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The Effect of Omnichannel Integration on Fresh Food Customer Engagement from the Viewpoint of Flow Experience

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Abstract: Customer engagement is a new value index affecting the omnichannel benefits of enterprises. It is beginning to attract the attention of both scholars and managers. However, there is still a lack of research on the mechanism influencing customer engagement in the fresh food omnichannel retail context. Drawing from the stimulus–organism–response (SOR) framework, this paper builds a relationship model between omnichannel integration and fresh food customer engagement. In addition, the paper empirically analyzes the mechanism of omnichannel integration's impact on fresh food customer engagement. The findings show that omnichannel integration promotes flow experiences through three modes: information integration, business integration, and service and distribution integration. Flow experience is mediating the relationship between omnichannel integration and customer engagement. Strengthening the customer engagement knowledge system can help fresh food omnichannel retailers to create and manage the long-term cooperative relationship between customers and the company's value creation. The higher the degree of omnichannel integration of fresh food retail firms, the more conducive it is to enhancing the customer flow experience, which will positively impact customers' attitudinal and behavioral engagement.

Keywords: omnichannel integration; flow experience; customer engagement; fresh food; SOR model

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1. Introduction

With the development of big data, 5G, mobile internet, and other technologies, it has become a general trend for physical fresh food retailers to accelerate omnichannel transformation and business innovation [1,2]. Retail enterprises such as Yonghui, Wal-Mart, and RT-Mart have developed apps, WeChat, and corporate websites or accessed third-party platforms in order to promote online sales. Fresh food companies either explore online and offline integrated community fresh food stores or supermarkets or try to build an online fresh food sales business to enter omnichannel retail. Since the COVID-19 pandemic, online fresh food consumption habits have been gradually cultivated. According to the report of Iimedia [3], 95.3% of customers purchased food on fresh food e-commerce platforms, and 42.1% of surveyed users purchase food on fresh food platforms two to three times weekly. In 2021, the transaction scale of China's fresh food e-commerce market reached CNY 465.81 billion, up 27.9% year-on-year, and the online penetration rate reached 7.9% [4].

The omnichannel business model of online and offline integration has become an important way for retailers to improve operational efficiency and gain competitive advantage [5,6]. Firms must coordinate their movements across channels and different phases of the customer journey and development flow to compete in today's omnichannel business context. Firms must take an integrative strategy, managing each omnichannel design decision from a dual demand-side (marketing) and supply-side (operations) outlook [7]. However, multichannel integration also requires companies' higher ability to integrate and manage multiple channels. Research on the omnichannel customer service gap shows that

only 7% of respondents are satisfied with the omnichannel service experience provided by brands [8]. The survey from Invesp also shows that approximately 87% of customers believe that retailers need to put more effort into providing an omnichannel shopping experience [9]. An overview of China's market performance shows that its fresh produce e-commerce enterprises are generally not profitable [10]. JDA survey results show that retailers' investment in omnichannel models is increasing year-by-year, but there are few cases that have benefited from it. The report by the China Business Industry Research Institute shows that the vast majority of the more than 4000 fresh food e-commerce platform enterprises in China are losing money [11]. Some studies in the literature also show that the omnichannel business strategy does not significantly affect business performance [12] and even weakens the overall effect of channel integration [13], making it difficult for physical retailers to obtain stable returns [14]. It suggests that retailers still face the challenge of unclear integration models and unclear reward mechanisms [1]. Therefore, how to build an effective omnichannel integration strategy to benefit from omnichannel retailing becomes a key issue for fresh food retailers.

Recently, it has been pointed out that the level of customer engagement is a key value indicator for retailers to benefit from the omnichannel model [15]. Customer engagement reflects the cognitive, emotional, and behavioral connections between customers and firms [16,17] in which engaged customers create value and enhance a firm's competitive advantage through a range of transactional and nontransactional behaviors, such as purchases, recommendations, word-of-mouth communication, feedback, and social interactions [18–20]. Saleh's survey also shows that retailers that implement an omnichannel customer engagement strategy retain an average of 89% of their customers, compared to only 33% for retailers with weak customer engagement [21]. The customer engagement literature has called for further research to examine the outcomes of the omnichannel customer engagement strategy in terms of customer response (e.g., purchase intention) and organizational outcomes (e.g., user growth) [22]. Therefore, how to better motivate the level of customer engagement has become an important topic to be explored in fresh producing omnichannel retailing [23,24].

Existing research has studied the definition, dimensions, and influencing factors of customer engagement from different perspectives. Customer engagement mainly falls into two categories, i.e., the single-dimensional and the multidimensional definition that emphasize psychology [25] or behavior [22,26,27], of which the multidimensional definition is dominant. From the perspective of influencing factors, previous studies on customer engagement usually focus on the impact of individual customer psychological factors on customer engagement. For example, Hollebeek et al. believed that customer involvement positively impacted customer psychological engagement [25]. According to Pansari and Kumar [28], customer engagement behaviors occur when a relationship based on trust and commitment is satisfying and has an emotional bond. It refers to customer purchase, customer recommendation, customer influence, and customer knowledge. Li and Han [22] assesses four types of customer engagement behaviors in online communities, i.e., augmenting, co-developing, influencing, and mobilizing behaviors. Goal pursuit and emotional attachment to the community are found to be the key antecedent factors of these behaviors. From the customer group perspective, community value [29], identity [29], community engagement [30], social need [31], social bonds [32], and other group psychological factors have been found to have a positive impact on customer engagement in online brand communities. Therefore, individual and group psychological factors at the customer level positively affect customer engagement. In addition, some scholars have focused on the impact of channel integration on customer engagement at the enterprise level. For example, Lee et al. [33] found that the higher the quality of retailer channel integration, the more significant the impact on customer engagement from the psychological levels and the greater the probability of repeated purchases and positive word-of-mouth recommendations. At the same time, differences in physical retail and online retail [34], and channel integration in omnichannel retail, positively impact customer agreement at the behavioral

levels of customer purchase, customer recommendation, customer influence, and customer knowledge [35].

