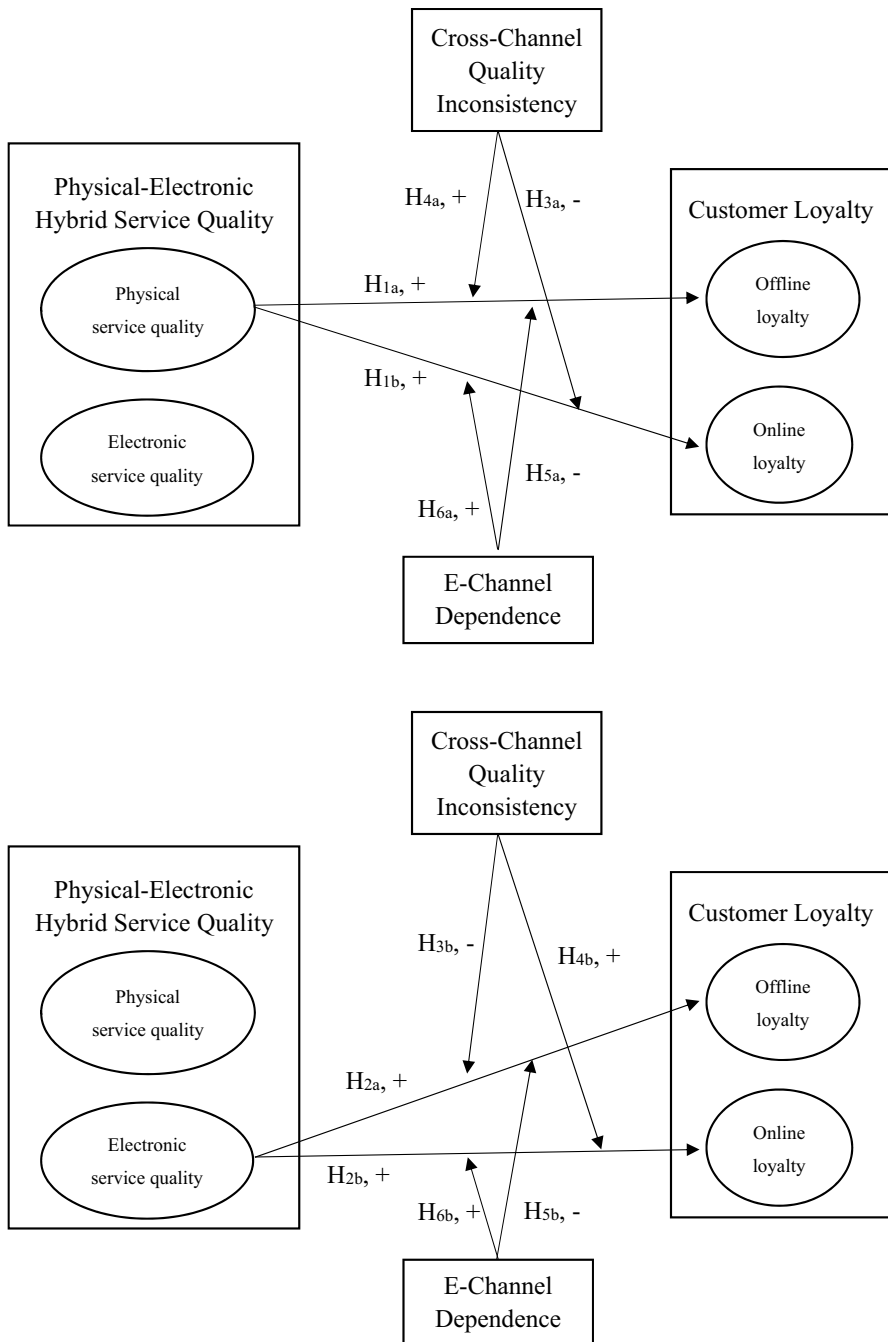


Fig. 1 Conceptual framework and research hypotheses

We illustrate the conceptual framework and proposed hypotheses in Fig. 1.

3 Methodology

3.1 Overview

We designed a random assignment experiment to further validate the results. We tested the main effects of physical–electronic hybrid service quality and the moderating effects with a $2 \times 2 \times 2 \times 2$ between-subjects design. The four manipulation factors were service scenario (physical/electronic), service quality (low/high), cross-channel inconsistency (low/high), and channel use pattern (low/high e-channel dependence). 319 Amazon Mechanical Turk workers participated in the experiment. The product class of apparel was used because its purchasing experience can be online, offline, or hybrid and because the product was relevant to most consumers.

