



Article

Demystifying the Combined Effect of Consistency and Seamlessness on the Omnichannel Customer Experience: A Polynomial Regression Analysis

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Abstract: Although channel consistency and seamlessness have been regarded as two critical factors in conducting omnichannel business, their combined effect has yet to be revealed. By employing a polynomial regression, this study disentangles the combined effect of channel consistency and seamlessness on customer experience in the omnichannel context. The results indicate that enhancing channel consistency and seamlessness simultaneously can improve the omnichannel customer experience. The combined effect of a high (low) level of channel consistency and a low (high) level of channel seamlessness on the omnichannel customer experience is also positive. Data vulnerability can strengthen the combined effect of channel consistency and seamlessness on customer experience in the omnichannel context. This study not only uncovers the complex influences of different combinations of channel consistency and seamlessness but also provides new insights into conducting omnichannel retail for practitioners.

Keywords: omnichannel; channel consistency; channel seamlessness; customer experience; data vulnerability



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1. Introduction

Due to the leapfrog development of digital technologies in recent years, a number of new channels have emerged [1], and the omnichannel model has become an important business model in retail [2–5]. Owing to the influence of COVID-19 and the associated lockdowns and restrictions, people are becoming accustomed to omnichannel shopping [6]. Many firms have adopted omnichannel strategies [7] because, on average, businesses embracing omnichannel marketing experience a 9.5% increase in their annual revenue [8]. The size of the global omnichannel market is expected to reach \$16.6 billion by 2026, with market growth of 15.2% CAGR [9]. Therefore, omnichannel retail is key to obtaining competitive advantages for firms [3,10,11] and for promoting sales growth and economic development [12].

An omnichannel business strategy emphasizes that optimizing customer experience across various channels through the coordinated management of these channels is the key to a successful business [2]. This requires omnichannel firms to provide customers with a holistic and well-integrated customer experience through any channel at any stage of their shopping journey [13,14]. Thus, the key to implementing a successful omnichannel strategy is to provide a superior omnichannel customer experience by managing all the available channels. Considering the characteristics of omnichannel shopping, customers use different channels and switch between them during a single shopping process [7,15]. As such, the synergistic management of the omnichannel to provide an exceptional customer experience is much more complex and difficult than improving customer experience in a single channel (e.g., an online store or a physical store) context [16,17]. Therefore, how to

effectively a company manages the relationships between the various channels to offer a superior customer experience is a challenge that omnichannel firms face.

Given the importance of customer experience in omnichannel retail, an increasing number of studies have examined the drivers of omnichannel customer experience and suggested that channel integration is critical for developing customer experience [7,18,19]. These studies have argued that omnichannel firms need to integrate their omnichannel shopping system to maintain consistency and seamlessness between the different channels [20–22]. Thus, channel consistency and seamlessness are significant drivers of the omnichannel customer experience [23,24]. However, studies have mainly focused on the roles of channel consistency and seamlessness separately. To the best of our knowledge, no study has focused on the combined effect of channel consistency and seamlessness on customer experience in an omnichannel environment. To fill this gap, in this paper, we examine the confluence of channel consistency and channel seamlessness on the omnichannel customer experience. Accordingly, the first research question of this study is: How do the combined effects of channel consistency and seamlessness affect the omnichannel customer experience?

In an omnichannel environment, firms collect customer data or information from the various channels or touchpoints adopted by the customers and analyze these data to provide customers with better and more personalized service than would otherwise be possible [3]. However, the omnichannel firm's access to and use of different kinds of customer data (e.g., browsing history, payment accounts, and location information) is likely to intensify customers' perceptions of data vulnerability [25]. From the customers' perspective, data vulnerability can violate their emotions and reduce their cognitive trust [25]. It may influence the joint effect of channel consistency and seamlessness on the omnichannel customer experience. Therefore, this study aims to explore the moderating role of data vulnerability. Our second research question is: How does data vulnerability moderate the combined impact of channel consistency and channel seamlessness on the customer experience in the omnichannel context?

To answer the above research questions, in this study we adopt a stimulus–organism–response (SOR) framework to explore the combined effect of channel consistency and seamlessness on the omnichannel customer experience through a polynomial regression. This study contributes to the literature in three respects. First, it provides a new perspective from which to improve understanding of the significant roles of channel consistency and seamlessness by considering their complex combination. Second, we confirm the importance of customer experience and reveal its unique formation mechanism in an omnichannel environment. Third, this study enriches our knowledge of data vulnerability by disentangling the boundary condition role of data vulnerability on the influence of the combined effect of channel consistency and seamlessness. Fourth, the study deepens our understanding of the SOR framework in the omnichannel context.

2. Research Background

2.1. SOR Framework

The SOR framework was developed by Mehrabian and Russell (1974) to explain how an environmental stimulus influences an individual's behavior [26]. It suggests that environmental stimuli (S) influence people's internal organism (O), which results in behavioral responses (R) [26]. Stimuli (S) are external to people and include various marketing-related environmental cues [27], such as website design [28], store atmosphere [29], channel integration [7], and the seamlessness of the omnichannel environment [30]. Organism (O) refers to individuals' internal feelings, experiences, thinking, perceptions, and evaluations [31], such as satisfaction and trust [32], customer empowerment [27], customer experience [7], and hedonic value [15]. Responses (R) consist of different customer behaviors, such as e-impulse buying [33], patronage intention [27], showrooming behavior [34], and usage intention [7].

SOR offers a parsimonious and structured framework to explore the effect of environmental stimuli on individuals' internal states, which in turn affect their responses [26]. It has been widely adopted to examine customer behavior in an omnichannel environment [7,14,30,32]. Therefore, this study proposes that channel consistency and seamlessness are two stimulus factors, customer experience represents the internal organism, and the omnichannel continuance intention is the customer's response based on the SOR framework.