Although the influence of channel integration on customer engagement has been a concern of researchers, the focus on customer engagement from the single-dimensional perspective or behavioral level is insufficient in reflecting the conceptual scope of customer engagement [36]. Customer engagement is a dynamic interaction, communication, and co-creation process between customers and enterprises [37,38]. It includes multiple dimensions of cognition, emotion, and behavior [39], and is a common expression of psychology and behavior [29]. Given the multifaceted perspective that has been given attention in academic circles, this paper will consider customer engagement from the psychological and behavioral multidimensional perspective. Hollebeek et al. [25] further divided customer engagement into attitudinal and behavioral factors and believed that attitude affects behavior. The multidimensional view of customer engagement behaviors may better capture the dynamics of engagement behaviors in the context of omnichannel retailing. Therefore, the current study adopts a multidimensional view of customer engagement behaviors [40]. Second, the existing studies mainly investigated the direct effect of channel integration on customer engagement in omnichannel retail. Still, there is a lack of in-depth research on the action path and possible intermediate mechanism of omnichannel integration in customer engagement. According to the SOR model, consumers are stimulated by the marketing environment to generate an emotional response, which leads to a series of behavioral responses.

Smooth cross-channel experience, also known as flow expertise, is an essential feature of omnichannel service and serves as its core. It is an emotional reaction to customers' interaction with companies in the process of omnichannel shopping. It can reflect the lasting pleasure of customers at the purchase stage as a result of the brand initiative stage [41] and is an essential reflection of the integration effect of online and offline channels of fresh food retailers [42]. Unfortunately, little attention has been paid to the role of flow experience in omnichannel integration in improving customer engagement [43]. Based on the SOR model, this paper introduces flow experience to clarify the intermediate mechanism of omnichannel integration in customer engagement, so as to uncover the black box of "channel integration customer engagement".

The influence of omnichannel integration on customer engagement is beginning to attract academic attention, and some valuable conclusions have been drawn. However, the research on the relationship between the two is incomplete and systematic, and insufficient attention has been paid to the role of flow experience. In addition, previous studies primarily focused on the retail industry, and few people chose the fresh food market as the research target [44]. The biological characteristics of fresh agricultural products and their vulnerability to decay and nonstandard properties [45] make them different from general farming and industrial products and make the market unique. The constitutive dimension and formation process of fresh food customer engagement need to be further analyzed.

Therefore, this paper takes fresh food customers as the research object and explores the impact of omnichannel integration on fresh customer engagement based on the SOR model, aiming to answer the following questions: (1) What is the connotation and measurement dimension of fresh food customer engagement? (2) What is the influence mechanism of omnichannel integration on customer engagement? (3) What role does flow experience play in this process? The research results provide empirical support and theoretical guidance to improve fresh omnichannel retailers' and customer performance outcomes.

Overall, this study makes the following marginal contributions to the literature. First, from the perspective of cognitive–emotional–ideal–initiative–behavior dynamics, the rationality of dividing customer engagement into psychology and behavior levels in fresh food retailing is verified. This verification clarifies the internal category of the concept of customer engagement and its causal chain and deepens the research on engagement behavior in fresh retail. Second, an omnichannel integration or flow experience is constructed regarding research content. It is based on the SOR framework of the omnichannel fresh

food retail situation. It also involves attitudinal and behavioral engagement and, thus, opens the "black box" of the relationship between omnichannel integration and customer engagement. In addition, it illustrates how omnichannel integration contributes to the flow experience. In addition, it enriches the literature on flow experience while extending it to the fresh food omnichannel retail situation.

2. Theoretical Background

2.1. SOR Theory

Since Belk [46] introduced the SOR theory into marketing and proposed the SOR model in the e-commerce environment. He argued that when customers are stimulated by the external environment, such as the corporate environment, a series of cognitive and emotional changes are produced, including preference, pleasure, and trust. Cognition mainly refers to customers' perceptions of situations and behaviors, including customers' value perceptions and trust perceptions [47]. Emotions include customers' liking, pleasure, and immersion, which lead to a series of psychological and behavioral responses, such as use, participation, purchase, feedback, and comments [48]. The model has become the basic theoretical framework for studying customer behavior in specific situations [49]. Hu and Chaudhry [32] proposed that social and structural bonds positively affect consumer engagement directly and indirectly via affective commitment, while financial bonds have only an indirect effect via affective commitment on consumer engagement. Relational bonds by the e-commerce operator (S) may influence affective commitment (O), which in turn may affect consumer engagement (R). Therefore, relational bonds relate to affective commitment and correspondingly enhance consumer engagement. Laato et al. [50] investigated unusual consumer behavior during the COVID-19 pandemic; based on the SOR framework, the researchers placed online exposure to online information sources as the environmental stimuli, information overload as the organism, and two psychological responses (cyberchondria and perceived severity) and two behavioral responses (intention to make unusual purchases and intention to self-isolate) as responses. Yu et al. [51] examined the effect of understanding the Huawei smartphone brand as an intermediary between brand involvement and brand loyalty in China and analyzed behavioral and attitudinal loyalty as two major elements of brand loyalty. An exploratory mixed-methods design in the SOR framework entailed two interviews to construct a theoretical framework.

2.2. Omnichannel Integration as Stimuli

Widely recognized as a core way to implement omnichannel management [33,52,53], omnichannel integration is an important channel management strategy implemented by omnichannel retailers to adapt to changes in customers' purchasing behavior. Retailers integrate the information content and search function of one channel into another (e.g., they can scan the code for an online search in offline stores and provide offline store addresses and contact information in an online app) and integrate the order fulfillment function and realization method of one channel into another (e.g., online order pickup in stores and online payment in stores) to ensure that the retail information and service process to customers is consistent. The company also ensures the consistency of the retail information and service flow to customers and the consistency of the distribution process. It assimilates and coordinates the online and offline channels to achieve "information integration", "business integration", and "service and distribution integration" of the online and offline channels, with each channel maintaining its merchandise. Store orders are fulfilled from store products. An online order can be shipped from an online fulfillment center or store, maximizing the retailer's total profit [6]. According to Pereira and Frazzon [54], a data-driven approach integrates machine-learning direction forecasting and operational planning simulation-based optimization to adaptively synchronize demand and supply in omnichannel retail supply chains. The conclusions are affirmed by using the omnichannel retail supply chain strategy. Unlike multichannel retailing, in the omnichannel management model, fresh food companies integrate their separate retail channels into an integrated distribution

system to provide convenient services for customers to switch and migrate channels during the shopping process. It creates an "integrated and seamless retail network" that is supported by the unique value of cross-channel integration. The unique value creation and delivery mechanisms brought about by cross-channel integration [13,54–56] increase customer satisfaction and value perceptions by providing an integrated service experience that is not available to customers in individual channels [57,58], thereby helping retailers to better serve customers. Stimuli are defined as features, events, objects, marketing-related factors, or environmental components associated with the shopping environment that customers encounter [57]; therefore, in this paper, omnichannel integration is considered an environmental stimulus.