Subjects who participated in this study were told that we were interested in their shopping experience with a hypothetical multichannel clothing retailer called Ealing. This description contained the cross-channel inconsistency manipulation. They were then asked to imagine themselves engaged in a shopping experience with the retailer, which contained the service scenario, service quality, and channel use pattern manipulations. Next, subjects' online and offline loyalty toward the retailer was measured, followed by manipulation checks. The entire procedure took less than 15 min.

3.2 Manipulations

3.2.1 Service quality

For service quality, we created two scenarios for physical and electronic service with high- and low-quality descriptions.

3.2.2 Scenario 1: Physical service quality

“On Saturday, you go to a mall to buy clothes. [High quality]: You notice a store of Ealing with appealing facilities. After entering the store, you find that it is clean and tidy, the layout is simple and logical, and the employees greet you warmly and offer timely help when you need it. When checking out, you discover that there is an in-store-only discount. [Low quality]: After entering a store of Ealing, you find that the store is cluttered and unclean, the layout is complex and confusing, and the employees are difficult to find and unable to help when you need.”

3.2.3 Scenario 2: Electronic service quality

“On Saturday, you go online to buy clothes. [High quality]: After entering Ealing's online store, you find that it is easy to navigate through searching and product categories. The interface is simple and beautifully designed and responds quickly. There is a statement addressing the store's dedication to protecting consumers' privacy.

The product information for each item is comprehensive, including delivery, material, and color. When checking out, you find the payment system is convenient and secure. [Low quality]: After entering Ealing's online store, you find that it is difficult to navigate the website. The interface is cluttered and awkwardly designed and responds slowly. Some product information, including delivery, material, and color is incomplete."

3.2.4 Cross-channel inconsistency

The cross-channel inconsistency manipulation was contained in the description of the retailer. Ealing was stated as a popular multichannel clothing retailer introduced to the market in recent years. In the high inconsistency condition, the participant read, "from what you have heard about Ealing. The service qualities are very different for its online and offline stores." In the low inconsistency condition, the participant read, "from what you have heard about Ealing. The service qualities are very similar for its online and offline stores."

3.2.5 Channel use pattern

The manipulation of channel use patterns was introduced after the service quality scenarios. In the high electronic dependence condition, participants were asked to "imagine that due to certain uncontrollable forces, you find it much easier for you to shop online than visit a physical store." In the low electronic dependence condition, participants were asked to "imagine that due to certain uncontrollable forces, you find it much easier for you to shop in a physical store than online."

3.3 Measures

3.3.1 Manipulation checks

Perceptions of manipulated variables were measured with scales used in the existing literature. Physical service quality refers to the service quality perception, which was generated in the face-to-face interaction with service personnel in physical channels (Sousa and Voss 2006). Six items were used to measure this construct of physical service quality based on ones previously developed by Parasuraman et al. (1985). Electronic service quality focuses on human–technology interactions, and six items were used to measure this construct, based on items from Parasuraman et al. (2005). Cross-channel quality inconsistency occurs when service quality perception of different channels varies. Three items from Liao et al. (2011) were used to measure this construct. Channel usage pattern is described as the degree of focus on the Internet (DFI), i.e., the proportion of total service interaction completed by customers through Internet channels. Three items were used to measure this construct based on items from Sousa (2012).

Table 1 Latent variables and items for measurement

Latent variable	Items
Physical service quality	The shop facilities are attractive The shop is clean and tidy Store layout and display make it easy for customers to find what they want The store's promotion is a pleasant surprise The store provides timely and accurate service, and the service process is convenient The store is quick to deal with customer complaints
Electronic service quality	The website can protect my privacy from being leaked It is safe to make electronic payments on the site The interface is simple and beautifully designed The website can respond quickly The website provides full shopping information, such as delivery time, purchase conditions, etc The goods/services provided on this site are consistent with the goods/services described on this site
Cross-channel quality inconsistency	I feel that the physical service quality of the retailer is better than the electronic service quality I feel the electronic service quality of the retailer is better than the physical service quality I feel that the physical service quality of the retailer is close to the electronic service quality
Electronic channel dependence	I prefer to use electronic stores of multichannel retailers over physical stores I shop more frequently at multichannel retailers' e-stores than in their physical stores In multichannel retail transactions, the proportion of my transactions through electronic stores is larger This shop is reliable I have confidence in future of this shop
Online loyalty	The electronic store of the multichannel retailer has a strong attraction for me I will also shop at the retailer's electronic store in future I would like to recommend the retailer's electronic store to my friends
Offline loyalty	I would like to recommend the physical store to others I will buy the products of the physical store first I will continue to buy products from this physical store in future