2.2. Channel Consistency and Seamlessness in the Omnichannel Environment

In the omnichannel shopping environment, customers want to control their channel choice and freely switch from one channel to another without friction to achieve the optimal customer experience [22]. Thus, channel integration is critical for the success of omnichannel business [7,35]. For example, Sheng et al. (2018) found that channel integration can increase perceived fluency in the restaurant omnichannel service [36]. Similarly, Kopot and Cude (2021) confirmed that an omnichannel fashion department store retailer can increase perceived fluency and brand attitude through channel integration [37]. Cheah et al. (2022) suggested that channel integration can improve consumer empowerment, trust, and patronage intentions in an omnichannel retail context [38]. Therefore, as the two important components of channel integration, channel consistency and seamlessness are also vital for omnichannel retail [20,22].

Channel consistency is defined as the degree to which an omnichannel firm provides a consistent retail mix across channels [20,39,40]. It indicates that the product and promotional information, customer service, price, and store images are kept coherent across various channels [30]. The consistency of omnichannel shopping is significant for customers because it can provide a unified and satisfying shopping experience [14,15]. In a consistent omnichannel environment, customers do not need to compare the information and services from different channels, which significantly reduces their cognitive effort and perceived risk [21]. In addition, channel consistency is helpful for driving channel transparency [36], perceptions of behavior control [41], and favorable attitudes toward omnichannel shopping [22]. Accordingly, channel consistency plays an important role in conducting omnichannel business.

In addition to channel consistency, seamlessness is a critical element in an omnichannel setting [20,22,23]. Channel seamlessness is defined as the smoothness with which customers can switch between different channels [20,40,42]. Essentially, channel seamlessness is intended to create a shopping environment without any ruptures by blurring the obstacles between channels [20], enabling customers to freely, uninterruptedly, and effortlessly move from one channel to another [22,39,40,43]. Thus, a seamless omnichannel environment provides a fluid shopping experience, empowers customers to select their preferred channel freely [42], and enhances their purchase intentions [44].

Based on the review above, we find that channel consistency and seamlessness are important for omnichannel business [15,20,22]. However, as previously noted, studies have mainly explored the impact of channel consistency and seamlessness separately. There is a lack of research that considers the combined effect of channel consistency and seamlessness in an omnichannel setting.

2.3. Omnichannel Customer Experience

Customer experience comprises subjective, holistic, and mental responses to interactions with firms [45,46]. In an omnichannel environment, it reflects customers' subjective assessments of their experiences across all the various channels [17]. Omnichannel customer experience has received increasing attention because of its importance to an omnichannel strategy and because it is difficult to manage in an omnichannel context [23,42,47]. Research has found that customer experience plays a significant role in improving engagement, satisfaction [48], word of mouth, repeat purchase intentions [49], and customer loyalty [24].

Considering the key role of customer experience in an omnichannel environment, several studies have explored its stimulating factors. These studies have suggested that integrated omnichannel strategies, such as channel-service configuration [14], consistency [43], cross-channel integration [18], individualization [19], and platform synergy, are beneficial for building a superior customer experience. Although studies have devoted great effort to understanding how to improve the omnichannel customer experience, there has been limited research examining the joint effect of channel consistency and seamlessness on customer experience in the context of omnichannel business.

2.4. Data Vulnerability

Data vulnerability refers to customers’ feelings of being susceptible to harm because their personal data is possessed by firms [25,50]. The data management practices of firms, which include collecting, storing, and using customer data, are likely to trigger this negative perception [25]. In the case of omnichannel business, omnichannel firms widely collect customers’ personal data and analyze these data to improve the customers’ experience and the firms’ own performance [3,51]. Thus, omnichannel shopping, by generating various types of customer data, may result in data vulnerability for customers. Research has suggested that data vulnerability can directly reduce trust [25], the perceived effectiveness of privacy policies [51], and psychological comfort [50]. Thus, a high level of data vulnerability creates a boundary turbulence situation, which may influence the relationships between omnichannel firms and their customers [52]. Thus, in this study, we intend to explore the moderating effect of data vulnerability on the relationships between different combinations of channel consistency and seamlessness and the omnichannel customer experience.

2.5. Conceptual Model and Development of the Hypotheses

Based on the above literature review, this study explores the combined effect of channel consistency and seamlessness on the omnichannel customer experience and customers’ continuance intention by applying the SOR framework. Then, we further examine the moderating effect of data vulnerability. The conceptual model is presented in Figure 1.