2.3. Flow Experience as Organism

The flow experience is the value in use that retailers provide to customers through the integration of resources [59], a pleasant psychological condition for customers during their interactions with omnichannel retailers [60], and its impact has the potential to permeate various levels of customer engagement [61] and is an important mechanism for promoting customer engagement [43]. In the omnichannel integration context, customers aggregate the experience of using each channel to form an evaluation of the overall experience of every channel of the retailer [62], generating a phenomenon of integrated experience [63], and if this experience is good, customers will rate the retailer higher, so that their willingness to engage in activities related to the retailer will increase. Thus, the flow experience is an important manifestation of the effectiveness of the retailer's integration of online and offline channels [42]. It can reflect the customer's lasting pleasure throughout the pre-purchase, purchase, and post-purchase stages that continue from the search stage and purchase stage to the brand initiative stage [41]. The omnichannel model as a resource integration can drive customer engagement by creating positive customer flow experiences [15]. Flow experiences are a potential antecedent of customer engagement in omnichannel contexts [36,41]. The mental processing caused by stimuli [64] reflect the subjective perception and overall evaluation of the cross-channel experience by fresh food customers [65].

2.4. Consumer Engagement as Response

Customer engagement is an important factor that affects the performance of a company and its sustainable profitability [18,66,67]. Davis and Bagozzi [68] argues that response "R" is the end result of customer response, which includes not only behavioral responses but also psychological responses, such as attitudes. Using only customer engagement behavior as the behavioral response of customers to the retailer's implementation of omnichannel integration makes is difficult to distinguish between customer's transactional motivation. When the correlation between customers and retailers with transaction motivation is very low and not long-term, it will make it difficult for retail enterprises to improve their business performance. An emotion-based relationship is a stronger "relationship" that leads to better business performance for the retailer, and it is essential to consider the customer's attitudinal "response" to the retailer. In addition, with the development of social media, the social attributes of the channel have also attracted the attention of researchers [69]; therefore, three dimensions of attitudinal engagement, re-patronage, and social interaction are used as responses (R) to represent the psychological and behavioral responses of customers to fresh food retailers under the stimulus of omnichannel integration, such as preferences, usage, engagement, and purchase [70].

3. Research Hypotheses and Conceptual Models

3.1. Omnichannel Integration and Flow Experience

Omnichannel integration in this study refers to the integration and unified management of fresh food retail enterprises' information, business, services, and distribution of fresh online and offline channels and contact points, such as fresh food online shops and stores. At the same time, it can create synergies for enterprises and provide customers with

seamless and consistent channel management methods, including three dimensions: information integration, business integration, and service and distribution integration [33,53,71]. Flow experience refers to the degree of immersion and pleasure of customers' interaction with multiple objects in the omnichannel (such as the retailer's physical store, website, app, and social media) [42]. Specifically, the business association and integration of different online and offline channels in order fulfillment, service and delivery, and other related shopping processes improve the processing fluency [72].

It can be seen that under omnichannel integration, customers can obtain a smooth [73], consistent, and seamless shopping experience [71] in unified channel management that can make customers focus on fresh food. Such fluency makes customers feel happy [74] and enjoy the state of being immersed in omnichannel shopping, so a flow experience emerges [75]. It does not divert attention or interrupt the transaction while switching different channels during the purchase process. Thus, it is easier to obtain the flow state brought by the cross-channels [76]. Accordingly, the following hypothesis is proposed in this study:

H1. *The higher the omnichannel integration of fresh food retailers, the more likely customers are to experience flow.*

3.2. Flow Experience and Attitudinal Engagement

Ajzen [77] believes that attitude is a general evaluation of an object, including beliefs, perceptions, and assessment of results. Attitudinal engagement (accurate, courteous, and efficient) can be understood as the degree of customers' psychological involvement, preference, affection, and investment in fresh food retailers according to customers' needs and interests [36]. Some researchers have pointed out that flow experience is an important antecedent influencing attitudinal engagement [36,61]. Customers' attitude preference toward fresh food retailers is based on cognitive effect evaluation [68] and emotional satisfaction [78].

Compared with the traditional single channel to buy fresh food, integrating online and offline channels brings about immersion. The attitudinal engagement occurs throughout the user experience [79]. It controls flow experience, which meets the fresh food customer's expectations of non-differentiated experience across channels and realizes the transformation of fresh food customers from functional consumption to experiential consumption. It can be seen that the fluency and immersion experienced by customers in the omnichannel process will change customers' cognition of fresh food retailers and will generate a favorable impression, trust, and positive word-of-mouth for the fresh food retailer emotionally [52]. Based on the above analysis, the following hypothesis is proposed in this study:

H2. *The better the flow experience of fresh food customers, the better their attitudes' engagement with those of fresh retailers.*

3.3. Attitudinal Engagement and Behavioral Engagement

Behavioral engagement refers to customers paying attention to a specific fresh food retailer, including re-patronage and recommendations, comments, helping other customers, and other social interaction behaviors [15,80]. According to the standard learning hierarchy theory of attitude, consumption behavior follows a hierarchical relationship of "cognition–emotion–intention–behavior". Cognition affects emotion, and emotion affects behavioral intention [47]. Additionally, the behavioral choice affects behavior. Wang et al. [81] and Zhou et al. [82] both verified that attitudinal engagement has a significant positive impact on re-patronage and social interaction.

The degree of closeness, dependence, exchange, and investment of customers with the enterprise will affect their subsequent behaviors [25]. Moreover, attitudinal engagement can trigger behavioral engagement, which also conforms to the general rule of the cognitive theory that psychological motivation influences actual actions. Specific to the fresh food field, when fresh food customers have a positive attitude toward the quality

evaluation of omnichannel integration, customers have recognition and satisfaction with fresh food retailers.

