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How does customer involvement in service innovation motivate service innovation performance? The roles of relationship learning and knowledge absorptive capacity

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Abstract

Service innovation has become an essential element for firms to promote their business successes, attract new customers, accelerate growth, and increase profitability. Service innovation requires customers to be more deeply involved in service product innovation. Yet, few empirical studies have examined the business outcomes of customer involvement in service innovation. There has been a lack of convincing arguments for firms to improve their service innovation performance by enhancing their internal knowledge absorptive capacity or their external relationship learning. To fill these research gaps, the current work explores the internal mechanisms and contextual conditions of the relationship between customer involvement in service innovation and firms' service innovation performance. Our findings suggest that (1) higher degrees of customer involvement in service innovation significantly contribute to the improvement of service innovation performance, (2) relationship learning plays a mediating role in the link between customer involvement in service innovation and service innovation performance, (3) greater knowledge absorptive capacity substantially increases the impact of customer involvement in service innovation on relationship learning, and (4) greater knowledge absorptive capacity significantly increases the indirect effects of customer involvement in service innovation on service innovation performance via relationship learning. Drawing on both service-dominant logic (SDL) and resource dependence theory (RDT), our findings contribute to the literature on service innovation for both manufacturing and service sector firms by revealing that the improvement of service innovation performance requires a full understanding not only of customer involvement but also of internal and external organizational learning capacities.

Keywords: Service innovation; Customer involvement; Knowledge absorptive capacity; Relationship learning

1. Introduction

As the global economy becomes ever more service-oriented, firms have realized that service innovation is an increasingly important aspect of gaining a competitive advantage and formulating new business strategies (Carbonell, Rodríguez-Escudero, & Pujari, 2009; Statsenko & de Zubielqui, 2020). Service innovation refers to a number of activities that can promote business operations and services and

generate new value propositions (Ndubisi, Dayan, Yeniaras, & Al-hawari, 2020). Service innovation encourages firms to develop products, technologies, and services that conform to market preferences; the development of these things is essential for firms' prosperity in the face of increasingly fierce business competition (Casidy, Nyadzayo, & Mohan, 2020; Chen, Tsou, &

Ching, 2011; Heirati & Siahtiri, 2019; Ndubisi et al., 2020). To promote the effectiveness of service innovation, many companies work to integrate their activities and resources with other value-creating entities, including customers (Anning-Dorson, Hinson, Amidu, & Nyamekye, 2018; Iden, Eikebrokk, & Marrone, 2020). Correspondingly, innovation research attempts to identify the factors that are essential to service innovation. Researchers have found that customer involvement is generally considered an important element for the success of the service innovation process (Chen et al., 2011). Although there is now greater awareness of the importance of customer involvement (Cui & Wu, 2016; Najafi-Tavani, Mousavi, Zaefarian, & Naudé, 2020), few empirical studies have focused their attention on the internal mechanisms that lead to productive outcomes for customer involvement in service