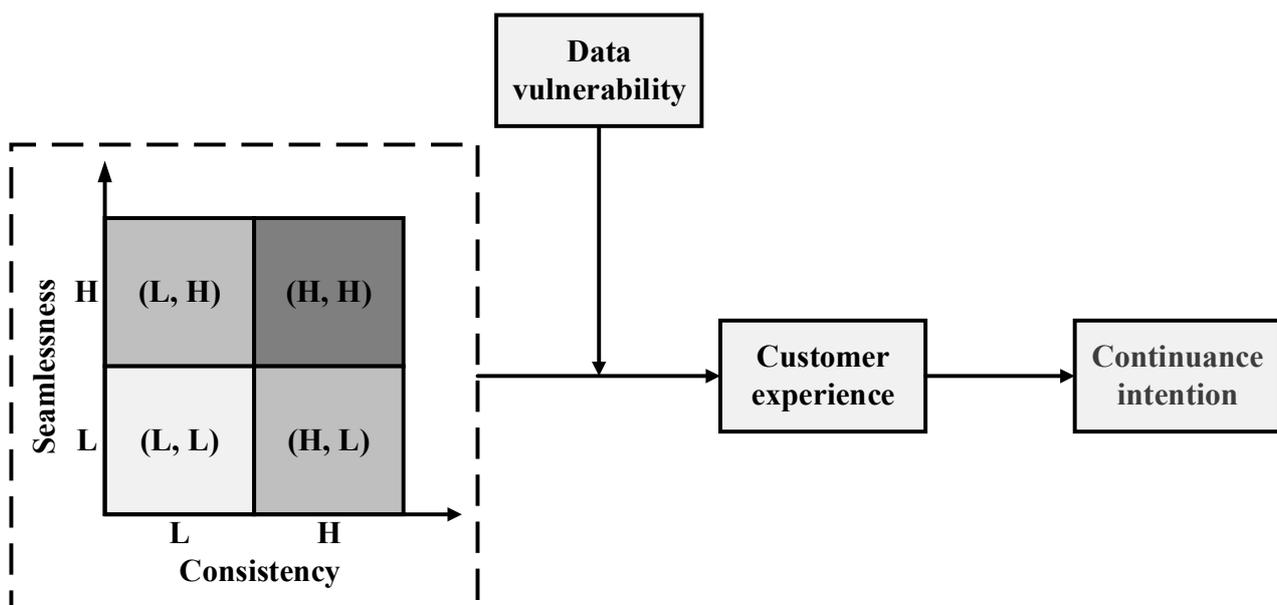


Figure 1. Conceptual model.

2.5.1. Combined Effect of Channel Consistency and Seamlessness

When channel consistency and seamlessness are both at high levels simultaneously, they can considerably enhance the omnichannel customer experience. The consistency of omnichannel information and service reduces both information asymmetry across channels and customers' perceived shopping risk because the customers do not need to consider differences in products and prices between different channels [21]. First, the higher the level of consistency among channels, the less confusion that customers experience when they use the omnichannel service [14]. In addition, a consistent omnichannel setting can reduce customers' cognitive effort, the time spent on comparing and choosing products, and channel switching [2,14,21]. Second, a high level of channel seamlessness can remove channel transition barriers, enabling customers to move smoothly and easily from one channel to another [20,22]. Furthermore, a seamless omnichannel environment provides customers with the freedom to choose the channel that they prefer [42]. Conversely, when channel consistency and seamlessness are at low levels simultaneously, customers experience incompatible channel services [21] and friction in their shopping journey [22]. Therefore, we propose that:

H1: *Customer experience will be higher when both channel consistency and channel seamlessness are at a high level than when both are at a low level.*

In addition to the two scenarios in H1, there are other two combinations of channel consistency and seamlessness. First, when channel consistency is high but channel seamlessness is low, the barriers between various channels have not been removed fully [20] and it is hard for customers to switch between different channels [42]. In this situation, highly consistent information and service from the omnichannel firm could offset the negative shopping experience derived from low channel seamlessness. Because the omnichannel system remains consistent, customers can obtain what they want through any available channel. Thus, compared with the situation of low consistency, their switching intentions between different channels are reduced, and they are less likely to be influenced by friction between the channels. Second, channel consistency can be low and channel seamlessness high. In this situation, an inconsistent omnichannel setting can reduce channel transparency [36] and increase the effort level required and the risk to the customer while shopping [21]. However, channel seamlessness can offset and potentially reverse these negative influences. A highly seamless omnichannel environment enables the customer to move from one channel to another without rupture [20] and to easily determine the differences among channels and choose their channel freely [22]. Therefore, we propose that:

H2: *Customer experience will be increased by the combined effect of high (low) channel consistency and low (high) channel seamlessness.*

2.5.2. Mediation Effect of the Omnichannel Customer Experience

Based on the SOR framework, the organism state of an individual plays a mediating role in the relationship between environmental stimuli and behavioral responses [26]. Research has found that customer experience mediates the effects of some environmental stimuli on behavioral responses in the omnichannel context [7,14]. This indicates that channel consistency and seamlessness have a combined effect on a customer's continuance intention through customer experience. As such, we propose that:

H3: *Customer experience mediates the combined effect of channel consistency and channel seamlessness on a customer's omnichannel continuance intention.*

2.5.3. Moderation Effect of Data Vulnerability

As previously mentioned, in the omnichannel context, data vulnerability reflects a customer’s feelings of being harmed by a firm’s possession of their data [25]. Data vulnerability builds a turbulent boundary condition, which may influence the relationship between firms and customers [52]. When there is a high degree of data vulnerability, the perceived effectiveness of privacy policies is low [51], and the customers’ perceived levels of risk and uncertainty are increased [25,52]. Thus, in a highly unprotected shopping environment, customers are motivated to rely on firms’ omnichannel services [53]. In such conditions, increasing channel consistency and/or channel seamlessness can meet customers’ expectations, and the combination of consistency and seamlessness will have an increased impact on customer experience. Conversely, when data vulnerability is low, the perceived risk of omnichannel shopping is reduced and customers may not regard channel consistency and seamlessness as indispensable components of the customer experience. That is, the importance of channel consistency and seamlessness is reduced compared with situation in which data vulnerability is high, and the combined effect of these factors on customer experience is weakened. Thus, we propose that:

H4: *The combined effect of high channel consistency and high channel seamlessness on customer experience is stronger when data vulnerability is high.*

H5: *The combined effect of high (low) channel consistency and low (high) channel seamlessness on customer experience is stronger when data vulnerability is high.*

3. Methodology

3.1. Data Collection and Sample

For this study, we conducted an online survey through a professional survey platform, Sojump (<https://www.wjx.cn/>), to collect data on omnichannel users in China. To guarantee data validity, we established a screening question at the beginning of the questionnaire. If the respondents confirmed that they had used the omnichannel service of the department store retailer in the past three months, they were allowed to participate in the survey. Next, they were asked to fill in the questionnaire based on their most recent experience of using an omnichannel department store retailer in the past three months. Finally, we obtained 455 valid responses to conduct the subsequent data analysis. The detailed demographic information of our sample is presented in Table 1.