When such credit and satisfaction are high enough, customers will change their cognitive perception into the psychological perception of "safety, credibility, and fickleness" and corresponding emotional investment [37]. They will tell and disseminate the information about fresh agricultural products and the evaluation and psychological feelings about services, such as fresh food delivery [33]. As such, they will trust fresh food retailers more and be more willing to buy again [69,83]. Therefore, the following hypotheses are proposed in this paper:

H3a. *The more customers agree with the fresh food retailer in attitude, the more willing they are to continue to buy fresh food from the fresh food retailer.*

H3b. *The more customers agree with the fresh food retailer in attitude, the more willing they are to engage in social interaction with others.*

Based on the above literature review and theoretical analysis, this study constructed the following research model shown in Figure 1. Customers experience flow (organic) when stimulated by omnichannel integration implemented by fresh food retailers. This emotional change will eventually impact customer attitudes and behaviors (reactions), including customer attitudinal engagement, re-patronage, social interaction, and other responses.

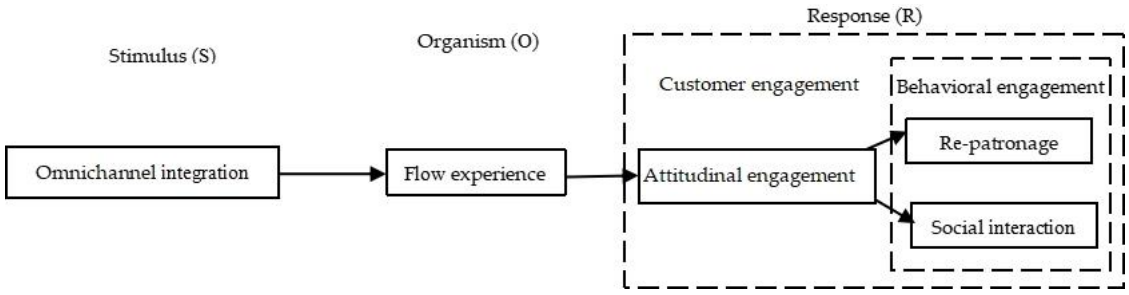

Figure 1. Formation mechanism model of customer engagement in fresh food omnichannel scenario. Source: Design of this study.

4. Research Design

4.1. Variable Measurement and Questionnaire Design

Based on domestic and foreign scales, this study has proven to be credible. It was adapted to the current state of research, taking into account the characteristics of fresh food and the findings observed by participants. The omnichannel integration scale designed by Lee et al. [33] is widely recognized and used by the academic community based on fresh food customers' high requirements for distribution. This study adjusts service integration to service and distribution integration and determines the measurements from three subdimensions consisting of information integration, business integration, and service and distribution integration. Flow experience was measured by using the scale proposed by Zhou and Lu [84], which is widely used in academic circles. This scale fits the actual situation of fresh food shoppers and has strong relevance. Referring to the scales designed by Hollebeek [25] and Wang et al. [81], customer engagement is divided into three dimensions, namely attitudinal engagement, re-patronage, and social interaction. The questionnaire adopted a 5-point Likert scale, with 1 representing "strongly disagree" and 5 representing "strongly agree". In early December 2020, online questionnaires were distributed for pre-survey. SPSS24.0 was used to conduct exploratory factor analysis on the pre-survey data, and it was found that the RP1 load of the re-patronage item was higher than 0.4 in both factors. After deleting the question item of RP1, sample reliability and validity passed the test, thus, forming a formal survey questionnaire. Finally, 128 valid questionnaires were collected during the pre-survey. All the items of the scale are shown in Table 1.

Table 1. Measurement scale of variables.

The Dimension	Measurement Item	References
Information integration (II)	I can check the detailed address of the fresh food retailer's offline store through its online store	Lee et al. [33]
	I can check the price information of the fresh food retailer's offline store through its online store	
	I can search the product information of the offline store through the online store of the fresh food retailer	
	I can search the stock information of the offline store through the online store of the fresh food retailer	
Business integration (IB)	The retailer allows customers to buy fresh produce online and pick it up offline	
	The retailer supports online purchases and offline returns for fresh produce	
	Offline stores provide after-sales service for the fresh produce that I buy online	
	Offline stores can provide timely, fresh food consultation services for online customers	
Service and distribution integration (SDI)	My impression of the fresh food retailer's online and offline stores is the same	
	I think the fresh food retailer's online and offline stores maintain the same level of service	
	I have the same perception of the delivery services of the fresh food retailer's online and offline stores (such as timely processing of returns and exchanges, real-time update of distribution information)	
	I think the fresh food retailer's online and offline stores have the same delivery timeliness	
Flow experience (FE)	When I use a combination of the retailer's online and offline stores to buy fresh food, time passes quickly	Zhou and Lu [84]
	I enjoy buying fresh food using a combination of the retailer's online and offline stores	
	I am immersed in the shopping as I use a combination of the retailer's online and offline stores to buy fresh food	
	I am interested in using a combination of the retailer's online and offline stores to buy fresh food	
Attitudinal engagement (ACE)	I'd like to know more about this fresh food retailer	Hollebeek [25]
	I'm pleased with the fresh food retailer	
	I love this fresh food retailer	
	I've spent more time with this retailer than any other retailer	
Re-patronage (RP)	I will continue to buy fresh produce from this retailer	Wang et al. [81]
	If there is a need to buy fresh food, I plan to buy from this retailer	
	I will often buy fresh food from this retailer	
Social interaction SI	I speak positively about the retailer to others	
	I would recommend the retailer to others	
	I like to share my experience of using this retailer with my friends	
	When I tell people about the retailer, I tell them in great detail	
	I feel happier using the retailer when others around me use it to buy fresh food	

4.2. Data Collection and Sample Statistics

The respondents were limited to customers with omnichannel purchase experience at a particular fresh food retailer identified by a screening item placed at the beginning of the questionnaire. The item was "Have you ever purchased fresh food (fruits and vegetables, meat, poultry, eggs and milk, seafood, frozen and refrigerated products, etc.) in both offline and online stores of an omnichannel retailer". If the answer was "no", the questionnaire was finished; if the answer was "yes", the respondent was selected for this study. In order to better understand the omnichannel fresh food purchase situation of the respondents and facilitate respondents' recall of their feelings about the latest purchase of fresh food, respondents were asked to identify retailers (such as FRESHIPPO, Bravo, Wal-Mart, Rt-Mart, Seven Fresh, Super Species, Neighbor Shop, Carrefour, PAGODA, sfbest.com, etc.) with which they had an omnichannel fresh food shopping experience and to select the type of channel (physical, online, or mobile) that they used the previous time.