innovation. This research gap restricts our understanding of the mechanisms by which customer involvement in service innovation improves firms' service innovation performance. There are several reasons for the paucity of research on this subject. First, published research lacks both the theoretical development and the empirical testing of whether manufacturing and service firms' service innovation performance truly benefits from customer involvement. While the importance of manufacturing firms working closely with customers when developing new services has begun to be acknowledged (Johansson, Raddats, & Witell, 2019; Schaarschmidt, Walsh, & Evanschitzky, 2018), scholars have mainly been interested in the effect of customer involvement on product innovation and firm performance (e.g., Cui & Wu, 2016; Ho, Chung, Kingshott, & Chiu, 2020; Najafi-Tavani et al., 2020; Tjahjono & Cao, 2020; Xie & Wang, 2020; Zaborek & Mazur, 2019). Unlike service companies, the lack of a formal way to guide service innovation efforts in the servitization of manufacturing firms could lead to the failure of service innovation in such firms (Mennens, Van Gils, Odekerken-Schröder, & Letterie, 2018; Storey, Cankurtaran, Papastathopoulou, & Hultink, 2016). Nevertheless, we know that to a certain extent, customer involvement is an essential factor in service innovation (Carbonell et al., 2009). There is thus an urgent need to explore the broader performance benefits related to involving customers in service innovation: it is necessary to further investigate how to engage with customers to amplify the service innovation performance of both manufacturing and service firms. Second, although some scholars incorporate customer involvement in service innovation in their work (Carbonell et al., 2009; Chen et al., 2011; Heirati & Siahtiri, 2019; Ho et al., 2020), there is little research on the internal mechanisms of how customer involvement promotes service innovation performance. Existing studies discuss how companies' relationship learning can use their connections with customers in order to integrate more resources (Bhatti, Larimo, & Servais, 2020; Chen, Lin, & Chang, 2009), and also that firms and their customers can engage in ongoing innovation through their interactions (Wang & Hsu, 2014; Zeng, Xie, & Tam, 2010). However, the crucial role of relationship learning as an intermediary between customer involvement and service innovation performance has largely been ignored in the literature. Moreover, there are studies on relationship learning that discuss its effects on product innovation (Fang, Fang, Chou, Yang, & Tsai, 2011; Najafi-Tavani et al., 2020) and product innovation performance (Chen et al., 2009), yet the possible impact of relationship learning on service innovation performance continues to be poorly understood. Therefore, in the current work, we sought to advance our understanding of relationship learning in service domains and to analyze the role of relationship learning in the link between customer involvement and service innovation performance. Third, although some researchers have linked relationship learning to either customer involvement or knowledge absorptive capacity (e.g., Chen et al., 2009; Najafi-Tavani et al., 2020), little attention has been given to their combined impact on relationship learning. Specifically, although there is much research on customer involvement (e.g., Cui & Wu, 2016; Najafi-Tavani et al., 2020), as well as organizational learning and interorganizational learning (e.g., Bhatti et al., 2020; Heirati & Siahtiri, 2019; Hung, Yang, Lien, McLean, & Kuo, 2010), studies examining the contextual conditions by which customer involvement affects relationship learning remain quite limited. To better understand more about the learning mechanisms that exist between organizations, absorptive capacity theory can be used to complement our understanding of knowledge-sharing routines (Tjahjono & Cao, 2020). Therefore,

in this work, we integrated the influence of knowledge absorptive capacity into our model to test whether the strength of the relationship between customer involvement and relationship learning depends on the level of knowledge absorptive capacity. Fourth, although the literature discusses the important role of customer involvement in corporate service innovation (e.g., Carbonell et al., 2009), it remains unclear exactly how and when the underlying

mechanisms for customer involvement improve corporate service innovation performance via relationship learning. When external ideas originate from customers, they are typically quite different from ideas generated within a firm, and for this reason, they are often more difficult to be understood and to be absorbed by firms (Schweisfurth & Raasch, 2018). Knowledge absorptive capacity can enable firms to effectively acquire and use the knowledge shared with them by their customers, thereby positively affecting firm innovation (Chen et al., 2009; Xie, Zou, & Qi, 2018). Yet, while many scholars have examined the important role of absorptive capacity in enhancing product innovation (Martínez- Sánchez, Vicente-Oliva, & Pérez-Pérez, 2020), they frequently have ignored its importance in service innovation. In our present knowledge economy era, investments in both external determinants (i.e., relationship learning) and internal determinants (i.e., knowledge absorptive capacity) are crucial for improving firms' innovation performance and competitive advantage (Chen et al., 2009). Therefore, we propose that the effect of customer involvement on firm service innovation performance via relationship learning depends on the level of a firm's knowledge absorptive capacity. The various research gaps discussed above indicate that our existing knowledge is insufficient for providing theoretically reasonable and managerially useful recommendations on whether, how, or under what conditions customer involvement can improve service innovation performance via relationship learning, as well as what the practical implications of such an underlying mechanism might be. Therefore, in this study, we sought the answers to three specific questions: How does customer involvement affect service innovation performance? Does relationship learning mediate the effect of customer involvement on service innovation performance? And lastly, does knowledge absorptive capacity moderate the indirect relationship between customer involvement and service innovation performance via relationship learning? To answer these questions, we used data from both manufacturing and service firms in China to investigate the mechanisms and conditions by which customer involvement promotes service innovation performance through both internal absorptive capacity and interorganizational learning capacity. In so doing, our aim was to offer several important contributions to the literature. First, by theoretically and empirically examining the effect of customer involvement on firms' service innovation performance, we looked to clarify how firms can promote their service innovation activities. Second, we sought to contribute to the service innovation research by identifying how customer involvement can improve a firm's service innovation performance through the role of relationship learning at the interorganizational level. Third, by establishing a moderated mediation model, we endeavored to provide a better understanding of the contingent role of knowledge absorptive capacity by identifying how the interaction between knowledge absorptive capacity and customer involvement affects firms' relationship learning and service innovation performance.