Table 1. Demographic information.

	Number	Percentage
Gender		
Male	211	46.4
Female	244	53.6
Age (years)		
≤20	38	8.3
21–30	129	28.4
31–40	158	34.7
≥41	130	28.6
Education		
High school or below	45	9.9
Junior college	141	31.0
Bachelor	229	50.3
Masters	32	7.0
Doctor	8	1.8

Table 1. Cont.

	Number	Percentage
Monthly income (yuan)		
≤3000	117	25.7
3001–6000	134	29.4
6001–9000	106	23.3
9001–12,000	65	14.3
≥12,001	33	7.3

3.2. Measurement

The measurement items were adapted from the literature, with minor modifications to suit the omnichannel context. We conducted a pretest with a sample of 20 faculty and students to check the measurement items. According to their feedback, we made slight modifications to the wording of some items. All of the measurement items are presented in Table 2. The five items for channel consistency were adapted from Rodríguez-Torrico et al. (2023) [30], the three items for channel seamlessness from Gao et al. (2021) [42], the three items for customer experience from Kim and Choi (2016) [54], the five items for data vulnerability from Martin et al. (2017) [25], and the three items for omnichannel continuance intention from Chang and Geng (2022) [55]. All the items were measured using a 7-point Likert scale.

Table 2. Measurement item.

Channel consistency
CON1. This firm provides consistent store images across different channels.
CON2. This firm provides consistent product information across different channels.
CON3. This firm provides consistent promotional information across different channels.
CON4. This firm provides consistent pricing policy across different channels.
CON5. This firm provides consistent customer services across different channels.
Channel seamlessness
SEA5. Moving from one channel to another channel of this firm has been easy.
SEA6. Moving from one channel to another channel of this firm is fluid.
SEA7. You have not perceived any boundaries or barriers when moving from one channel to another channel of this firm.
Omnichannel customer experience
OCE1. I would say that the experience at this firm’s omnichannel is excellent.
OCE2. I believe that we get a superior experience at this firm’s omnichannel.
OCE3. I think that the total experience procedure at this firm’s omnichannel is excellent.
Continuance intention
CIN1. I intend to continue using this firm’s omnichannel in future.
CIN2. My intentions are to continue using this firm’s omnichannel in future.
CIN3. I would like to continue my use of this firm’s omnichannel.
Data vulnerability
DVU1. The personal information that this firm has about me makes me feel insecure.
DVU2. The personal information that this firm has about me makes me feel exposed.
DVU3. The personal information that this firm has about me makes me feel threatened.
DVU4. The personal information that this firm has about me makes me feel vulnerable.
DVU5. The personal information that this firm has about me makes me feel susceptible.

3.3. Reliability and Validity

We performed a confirmatory factor analysis, and the results indicated that the conceptual model has a good fit with our data ($\chi^2 = 324.135$, $df = 142$, $RMSEA = 0.053$, $CFI = 0.977$, $TLI = 0.972$, $SRMR = 0.042$). Table 3 shows that all values of Cronbach’s α and composite reliability (CR) are greater than 0.7, which suggests good reliability. The scores of average variance extracted (AVE) are larger than 0.5, indicating sufficient convergent validity [56]. As presented in Table 3, the lowest square root of the AVE value is larger than the greatest correlation coefficient, implying adequate discriminant validity [56].

Table 3. Reliability, validity, and correlation coefficient matrix.

Variable	Cronbach’s α	CR	AVE	1	2	3	4	5
1. CON	0.938	0.938	0.753	0.868				
2. SEA	0.898	0.899	0.748	0.408 **	0.865			
3. OCE	0.931	0.932	0.820	0.399 **	0.271 **	0.906		
4. CIN	0.880	0.886	0.722	0.358 **	0.278 **	0.283 **	0.850	
5. DVU	0.963	0.963	0.840	−0.289 **	−0.243 **	−0.346 **	0.157 **	0.917

Note: ** $p < 0.01$. The bold numbers on the diagonal represent the square roots of the AVE values.

3.4. Common Method Variance

We adopted two methods to check the issue of common method variance (CMV) in this study. First, the result of a Harman’s single-factor analysis showed that the first factor only explained 38.575% of the variance, which is significantly lower than the cutoff value of 50%. Second, we found that the largest correlation is 0.408, as shown in Table 3, which suggests that there were no extremely high correlations and that no single factor affected all of the variables [57]. All of the above results imply that CMV was not a serious issue in this study.

4. Data Analysis

4.1. Result of the Combined Effect of Channel Consistency and Seamlessness

To test the complex influences of channel consistency and seamlessness, we employed a polynomial regression, which has been used widely to explore the combined effect of two predictors on outcomes [42,53,58–60]. A polynomial regression analysis uses five polynomial regression terms, such as two simple terms, one interaction term, and two squared terms, to predict the dependent variable simultaneously [58]. Thus, as shown in Equation (1), the omnichannel customer experience (OCE) was predicted by channel consistency (CON), channel seamlessness (SEA), CON^2 , $CON \times SEA$, and SEA^2 . Specifically, the surface (i.e., the slope and curvature) of the (in)congruence line was adopted to reveal the combined effect of channel consistency and seamlessness. To test H1, the slope of the congruence line ($b_1 + b_2$) should be positive and significant, and the curvature of the congruence line ($b_3 + b_4 + b_5$) should be nonsignificant. To confirm H2, the curvature of the incongruence line ($b_3 - b_4 + b_5$) should be positive and significant.