A total of 570 questionnaires were distributed on the professional research platform Credamo in December 2020. By excluding invalid questionnaires that were incomplete, failed the screening test, took too little time, or had obvious answering patterns, 458 valid questionnaires were obtained, with a valid return rate of 80.4%. Females accounted for 59.8% and males accounted for 40.2% of the respondents; 92.1% were 18 to 35 years old, 80.1% had a bachelor's degree, and 57.8% of the respondents were from middle- and high-income groups (CNY 5000 to 15,000 per month). Of the respondents, 74.2% were employees who worked for enterprises and public institutions. The top four omnichannel preferences were FRESHIPPO, Rt-Mart, Wal-Mart, and Bravo for their latest purchases of fresh agricultural products. The channel customers used most at omnichannel retailers was the physical channel, accounting for 88% of the respondents, followed by the mobile channel and network channel, accounting for 68.8% and 53.9%, respectively, and finally, the social media channel, accounting for 17.7%. The sample distribution conformed to the characteristics and actual situation of fresh food omnichannel customers, and the quality of the data was high.

4.3. Data Analysis and Hypothesis Testing

First, Harman's single-factor method was used to test common methodological bias of the collected data. Second, the reliability and validity of measurement tools were analyzed by constructing measurement models. Finally, SPSS24.0 and AMOS24.0 were used to verify the relationship between variables and path coefficients in the structural equation model.

4.4. Common Method Bias Testing

There may be a common method bias since the above variables were all measured by self-evaluation. The Harman single-factor method was used to test the common method bias before data analysis [85]. Through unrotated factor analysis, seven factors have eigenvalues greater than 1, and the explanatory degree of variables reaches 72.08%, of which the explanatory degree of the first factor is 39.82%, less than the critical value of 40%, indicating that the common method bias of the survey data used in this study is not significant.

4.5. Reliability and Validity Testing of the Measuring Tools

The reliability and validity of the measurement tools were tested in this study. The Cronbach's α of the measurement scales of latent variables of information integration, business integration, service and distribution integration, and the flow experience, attitudinal engagement, re-patronage, and social interaction were all greater than 0.8, indicating that the internal consistency of the scale is very high (see Table 2). Analysis of the measurement model shows that after the normalization of the observed variables, the factor loads ranged from 0.647 to 0.932, all of which were greater than 0.6 ($p < 0.001$), and the standard error of measurement error variance of latent and observed variables ranged from 0.043 to 0.071. The combined reliability (CR) values ranged from 0.836 to 0.909, and the average vari-

ance extracted (AVE) values were above 0.5, indicating that the scale had good reliability and validity.

Table 2. Reliability and validity analysis.

Dimensions	Indicators	Unstd.	S.E.	Z-Value	*p*	std.	SMC	CR	Cronbach's α	AVE
Information integration (II)	II1	1				0.853	0.728	0.909	0.909	0.716
	II2	0.95	0.045	21.157	***	0.815	0.664			
	II3	0.932	0.047	19.774	***	0.776	0.602			
	II4	1.14	0.043	26.72	***	0.932	0.869			
Business integration (BI)	IB1	1				0.843	0.711	0.886	0.884	0.661
	IB2	0.838	0.047	17.867	***	0.739	0.546			
	IB3	0.845	0.047	17.81	***	0.739	0.546			
	IB4	1.077	0.045	23.807	***	0.918	0.843			
Service and distribution integration (SDI)	SD1	1				0.752	0.566	0.853	0.851	0.596
	SD2	1.045	0.065	16.015	***	0.771	0.594			
	SD3	0.786	0.058	13.519	***	0.647	0.419			
	SD4	1.199	0.067	17.891	***	0.897	0.805			
Flow experience (FE)	FE1	1				0.775	0.601	0.836	0.834	0.561
	FE2	0.835	0.06	13.832	***	0.679	0.461			
	FE3	0.804	0.057	14.169	***	0.687	0.472			
	FE4	1.155	0.07	16.437	***	0.844	0.712			
Attitudinal engagement (ACE)	ACE4	1				0.758	0.575	0.840	0.839	0.567
	ACE3	0.866	0.061	14.309	***	0.718	0.516			
	ACE2	1.052	0.07	15.13	***	0.769	0.591			
	ACE1	1.057	0.071	14.902	***	0.767	0.588			
Re-patronage (RP)	RP1	1				0.881	0.776	0.884	0.883	0.718
	RP2	0.945	0.045	21.121	***	0.851	0.724			
	RP3	0.934	0.046	20.103	***	0.808	0.653			
Social interaction (SI)	SI1	1				0.798	0.637	0.857	0.855	0.548
	SI2	0.813	0.057	14.277	***	0.68	0.462			
	SI3	0.84	0.06	14.075	***	0.679	0.461			
	SI4	0.855	0.054	15.73	***	0.707	0.500			
	SI5	1.034	0.061	16.916	***	0.824	0.679			

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

The discriminant validity test results of variables are shown in Table 3. The square root of the AVE values of each variable are more significant than their Pearson correlation coefficients with other variables. It shows that the seven measuring tools have good discriminant validity.

4.6. Second-Order Processing of Omnichannel Integration

Chen et al. [86] pointed out that even if a construct is multidimensional in nature, researchers may sometimes be interested only in global constructs. In such cases, it is perfectly reasonable to treat the construct as a one-dimensional construct. This study focuses on exploring the relationship among omnichannel integration, flow experience, and customer engagement. To simplify the model and facilitate empirical testing, the three latent variables of omnichannel integration, namely information integration, business integration, and service and distribution integration, were processed in the second order [57]. Before processing, it was necessary to check whether the second-order model of omnichannel integration was established. As shown in Table 4, the fitting degree of the three-factor model is much better than that of the single-factor model, while the fitting degree indexes of the second-order factor model are all above the corresponding standard, and the overall fitting is good. Therefore, the second-order model was adopted in the subsequent structural model checking.