2. Conceptual framework and hypotheses

2.1. Conceptual framework

Service-dominant logic (SDL) emphasizes that the units of exchange in business are competencies or skills (Lusch, Vargo, & O'Brien, 2007). Bitner (2017) stated that all such exchanges are service-related and also that everything is essentially a service. In this view, not only do service firms need to follow SDL but also manufacturing firms, many of which have been changing from a product-oriented strategy to a service-oriented strategy (Gebauer, 2009; Yiu, Ngai, & Lei, 2020). Under SDL, customers perceive the process of producing services geared toward them, and to a critical extent, they participate in that process as co-creators (Bitner, 2017; Zaborek & Mazur, 2019). In fact, customers have particular capabilities that may be able to help all types of firms create new services and improve their service innovation performance to meet changing needs (Witell et al., 2017). However, the effect of

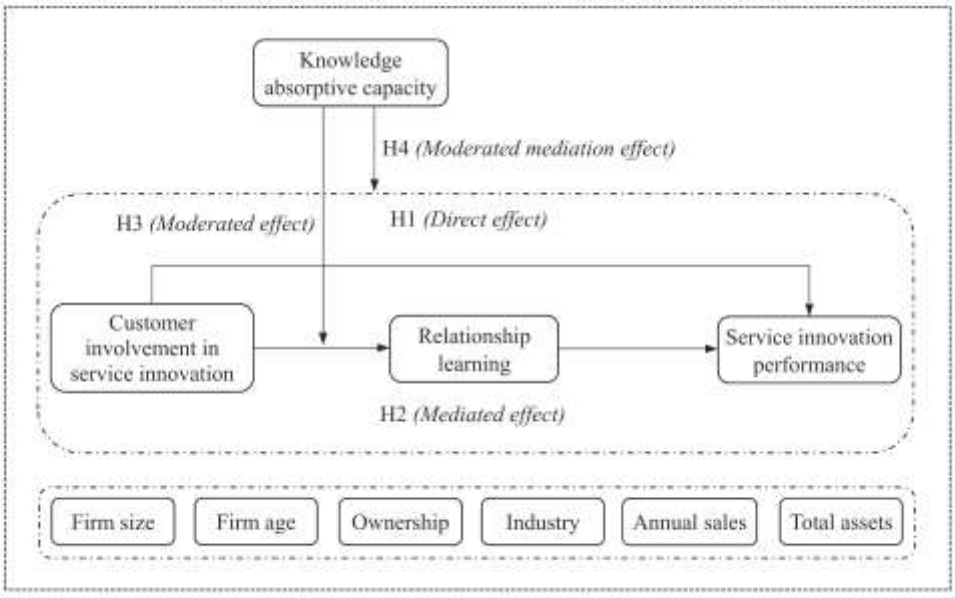

Fig. 1. Conceptual model.

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customer involvement in service innovation is likely to be contingent on various factors (Saldanha, Mithas, & Krishnan, 2017), and how these other factors moderate or mediate the relationship between customer involvement and service innovation performance requires a systematic research framework and empirical verification. Following resource dependence theory (RDT), an organization is rarely completely self-contained; rather, any given organization depends on other organizations for the many resources it requires, which means it must interact with fellow organizations to obtain those resources (Albort-Morant, Leal-Rodríguez, & De Marchi, 2018; Liu & Chen, 2018; Pfeffer & Salancik, 1978). Consequently, it is vital for firms to establish effective and innovative external relationships; in fact, these types of external relationships need to be established with their own customers, as well (Liu & Chen, 2018). Good customer involvement in service innovation activities can lead to relationship learning between a firm and its customers, can inspire a willingness of both parties to learn from each other, and can obtain future benefits by engaging in the exchange of ideas (Liu & Chen, 2018). Thus, we argue that relationship learning, which is regarded as an effective interaction capability based on RDT (Liu, 2012), might affect a firm's service innovation performance. However, acquiring external knowledge alone is not enough to enable firms to fully incorporate the new knowledge into their service innovation processes. It is also important for firms to focus on absorptive capacity, which is the internal ability of firms to successfully absorb, transform, and apply knowledge from the outside (Chen et al., 2011; Ferreras-Méndez, Fernández-Mesa, & Alegre, 2019; Martín-de Castro, 2015). Firms wanting to utilize customer resources successfully—especially distant sources of knowledge from cognitive perspective—need to develop their internal capabilities to absorb that external knowledge (Santoro, Bresciani, & Papa, 2020). Therefore, we propose that knowledge absorptive capacity might moderate the relationship between customer involvement and service innovation performance through relationship learning. Based on both SDL and RDT, we provide the conceptual model shown in Fig. 1, which illustrates the internal mechanism and boundary conditions for improving firms' service innovation performance. This model includes service innovation performance as the dependent variable,