$$OCE = b_0 + b_1CON + b_2SEA + b_3CON^2 + b_4CON \times SEA + b_5SEA^2 + e \quad (1)$$

According to the results of Model 1, shown in Table 4, we calculated the slope and curvature of the (in)congruence line between channel consistency and channel seamlessness. As seen in Table 5, the slope of the congruence line is positive and significant (0.566, [0.386, 0.718]), and the curvature of the congruence line is nonsignificant (−0.048, [−0.112, 0.021]), indicating that H1 is supported. As seen in Figure 2a,b, the omnichannel customer experience has been enhanced significantly along with the congruence line from low to high congruence between channel consistency and seamlessness. The results of Table 5 also indicate that the curvature of the incongruence line is positive and significant (0.328, [0.091, 0.547]). Therefore, H2 is supported. As shown in Figure 2a,c, as the increasing of channel consistency and seamlessness in two directions ($CON > SEA$ and $CON < SEA$), the omnichannel customer experience is improved.

Table 4. Polynomial regression results.

Variable	Model 1	Model 2
	DV: OCE	DV: CIN
Constant	5.380 ***	4.085 ***
Gender	−0.445 ***	0.165
Age	−0.013 *	−0.005

Table 4. Cont.

Variable	Model 1	Model 2
	DV: OCE	DV: CIN
Education	-0.114	0.026
Income	-0.042	-0.018
DVU	-0.222 ***	0.005
CON	0.332 ***	0.397 ***
SEA	0.224 **	0.093
CON ²	0.088 *	-0.117 **
CON × SEA	-0.188 **	0.076
SEA ²	0.052	-0.041
OCE		0.145 **
R ²	0.284	0.200

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

Table 5. Testing of H1 and H2.

	Estimate	95% BC-CI	Conclusion
Congruence line slope	0.556	[0.386, 0.718]	Supports H1
Congruence line curvature	-0.048	[-0.112, 0.021]	
Incongruence line slope	0.107	[-0.193, 0.384]	Supports H2
Incongruence line curvature	0.328	[0.091, 0.547]	

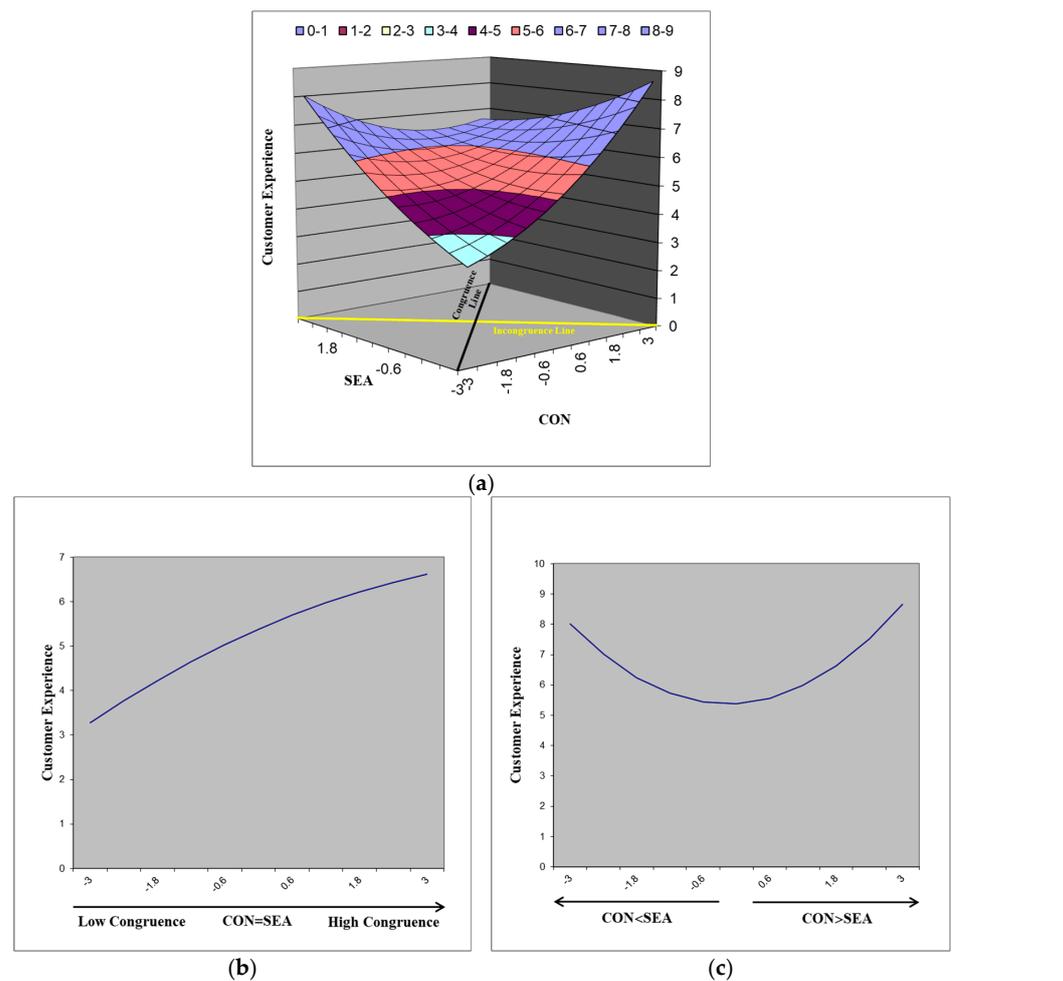


Figure 2. (a) Response surface analysis of the combined effect of CON and SEA; (b) surface of the congruence line; (c) surface of the incongruence line.