3.3.2 Dependent measures

Three items were used to measure online loyalty, and three items were used to measure offline loyalty from Gremler and Brown (1996). In the questionnaire design, we adopted the 7-point Likert scale, in which “1” represents “totally disagree” and “7”

Table 2 Regression results of the main effects of service quality on customer loyalties and moderating effects

DV	Physical service channel				Electronic service channel						
	Offline loyalty		Online loyalty		Offline loyalty		Online loyalty				
	Main effect	Moderating effects	Main effect	Moderating effects	Main effect	Moderating effects	Main effect	Moderating effects			
Service quality	0.727*** (0.047)	1.143*** (0.191)	0.561*** (0.161)	-0.085 (0.229)	-0.205 (0.176)	0.401*** (0.051)	0.965** (0.469)	0.371*** (0.194)	0.718*** (0.047)	0.257 (0.438)	-0.115 (0.156)
Cross-channel inconsis		-0.561*** (0.178)		0.117 (0.214)			-0.715* (0.424)			0.320 (0.396)	
Service Qual- ity × Cross- channel inconsis		0.078** (0.033)		-0.089*** (0.039)			0.098 (0.077)			-0.073 (0.072)	
E-channel depend			-0.253* (0.148)		0.093 (0.162)			0.393*** (0.163)			-1.054*** (0.132)
Service qual- ity × E-chan- nel depend			0.039 (0.029)		0.084*** (0.032)			-0.024 (0.032)			0.176*** (0.026)
Intercept	1.635*** (0.264)	-1.415*** (1.025)	2.726*** (0.734)	3.816*** (1.229)	3.547*** (0.803)	3.557*** (0.051)	-0.564*** (2.575)	2.285*** (0.869)	1.752*** (0.264)	3.779 (2.403)	6.686*** (0.701)
R ²	0.598	0.632	0.605	0.416	0.692	0.279	0.327	0.358	0.599	0.608	0.720
F value	233.167***	88.775***	79.397***	36.768***	47.550***	60.870***	25.203***	28.843***	234.801***	80.069***	132.984***

Reporting regression coefficients with corresponding standard error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

represents “strongly agree.” We then pretested the questionnaire with three researchers experienced in service marketing research and modified the items. A list of all measures used in this study is presented in Table 1.

3.4 Subjects

Subjects were 319 workers recruited from Amazon Mechanical Turk and were randomly assigned to the 16 treatments. Cell sizes were 19 to 21.

3.5 Results

3.5.1 Manipulation checks

We checked the effectiveness of the manipulations by comparing the participants’ perceptions of the independent variables. We found the experiment manipulation successful on three variables, i.e., physical service quality ($t=3.11$, $p<0.01$), electronic service quality ($t=3.25$, $p<0.01$), cross-channel quality inconsistency ($t=3.74$, $p<0.01$), but unsuccessful on electronic channel dependence ($t=1.27$, $p>0.20$). This may be because channel use mode measures a long-term consumer shopping habit, and the manipulation was not enough to change the subjects’ preferences. Thus, to account for the respondents’ heterogeneity, we used the measured independent variables in the following analysis.

3.5.2 Hypotheses

Table 2 shows the regression results. First, we found that physical service quality exerted a significant positive impact on offline loyalty ($t=15.27$, $p<0.01$) and online loyalty ($t=7.81$, $p<0.01$), respectively. The impact of electronic service quality on offline loyalty ($t=7.80$, $p<0.01$) and online loyalty ($t=15.32$, $p<0.01$) was also positive and significant. Thus, H_1 and H_2 were supported.

Second, the negative and significant interactive effect between physical service quality and cross-channel quality inconsistency in model 5 of Table 2 ($\beta=-0.089$, $p<0.01$) suggested that cross-channel quality inconsistency negatively moderated the impacts of physical service quality on online loyalty. Thus, H_{3a} was supported. The positive and significant interaction between physical service quality and cross-channel quality inconsistency in model 2 ($\beta=0.078$, $p<0.02$) suggested that cross-channel quality inconsistency positively moderated the impacts of physical service quality on offline loyalty. Thus, H_{4a} was supported. However, we did not find evidence supporting H_{3b} and H_{4b} from model 8 and 11. This indicated that consumers’ loyalty built on electronic service quality did not depend on the quality inconsistency between online and offline channels as expected.

Third and lastly, we found the interaction between physical service quality and e-channel dependence in model 6 to be positive and significant ($\beta=0.084$, $p<0.01$),

implying that e-channel dependence positively moderated the impacts of physical service quality on online loyalty. Similarly, the interaction between electronic service quality and e-channel dependence in model 12 was positive and significant ($\beta=0.084$, $p<0.01$), implying that e-channel dependence positively moderated the impacts of electronic service quality on online loyalty. Thus, H_6 was supported. However, we did not find evidence supporting H_5 from models 3 and 9. This suggests that consumers' offline loyalty built on physical or electronic service quality did not depend on their channel preferences as expected.