customer involvement in service innovation as the independent variable, knowledge absorptive capacity as the moderator, and relationship learning as the mediator. The model suggests several relationships among these variables, which are clearly identified in the hypotheses below.

2.2. Customer involvement and service innovation performance

Customer involvement in service innovation is defined as "the extent to which service producers interact with current (or potential) representatives of one or more customers at various stages of the new service development process" (Carbonell et al., 2009, p. 537). Close interactions with customers allow firms to

be able to collect heterogeneous knowledge from them (Fang et al., 2011). This heterogeneous knowledge is an important resource that can help the firms enrich the diversity of their own knowledge and discover novel service ideas (Alam, 2002; Heirati & Siahtiri, 2019). Moreover, good customer involvement provides firms with a better understanding of their customers' needs, thereby improving the adaptability of solutions to existing customer processes, allowing the firms to move beyond what they could do without such customer input (Hakanen, Kansola, & Valkokari, 2014; Johansson et al., 2019). Therefore, as illustrated in Fig. 1, customer involvement in service innovation has become a critical technique for companies to improve their service innovation performance. Service innovation performance refers to the degree to which a firm achieves a competitive advantage based on service innovation (Mennens et al., 2018; Storey et al., 2016). Previous research suggests that firms (service providers) need to create value by combining and exchanging resources with their customers, which is the foundation for producing outstanding new service performance (Carbonell et al., 2009; Chen et al., 2011). Accordingly, it is incredibly useful for firms to encourage their customers to participate in the service innovation process, which allows the firms to generate both revenue and recommendations for their products (Kohtamäki & Partanen, 2016). Firstly, customer involvement in service innovation enables firms and customers to conduct co-innovation activities according to feedback or expert opinions, allowing them to develop need-based solutions to existing issues (Bhatti et al., 2020). In fact, customers can often think beyond the scope

of current notions and contribute new ideas (Witell, Gustafsson, & Johnson, 2014). Secondly, customers closely involved in service innovation can provide contextual knowledge that is essential for firms to understand how their customers use their products (Mahr, Lievens, & Blazevic, 2014). This process provides a more accurate assessment of their customers' needs, and it also allows the firms to avoid developing irrelevant features (Carbonell et al., 2009) and to contribute to outstanding service innovation performance. Therefore, we propose the following: Hypothesis 1. Customer involvement in service innovation is positively correlated to service innovation performance.

2.3. Relationship learning as the mediator

By definition, relationships refer to connections and networks among individuals or groups, including those between a firm and its suppliers or customers (Chen et al., 2009; Xie & Wang, 2021). The relationship between a firm and its customers is central to the present study. Based on organizational learning theory, relationship learning is defined as "a joint activity between a supplier and a customer in which the two parties share information, which is then jointly interpreted and integrated into a shared relationship-domain-specific memory that changes the range or likelihood of potential relationship-domain-specific behaviour" (Selnes & Sallis, 2003, p. 80). As a special type of interorganizational learning, relationship learning consists of three main subdimensions: information sharing, joint sensemaking, and relationship-specific memory (Selnes & Sallis, 2003). Information sharing refers to the extent to which partners exchange proprietary information with each other (Fang et al., 2011; Selnes & Sallis, 2003); joint sensemaking refers to the conceptual mechanism for interpreting and communicating information between partners (Fang et al., 2011; Selnes & Sallis, 2003); and relationship-specific memory is the stored knowledge of collective insights, routines, and procedures accumulated through interactions and sharing among organizations (Fang et al., 2011; Selnes & Sallis, 2003). Strong business relationships provide greater possibilities for business partners to share their expertise with each other (Hsu & Fang, 2009), and business partners can include a firm's customers. Thus, the communication between a firm and its involved customers provides the basis for the relationship-learning process. First, relationship learning emphasizes the impact of close relationships between partners on learning outcomes (Wang & Hsu, 2014). High knowledge sharing and effective learning activities can occur and be maintained between firms and their customers through intensive customer involvement in service innovation (Fang et al., 2011). Second, customers involved in service innovation are invaluable for providing joint solutions, strengthening mutual goals, and reducing cognitive distance (Bhatti et al., 2020), all of which help form joint sensemaking between a firm and its customers. Third, firms can build close relationships with customers by involving customers in service innovation in order to share information, which can then be integrated into relationship-specific knowledge (Wang & Hsu, 2014). Moreover, close relationships