4.2. Result of the Mediation Effect of Customer Omnichannel Experience

To explore the mediation effect of customer omnichannel experience (H3), we adopted the block variable method recommended by Edwards and Cable (2009) [61]. We integrated the five polynomial terms (CON, SEA, CON², CON × SEA, and SEA²) into a block variable to estimate their combined effect. This block variable is a weighted linear composite of the five polynomial terms, where the weights are the estimated regression coefficients in the polynomial regression [61]. Then, the block variable was used to conduct the mediation analysis.

Based on the results of Model 1 and Model 2, we calculated the block variable to analyze the mediation effect of the omnichannel customer experience. As seen in Table 6, the omnichannel customer experience significantly mediates the combined effect of channel consistency and seamlessness on the continuance intention to use the omnichannel service (0.060, [0.024, 0.106]). Thus, H3 is supported.

Table 6. Mediation analysis results.

Variable	OCE	CIN	Conclusion
Coefficient of the block variable	0.355 ***	0.356 ***	Supports H3
Coefficient of OCE (β)	–	0.169 **	
Mediation effect via OCE (0.355 × β)	–	0.060	
95% BC-CI for the mediation effect	–	[0.024, 0.106]	

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

4.3. Result of the Moderating Effect of Data Vulnerability

To explore the moderating role of data vulnerability (H4 and H5), we adopted the procedures suggested by [59]. In Equation (2), data vulnerability and its interactions with the five polynomial terms were added to the regression model. The slope of the congruence line can be calculated as $[b_1 + b_2 + (b_7 + b_8) \times DVU]$. The curvature of the congruence line can be calculated as $[b_3 + b_4 + b_5 + (b_9 + b_{10} + b_{11}) \times DVU]$. The curvature of the incongruence line can be calculated as $[b_3 - b_4 + b_5 + (b_9 - b_{10} + b_{11}) \times DVU]$. Then, we calculated the slope of the congruence line and the curvature of (in)congruence line at high and low levels of data vulnerability, respectively ($M_{DVU} \pm 1SD$).

$$OCE = b_0 + b_1CON + b_2SEA + b_3CON^2 + b_4CON \times SEA + b_5SEA^2 + b_6DVU + b_7CON \times DVU + b_8SEA \times DVU + b_9CON^2 \times DVU + b_{10}CON \times SEA \times DVU + b_{11}SEA^2 \times DVU + e \quad (2)$$

Table 7 shows the results of the polynomial regression after adding data vulnerability as the moderating variable. As shown in Table 8, the slope of the congruence line is significant and positive (0.602, [0.396, 0.787]), and the curvature of the congruence line is nonsignificant (0.099, [−0.001, 0.203]) in situations typified by a high level of data vulnerability. When the data vulnerability is at a low level, the slope of the congruence line is positive significantly (0.475, [0.091, 0.813]) and the curvature of the congruence line is significant and negative (−0.178, [−0.295, −0.049]). Despite the slope of the congruence line being significant, the curvature of the congruence line is also significant, which indicates that no linear relationship exists between customer experience and the congruence of channel consistency and seamlessness. As seen in Figure 3a,b, the omnichannel customer experience improves when channel consistency and seamlessness are both high, along with the congruence line, in high-data-vulnerability situations. However, when data vulnerability is low, the congruence line is an inverted U-shape (See Figure 4a,b), which suggests that improving channel consistency and seamlessness simultaneously does not always improve the omnichannel customer experience. Therefore, H4 is supported.

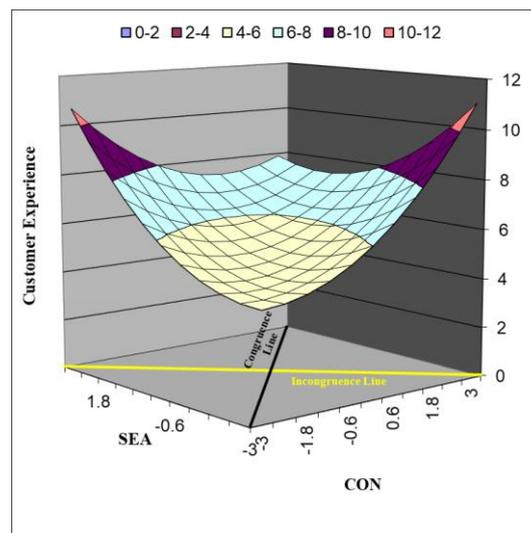
Table 7. Moderation analysis results.

Variable	Model 3
	DV: OCE
Constant	5.176 ***
Gender	-0.347 **
Age	-0.011
Education	-0.114
Income	-0.038
DVU	-0.553 ***
CON	0.372 ***
SEA	0.188 *
CON ²	0.082
CON × SEA	-0.169 **
SEA ²	0.093 *
CON × DVU	-0.031
SEA × DVU	0.069
CON ² × DVU	0.089 ***
CON × SEA × DVU	-0.084 *
SEA ² × DVU	0.077 **
R ²	0.342

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

Table 8. Testing of H4 and H5.

	High DVU		Low DVU	
	Estimate	95% BC-CI	Estimate	95% BC-CI
Congruence line slope	0.602	[0.396, 0.787]	0.475	[0.091, 0.813]
Congruence line curvature	0.099	[-0.001, 0.203]	-0.178	[-0.295, -0.049]
Conclusion	Supports H4			
Incongruence line slope	0.069	[-0.276, 0.373]	0.411	[-0.089, 0.947]
Incongruence line curvature	0.632	[0.367, 0.935]	-0.224	[-0.590, 0.122]
Conclusion	Supports H5			



(a)

Figure 3. Cont.