Table 3. Discriminant validity.

Variable	Social Interaction (SI)	Re-Patronage (RP)	Attitudinal Engagement (ACE)	Flow Experience (FE)	Service and Distribution Integration (SDI)	Business Integration (IB)	Information Integration (II)
Social interaction (SI)	**0.740**						
Re-patronage (RP)	0.492	**0.847**					
Attitudinal engagement (ACE)	0.577	0.613	**0.753**				
Flow experience (FE)	0.524	0.571	0.718	**0.749**			
Service and distribution integration (SDI)	0.364	0.522	0.571	0.537	**0.772**		
Business integration (IB)	0.671	0.513	0.583	0.511	0.387	**0.813**	
Information integration (II)	0.560	0.451	0.607	0.480	0.429	0.627	**0.846**

Note: The bold values in the table are the square root of AVE of the latent variables, and the value below the diagonal is the absolute value of the Pearson correlation coefficient of variables.

Table 4. Model fit index of the second-order confirmatory factor of omnichannel integration.

Omnichannel Integration Second-Order Validation Factor Model	X^2 Value	Degrees of Freedom (df)	χ^2/df	GFI	AGFI	CFI	RMSEA
First-order one-factor analysis	1393.958	55	25.345	0.614	0.453	0.606	0.231
First-order three-factor pattern (No correlation between factors)	396.186	54	7.244	0.878	0.823	0.901	0.117
First-order three-factor pattern (There is a correlation between the factors)	128.015	51	2.51	0.957	0.934	0.977	0.057
Second-order factor model	128.015	51	2.51	0.957	0.934	0.977	0.057
Recommended values	The smaller the better	The bigger the better	<3	>0.9	>0.9	>0.9	<0.08

4.7. Structural Model Checking

AMOS 24.0 statistical analysis software was used to analyze the relationship between variables, and the structural equation model is shown in Figure 2. The result of the data fit test is $\chi^2/df = 2.616 < 3$, GFI = 0.886 > 0.8, AGFI = 0.864 > 0.8, TLI = 0.921 > 0.9, CFI = 0.929 > 0.9, and RMSEA = 0.059 < 0.08. As can be seen from the above index values, the measurement model of this study has a high degree of fit with the actual data of the survey; thus, the model has a good fit.

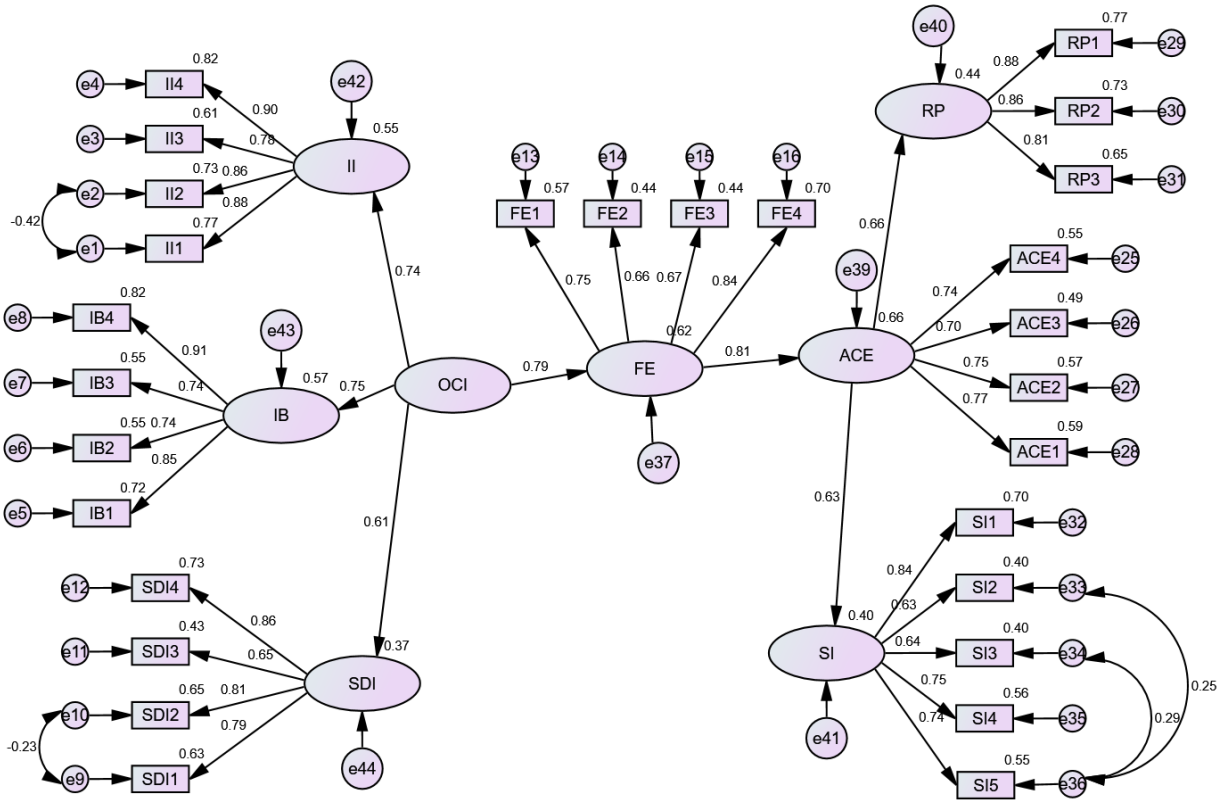

Figure 2. Structural equation model. Source: Design of this study.

Table 5 shows that fresh food retailers' omnichannel integration has a significant positive impact on the flow experience (path coefficient is 0.788, $p < 0.001$). This indicates that if a customer perceives a higher degree of omnichannel integration in a fresh food retailer, then that customer does not feel the compartmentalization between channels in the online channel–offline channel shuttle and can have a smooth cross-channel experience, thus, enjoying the pleasant mind-flow state brought by cross-channel shopping [87]; thus, hypothesis H1 is supported. Flow experience has a significant positive effect on attitudinal engagement (path coefficient of 0.814, $p < 0.001$, respectively), which shows that as the customer's flow experience increases, the more positive the customer's attitude toward that fresh food retailer is, and hypothesis H2 is supported. Attitudinal engagement has a significant positive effect on behavioral engagement, specifically, the path coefficient of attitudinal engagement re-patronage is 0.662, $p < 0.001$, and the path coefficient of attitudinal engagement social interaction is 0.632, $p < 0.001$. The above results indicate that the more positive the customer's attitude toward a fresh food retailer, the more the customer is willing to continue to buy fresh food from that retailer, and the customer is more willing to recommend, share, and evaluate to others to recommend, share, and evaluate; therefore, hypothesis H3a and H3b are supported.