between firms and customers reduce cognitive distance and increase interactions, leading to shared knowledge stores and common beliefs that can form the relationship-specific memory embedded in the mutual relationship (Wang & Hsu, 2014). Furthermore, relationship learning is an important way for firms to gain a competitive advantage (Liu, 2012). Relationship learning means that firms can share information with customers involved in service innovation and develop joint sensemaking and relationship-specific memories in order to establish stronger relationships with their target customers (Chen et al., 2009). The sharing of knowledge enables the firms and their customers to discover unique capabilities and opportunities to create value, joint sensemaking enhances agreement on customized solutions being developed, and relationship-specific memory allows firms both to gain knowledge that was previously unavailable

and to avoid competency traps (Fang et al., 2011; Johansson et al., 2019; Kohtamäki & Partanen, 2016). Relationship learning can thus improve a firm's understanding of its customers' needs through information sharing, joint sensemaking, and relationship-specific memory, all of which increase customer satisfaction and loyalty and enhance the firm's service innovation performance (Kohtamäki & Partanen, 2016). To summarize, firms can establish close, trusting relationships with their customers through customer involvement in service innovation, and then they can increase their knowledge reserves through relationship learning (Chen et al., 2009). In the collaborative learning process, different experiences can be shared to form joint sensemaking and relationship-specific memories, thereby increasing knowledge that firms would not be able to obtain otherwise (Fang et al., 2011)—knowledge that is beneficial for them to propel their service innovation performance, as shown in Fig. 1. Therefore, we propose the following: Hypothesis 2. Relationship learning mediates the relationship between customer involvement in service innovation and service innovation performance.

2.4. Knowledge absorptive capacity as the moderator

Knowledge absorptive capacity is defined as the routines and processes that enable a firm to analyze, interpret, and understand information obtained from external sources (Zahra & George, 2002). Knowledge absorptive capacity is considered a critical determinant in a firm's ability to acquire, absorb, and rationally use new knowledge to improve its innovation performance (Chen et al., 2009; Xie, Zou, et al., 2018). Specifically, knowledge absorptive capacity enables firms to identify, understand, and acquire knowledge outside their boundaries and to assimilate and integrate that knowledge with their existing internal knowledge bases (Crescenzi & Gagliardi, 2018). Therefore, a lack of knowledge absorptive capacity is the main obstacle for enterprises to acquire new knowledge and to maintain competitive advantage, as knowledge absorptive capacity determines the effectiveness of learning (Liu, 2012). In order to understand the interorganizational learning mechanism, absorptive capacity theory is used to supplement the understanding of knowledge-sharing routines. The ability to absorb external knowledge plays a leading role in determining the magnitude and scope of the knowledge flow, and the absorption of external knowledge helps firms identify market opportunities and accelerate the speed of problem-solving (Hurmelinna-Laukkanen, Olander, Blomqvist, & Panfilii, 2012; Xie, Zou, et al., 2018). Therefore, as shown in Fig. 1, the impact of customer involvement on relationship learning might depend on a firm's knowledge absorptive capacity. Specifically, firms with robust knowledge absorptive capacity can reduce barriers in information transmission and interpretation with their customers involved in service innovation, enabling these firms to absorb the beneficial opinions and suggestions submitted by their customers, which thus promotes the exchange of information and the formation of relationship-specific memories. Furthermore, cognitive distance is reduced through the process of joint sensemaking (Fang et al., 2011), since a firm and its customers involved in the service innovation process have absorbed and jointly constructed—or reconstructed existing—knowledge structures (Huikkola, Ylimäki, & Kohtamäki, 2013; Kohtamäki & Partanen, 2016). Therefore, we propose the following: Hypothesis 3. Knowledge absorptive capacity positively moderates the effect of customer involvement in service innovation on relationship learning. Viewed one way, a firm is a knowledge resource pool, and the ability of a firm to successfully combine internal and external knowledge resources provides it a great competitive advantage (Barney, 2001; Martínez-Sánchez et al., 2020). In other words, in addition to external relationship learning, firms also need to have internal capabilities—that

Table 1
Characteristics of the sample.