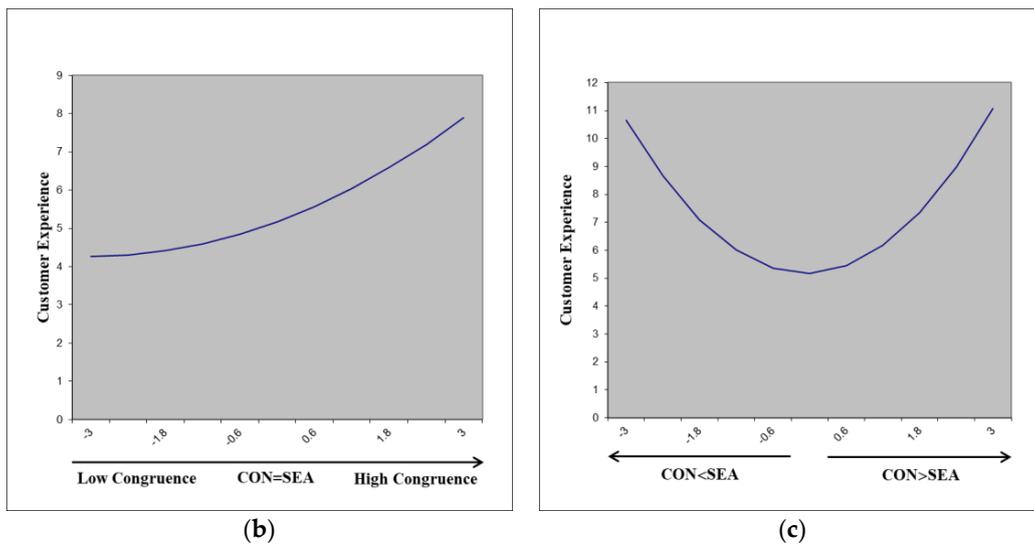


Figure 3. (a) Response surface analysis for the combined effect of CON and SEA at a high DVU; (b) surface of the congruence line at high DVU; (c) surface of the incongruence line at a high DVU.

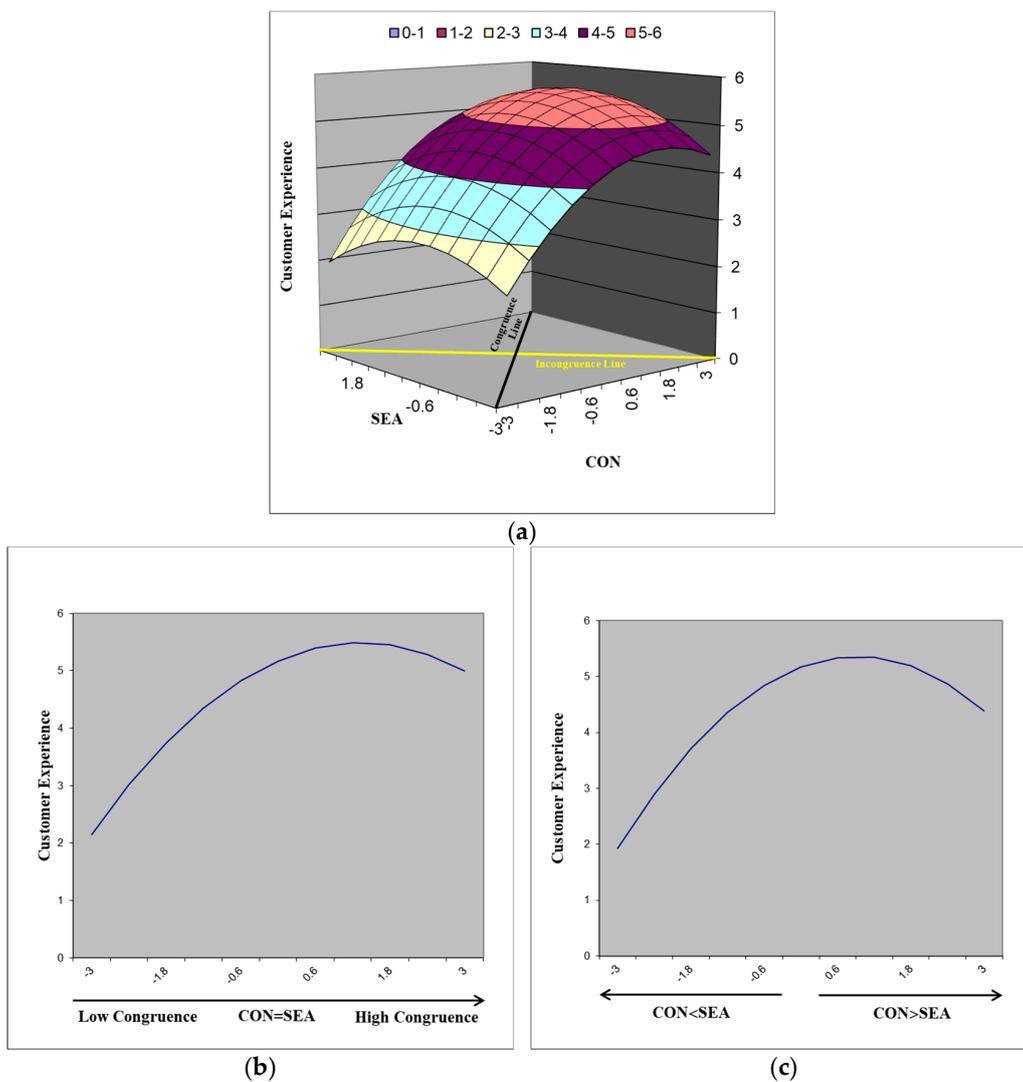


Figure 4. (a) Response surface analysis for the combined effect of CON and SEA at a low DVU; (b) surface of the congruence line at a low DVU; (c) surface of the incongruence line at a low DVU.