4 Discussion

This paper theoretically constructs and empirically examines a model to analyze the impact of service quality on offline and online loyalty in a hybrid service context. For the hypothesized main effects, the empirical results show that physical service quality and electronic service quality have significant positive impacts on consumers' online and offline loyalty. Moreover, for moderating effects, we find that cross-channel quality inconsistency negatively moderates the impact of physical service quality on online loyalty and positively moderates the impact of physical service quality on offline loyalty. On the other hand, electronic channel dependence positively moderates the impacts of physical service quality and electronic service quality on online loyalty.

4.1 Theoretical contribution

This study's contributions to the service marketing literature are twofold. First, our research generalizes the theory of service quality and customer loyalty from the context of single channel to multichannel. As the existing studies mainly analyze the influence of hybrid service quality from the perspective of overall loyalty or single-channel loyalty, this paper decomposes hybrid service loyalty into online loyalty and offline loyalty. The results suggest that the influence of service quality in one channel can spill over to another channel in the hybrid service context. Second, this study identifies two critical moderators, i.e., cross-channel quality inconsistency and electronic channel dependence. Interestingly, their moderating effects are asymmetric for online and offline channels. Cross-channel quality inconsistency only moderates the impact of *physical* service quality on both online and offline loyalty, while electronic channel dependence only moderates the impact of both physical and electronic service quality on *online* loyalty.

4.2 Managerial implication

Our study suggests that hybrid service enterprises should not only improve service quality in different channels but also strengthen channel integration quality. In

hybrid services, physical service quality is still an important driver of online and offline loyalty. Service enterprises ought to strengthen the facility construction of the physical stores, enrich the types of products and services, improve service recovery measures, and create a reassuring environment for the consumption experience. On the other hand, companies should actively protect consumer privacy and online transaction security, design an intuitive and appealing website interface, optimize website shopping navigation, timely handle customer complaints, ensure that the products delivered are intact and are consistent with the description posted on the website, and provide customers with professional purchasing advice and guidance online.

From the moderating effect of cross-channel quality inconsistency on physical service quality, we suggest companies that are traditionally operated solely offline pay extra attention to their service consistency when transiting to a hybrid business. While supporting online order and offline pickup, return, replacement, and maintenance, service enterprises should ensure the consistency of commodity information, price, promotion policies, and brand image between online and offline stores, and actively promote the awareness of alternative service channels on both online and offline stores. Adopting more advanced image interactive technologies such as 360-degree product images, 3D virtual models, and augmented reality in the electronic channel can further help reduce inconsistencies in consumer perception on products (Kim et al. 2007; Yim et al. 2017). Moreover, digital in-store technologies, such as magic mirrors with augmented reality and interactive game terminals can also help lessen the boundaries between classical in-store atmospherics and e-atmospherics (Poncin and Minoun 2014).

The moderating role of customer's channel use pattern that influences online loyalty suggests that driving online loyalty among online-oriented customers may take advantage of offline presence by introducing offline to online retention mechanisms are provided, such as presenting customers QR codes linking to business websites and social media account, creating online customer accounts, and signing up email lists during or after physical services. Hybrid service enterprises may better segment their online customers into different groups according to their channel use patterns. For example, hybrid service providers can develop a recommendation system by making use of the internal data of customer online and offline activities (Chung et al. 2016). For the purpose of enhancing customer experience, the recommendation system can not only personalize product offerings but also how and where each customer learns about, purchases, and receives the products (Herhausen et al. 2015; Ryu et al. 2020).

4.3 Limitations and further research

The results of our study need to be interpreted in consideration of certain limitations. First, a potential shortcoming of this study is the use of a limited sample from Amazon Mechanical Turk. Future research can further collect data from lab and field experiments to improve the internal validity of the results.

Second, the experiment scenario was limited to the clothing retail industry. We believe that the findings can be generalized to other hybrid services, such as banking and telecommunication. However, caution must be exercised in extending the conclusions of this study to other services. Future research may test our proposed model in different hybrid service industries, considering industrial characteristics.

Finally, our study's focus lies on the impacts of hybrid service quality on online and offline loyalty. Future research may discuss the relationship between hybrid service quality and other non-customer behavior variables, such as corporate profits, brand value, and social welfare. Future research can also enrich moderating variables between hybrid service quality and customer loyalty, such as cross-channel service experience and consumer psychological traits.

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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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