Table 5. Hypothesis testing results of the model.

Hypothetical Path	Standardized Coefficients	T Value	Verification Result
H1: Omnichannel integration → flow experience	0.788	10.777 ***	Support
H2: Flow experience → attitudinal engagement	0.814	13.241 ***	Support
H3a: Attitudinal engagement → re-patronage	0.662	12.279 ***	Support
H3b: Attitudinal engagement → social interaction	0.632	11.256 ***	Support

Note: *** means $p < 0.001$

5. Conclusions and Discussion

5.1. Research Conclusions

Based on the theoretical conceptual model of "stimulus–organism–response," with fresh food retail enterprises as an example, this study explores the influence mechanism of omnichannel integration on fresh food customer engagement. The findings show that omnichannel integration has a significant positive impact on flow experience, consistent with the existing literature [35,52]. Our results show that the higher the degree of channel integration perceived by customers of fresh food retailers, the easier it is for customers to have a pleasant and immersive flow experience in omnichannel shopping. Because of the wide variety of fresh agricultural products, it is challenging to achieve standardization, and it is difficult for customers to distinguish good from bad. They are worried about the different quality of fresh products purchased from various channels. Therefore, the consistent service experience of various channels has become an essential factor affecting consumers' perception of the service quality of fresh food retailers. In the omnichannel integration mode, all channels learn from and cooperate with each other. Customers cannot only intuitively and genuinely understand the quality of fresh agricultural products through taste, touch, vision, and other means through offline channels but also enjoy the convenience of shopping anytime and anywhere through an online channel. Various omnichannel modes, such as "online ordering + in-store pickup", "in-store consumption + online shopping + instant delivery", "online community shopping + home delivery", and "community stores + platform services", enable customers to freely choose a channel that meets their specific needs throughout the whole process of information search, selection, ordering, payment, receiving, feedback, and commenting on fresh agricultural products [88]. At the same time, channel switching is natural and unhindered [89]. Customers do not feel the division between channels in a highly integrated omnichannel retail system. They can get a smooth cross-channel experience and enjoy the pleasure brought by cross-channel shopping, which can improve the initiative and motivation of customer participation, leading to the flow state in customers [87].

Further, we found that the flow experience has a significant positive effect on customer engagement. The better the customer's flow experience, the more positive the customer's attitude toward the fresh food retailer. This is in line with the findings of Yu [90] and also validates Li's [35] theoretical view. It can be seen that as the customer's flow experience increases, the more positive the customer's satisfaction, preference, and favor-ability toward that fresh food retailer. In addition, the more attitudinal engagement with the fresh food retailer, the more willing the customer is to continue to purchase fresh food from that retailer. Furthermore, the positive attitude influences the customer to positively evaluate, recommend, and share the experience of shopping at that retailer to others, and in the event that others need the knowledge to introduce it in detail, to help other customers, and to form emotional recognition and pleasure with other customers.

We also found that customer engagement is a process framework that can be divided into attitudinal engagement and behavioral engagement, and behavioral engagement can be divided into two levels of re-patronage and social interaction, with attitudinal engagement directly influencing re-patronage behavioral engagement. This is also consistent with the intention–behavior conceptual association and with the findings of Wang [81], which suggest that customer engagement is a process framework.

5.2. Theoretical Contribution

First, this study defines fresh food customer engagement from the process of perspective, verifies the rationality of the division of psychological and behavioral aspects of customer engagement in fresh food omnichannel retail, and confirms the conceptual association of cognition–emotion–ideal–active behavior. This study also connects the psychological and behavioral engagement of fresh food customers and extends the causal chain of customer engagement. It offers a more accurate and scientific internal category classification and division for future research on omnichannel customer engagement be-

havior, and also gives empirical support for the views of Kumar et al. [15] and Manser et al. [91]. Therefore, this study provides a new perspective for the academic community by combining omnichannel integration with customer value creation to understand customer engagement. It is also responds to researchers' call for empirical testing of customer engagement in the omnichannel context [15,91].

Second, this study adds to the research on the formation mechanism of omnichannel integration to customer engagement in the context of fresh food omnichannel retailing. Based on the "stimulus–organism–response" model, this study constructs and tests the influencing factors of customer engagement in the omnichannel context, filling the theoretical gap between omnichannel integration and customer engagement in the fresh food field. This model includes the main research line of "external environment stimulus (omnichannel integration)–customer's internal state (flow experience)–customer's attitude response (attitudinal engagement)–behavior response (behavioral engagement) [92] (Prentice et al. (2019)". It makes up for the lack of attention paid to omnichannel integration and fresh food customer engagement mechanisms in the existing research. It helps define the role of omnichannel integration in improving the transportation experience and improves the relevant theories of fresh agricultural products circulation research. Finally, it enriches the literature on the transit experience and extends it to omnichannel retail conditions.

5.3. Management Implications

The study of customer engagement and its antecedents can help fresh food omnichannel retailers establish the consciousness of customer lifetime value. The conclusions of this study have practical value for fresh food retail enterprises to realize customer value co-creation.

First, fresh food retailers should change the strategic orientation of "enterprise-centric" channel design and investment and adopt "customer-centric" omnichannel integration as the guiding idea for value creation between customers and retailers [93]. Under the "enterprise-centric" channel management perspective, fresh food companies focus on short-term sales improvement and hope to capture the market by opening multiple channels but fail to integrate various channels, resulting in channel conflicts. The competition of the future is the competition of customer value. Hence, enterprises should regard customers as the input of enterprise resources and production process partners, the co-creator of enterprise value, rather than just the buyer and customer. Companies should consider how to make the customers engaged when receiving fresh food business services. Highly attuned customers are part of the growth of the company, an operational resource that can add value to the company and the basis for value co-creation. Under this idea, fresh food enterprises should bring together customers, fresh food, and services through various interactive channels from the perspective of customer participation and interaction, integrating online platforms, members of the food supply chain, and offline physical stores [94]. This also includes strengthening user experience, transforming consumption habits and, thus, enhancing customer trust and customer commitment to achieve favorable word-of-mouth propagation [95]. As well as obtaining the external economic effect of experiential consumption word-of-mouth effect, i.e., gaining new customers [96], thus, forming the core competitiveness and sustainable development advantage of fresh food retailers.