As shown in Table 8, the curvature of the incongruence line is positive and significant (0.632, [0.367, 0.935]) when data vulnerability is high. However, the curvature of the incongruence becomes nonsignificant (−0.224, [−0.590, 0.122]) when data vulnerability is low. In addition, the surface of the incongruence line changes from U-shaped (as in Figure 3a,c) to an inverted U-shape (see Figure 4a,c). This indicates that data vulnerability heightens the incongruence effect of channel consistency and seamlessness on the omnichannel customer experience. Therefore, H5 is confirmed.

5. Implications

5.1. Theoretical Implications

This study has some theoretical implications. First, it contributes to enriching the omnichannel literature. Channel consistency and seamlessness, as two important elements of omnichannel business, have gained much attention [20,22]. Research has found that consistent and seamless omnichannel settings can induce several positive outcomes, including perceived compatibility [21], customer retention [42], customer satisfaction, word of mouth [23], brand authenticity, purchase intention [44], and flow state [30]. Although these studies have devoted great effort to revealing the impacts of channel consistency and seamlessness, no studies have explored the combined effect of channel consistency and seamlessness. By analyzing and comparing the different combinations of channel consistency and seamlessness (i.e., high consistency and high seamlessness, high consistency and low seamlessness, low consistency and high seamlessness, and low consistency and low seamlessness) using polynomial regression, this study provides a new perspective from which to understand the combined impacts of channel consistency and seamlessness.

Second, this research elucidates the drivers of customer experience in the omnichannel context. As the key to an omnichannel strategy, offering a superior customer experience has always been a concern of omnichannel firms [2,7,48]. Studies have found that channel integration [7], rapport building [62], consistency [43], and individualization [19] have positive impacts on the omnichannel customer experience. However, the combined influence of channel consistency and seamlessness on customer experience in omnichannel business has not been examined. The current research not only deepens our understanding of the formation mechanism of the omnichannel customer experience but also confirms the vital role of customer experience in omnichannel business by examining how customer experience mediates the different combined effects of channel consistency and seamlessness on customers' omnichannel continuance intention.

Third, this study contributes to our knowledge of data vulnerability. In the digital age, the vulnerability of customer data has received increasing attention [25]. Research has verified that data vulnerability can result in several negative consequences, such as emotional violation [25], lower psychological comfort [50], and higher privacy concerns [52]. However, little research has explored the moderating role of data vulnerability. By introducing data vulnerability into the omnichannel context and considering its moderating effect on the relationship between different combinations of channel consistency and seamlessness and customer experience, this study uncovers the influence of data vulnerability from a new perspective.

Fourth, this study corroborates research [14,30,38] that has adopted the SOR framework in the context of omnichannel business. By considering channel consistency and seamlessness as the environmental stimuli (S) and exploring their combined effect on crafting an omnichannel customer experience (O), which in turn influences omnichannel continuance intention (R), this study not only adds new elements of environmental stimuli but also offers a novel perspective from which to understand the combined effect of different environmental stimuli.

5.2. Practical Implications

This study also has some practical implications. First, we find that increasing channel consistency and seamlessness simultaneously can significantly improve the customer experience.

rience, which indicates that consistent and seamless omnichannel service is a determinant of a successful omnichannel strategy. Thus, the omnichannel managers of department store retailers should integrate the entire omnichannel system, coordinate the relationships among various channels, and provide customers with consistent products, prices, and services across different channels. In addition, these department store retailers need to remove the barriers between the channels and ensure that channel transitions are smooth, thus improving customer experiences in the omnichannel context. In general, the managers of department store retailers should increase the resources invested in enhancing simultaneously the consistency and seamlessness of omnichannel service.

Second, we find that the situation of high (low) channel consistency and low (high) channel seamlessness can improve the omnichannel customer experience to a certain degree, which implies that properly leveraging channel consistency and seamlessness is important. It suggests that department store retailers should allocate their limited resources wisely to create a consistent and seamless omnichannel setting. Specifically, they can choose to build a high degree of channel consistency by offering consistent prices, products, and promotional information and a low level of channel seamlessness to craft the omnichannel customer experience. Alternatively, they could choose to increase their efforts to provide customers with a highly seamless omnichannel experience by reducing boundaries or barriers among various channels and devoting fewer resources to building a consistent omnichannel environment. To summarize, allocating limited firm resources equally to build a consistent and seamless omnichannel setting is not the best strategy.

Third, this study finds that data vulnerability strengthens the combined effect of channel consistency and seamlessness on the omnichannel customer experience. Thus, the omnichannel managers of department store retailers should note that a consistent and seamless omnichannel shopping environment is much more critical for improving customer experience in an environment with a high versus a low degree of data vulnerability. Specifically, when customers perceive their level of data vulnerability to be high, department store retailers should increasingly emphasize offering consistent products, services, and prices to customers among the various channels and reducing channel transition difficulties and barriers between different channels.

6. Limitations and Future Research Directions

This study has several limitations, which identify future research directions. First, we only collected data on omnichannel users in China. To increase the generalizability of our research conclusions, future research could test the conceptual model and hypotheses in other cultural settings. Second, this research mainly focuses on the combined effect of channel consistency and seamlessness on the omnichannel customer experience. Future research could examine the complex impact of consistent and seamless omnichannel environment on other outcomes (e.g., perceived value). Third, this study only considers the moderating role of data vulnerability. Future research could examine other boundary conditions, such as product involvement, customer age, and brand trust.

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