Second, accurately grasping the omnichannel integration model is vital in enhancing the flow experience. Fresh food retailers should implement appropriate omnichannel integration strategies to improve customer flow experience. Fresh food retailers can develop different levels of omnichannel integration strategies, from information and business to service delivery according to their own target positioning of customer engagement and considering the complementarity between the three channel integration modes to form a channel ecosystem covering the needs of fresh food customers. They can drive coordinated business flow, logistics, and business processes through information flow [97] and thereby gradually improve channel coordination. At the same time, they can be gathering customers and fresh agricultural products and services together, integrating online platforms

and offline physical stores, and speeding up logistics information networking through information platform construction, supporting the fresh food online purchase and the offline physical stores providing delivery service or in-store service and breaks channel conversion barriers. Then, customers can seamlessly shuttle between channels anytime and anywhere in every stage of fresh food purchase, so as to realize the immersive flow experience, effectively solving channel cannibalization caused by channel conflicts under multiple channels and improves business performance.

Third, fresh food retailers must continually enhance the customer flow experience, which is key to promoting customer engagement. The research conclusion of this paper points out the role of customer flow experience in the process of the influence of omnichannel integration. It shows that fresh food business firms should focus on the balanced development and synergistic integration of different types of online and offline service quality. First, strengthen the construction of e-service quality in online channels, including elaborate design of website and APP interfaces, optimize shopping navigation, use 3D product display technology and interactive multimedia tools. It will enhance the sense of touching goods in online virtual space, create a beautiful virtual shopping experience, and improve the quality of human–computer and interpersonal communication. At the same time, these will strengthen online guidance and feedback to omnichannel consumers and guide consumers to actively participate in the interaction of the virtual community on the website. Secondly, improve the level of physical service quality in offline channels, bring into play the comprehensive perception of sight, sound, taste, smell, and touch in physical stores. As a result, create good service facilities and atmosphere, ensure fair prices and promotional integrity, enhance employees' service attitudes and skills, optimize service remediation procedures, and create a shopping atmosphere that puts consumers at ease and provides a comfortable retail experience. Finally, they should also establish an omnichannel experience marketing scene and continuously optimize the shopping methods of consumers' online inquiries and offline purchases or offline experiences and online purchases to meet consumers' "showroom" and "anti-showroom" shopping experiences by providing an interactive experience with a consistent process and seamless connection, allowing customers to experience convenience and pleasure from a cross-channel information search, business process, and service experience. Their favorable impression and preference for enterprises will be enhanced, and their willingness to actively participate in omnichannel activities will also be improved accordingly.

Finally, managers should promote the realization of fresh food customer engagement behavior. This study proves that customer engagement can be divided into two levels, attitude and behavior, and the transfer from attitude to behavior need transformation. Fresh food retail business firms can design professional search engines using video, virtual reality, and other technologies to provide highly three-dimensional and visual fresh agricultural product information. It can enrich the channels of interaction between customers and companies, increase customers' perception of value and trust in the fresh food retailer, and achieve attitudinal engagement. Once attitudinal engagement is established, firms can further expand and add community channels and regularly release community activities, meanwhile creating a space for customer interaction. Firms can also add user topic discussion areas, encourage users to comment on products, broaden communication methods with customers, and guide customers to generate more emotional and behavioral investment, so as to promote positive word-of-mouth communication, obtain the external economic effect of experiential consumption, and make fresh food customers change their positive attitudes into behavior. Customer engagement becomes an operational resource that can bring value added to enterprises, and ultimately enables fresh food enterprises to have core competitiveness and sustainable development advantages.

6. Research Limitations and Future Research Directions

This study has certain limitations. First, the potential common method bias is caused by single-source data. We employed a recall method to activate customers' recent om-

nichannel shopping experience as a basis for forming their perception of omnichannel integration. Although this recall method is a valid survey method to collect perceptual data by soliciting respondents' perceptions of prior experience, future research should cross-validate the effects of omnichannel integration with experimental design to provide more conclusive empirical evidence for the causal relationship between core variables in the model.

Second, culture may also influence how omnichannel integration affects consumer engagement. Cultural factors have a strong influence on the consumer decision-making process, and different cultural backgrounds can lead to different consumer choices [98]. This study only selected Chinese samples, which reduces the generalization of the research conclusions. We conducted the investigation in China, a country that has cultural values different from Western countries [99]. The research conclusions could be verified in different cultural backgrounds in the future.

Third, this study attempts to reveal a new omnichannel phenomenon. Technology is changing the future of retailing. The key will lie in successfully integrating all channels in order to think about them as consumers do and try to offer shoppers an integrated and comprehensive shopping experience. This study only discussed the impact of omnichannel integration on customer engagement but did not discuss the antecedents that affect omnichannel integration. In the future, it is necessary to consider the influence of external enterprise factors (i.e., industry concentration and institutional pressure) and internal factors (i.e., corporate relationship governance capabilities and channel internalization strategies) on omnichannel integration, so that companies can clarify how to carry out omnichannel integration and explore innovative business solutions in omnichannel retailing.

Fourth, the influence of sociodemographic variables, such as age or gender, as moderator variables to complement the current model should be explored. In keeping with Li et al. [53], it would also be interesting to examine customer showrooming experience as a moderator variable in customer engagement. The showrooming experience represents a cross-channel customer experience, and also reflects the customer's demand for reducing uncertainty, desirable options, and cost savings in the transaction process, which is important for maintaining long-term customer relationships [100]. In addition, psychological factors (i.e., customer personality and cognition), channel factors (i.e., logistics service quality and logistics communication quality), and company factors (i.e., capital gains, technology challenges) will be interesting directions for future research to focus on to further explore the functional boundary of the degree of omnichannel integration.

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