Ownership	Percentage (%)	Firm size[a]	Percentage (%)
SOEs	20.56	<20	3.74
CREs	6.54	20–300	45.33
PEs	62.15	300–1000	41.12
FIEs	10.75	>1000	9.81
Total asset (million)	Percentage (%)	Annual sales (million)	Percentage (%)
<30	14.49	<3	5.14
30–100	47.2	3–20	29.44
100 – 300	22.43	20–400	46.26
>300	15.88	>400	19.16
Firm age (years)	Percentage (%)	Responder	Percentage (%)
<3	1.4	Senior manager	19.63
3–5	3.27	Middle manager	42.99
6–10	30.38	Junior manager	10.75
11–15	32.24	R&D manager	26.63
>15	32.71	Total	100.00

[a] Number of employees.

is, knowledge absorptive capacities—to combine new and diverse ideas in order to develop new services and improve output (Agarwal & Selen, 2009; Chen et al., 2009; Martínez-Sánchez et al., 2020; Xie, Zou, et al., 2018). Firms with high knowledge absorptive capacity may be more responsive to customer needs, leading them to have more effective innovation processes and stronger performance (Martínez-Sánchez et al., 2020). As shown in Fig. 1, these aspects strengthen the role of relationship learning as a mediator in the link between customer involvement and firms' service innovation performance.

First, the improvement of organizational performance is largely the result of the effective processing, sharing, application, and management of knowledge (Hung et al., 2010). If the crucial knowledge requirement or knowledge solution is outside the boundary of a firm, such as in the customers' domain, then the knowledge must first be absorbed by the firm before it can be used for the purpose of innovation (Schweisfurth & Raasch, 2018). Therefore, firms should have a good process in place for learning, absorbing, and decision-making, and they should combine this

Table 1. Sample characteristics.

they can provide more value to their customers while simultaneously improving their own service innovation performance (Yiu et al., 2020). Therefore, we propose the following: Hypothesis 4. Knowledge absorptive capacity positively moderates the indirect effect of customer involvement in service innovation on firms' service innovation performance through relationship learning, such that the effect will be stronger with higher levels of knowledge absorptive capacity.

3. Methodology

3.1. Data source

To test the above hypotheses, we conducted cross-sectional survey research, a method that has been widely used in previous studies on customers involved in service innovation (Chen et al., 2011; Iden et al., 2020). Specifically, the data were collected from firms in the manufacturing and service industries in China. To ensure the survey results were representative, we used the random stratified sampling method by classifying the firms by industry and scale (i.e., large, medium, small, and micro). The respondents included junior-, middle-, and senior-level managers, as well as R&D managers, because, traditionally, these individuals act as key informants who have both direct contact with customers and a rich understanding of their respective company's service innovation process and performance while exchanging information with customers. Therefore, the mix of the different levels of managers provided a comprehensive response to the survey. We first ensured the validity of our questionnaire by conducting a pretest. Then, based on the feedback of this pretest, we revised and improved the content of the measurement items. Finally, we distributed a total of 350 questionnaires, and we received 214 valid questionnaires back; thus, we had an effective response rate of 61.14%. To check for nonresponse bias, we used firm size, industry type, ownership type, and firm age to identify whether there were significant differences between the respondents and nonrespondents. The F-test results indicated no significant differences between the two groups (see Table A1). Furthermore, we checked for differences between the

earlier and the later respondents by conducting a t-test of the main variables. The results indicated that the t-statistics for customer involvement in service innovation (t = 0.681, p = 0.496), relationship learning (t = 0.862, p = 0.390), knowledge absorptive capacity (t = -0.152, p = 0.880), and service innovation performance (t =1.206, p =0.229) were all insignificant (see Table A2). Therefore, we inferred that there was no serious nonresponse bias in this study. The characteristics of the sample are presented in Table 1. From the full sample, 42.99% of the respondents were middle managers, 26.63% were R&D managers, 19.63% were senior managers, and 10.75% were junior managers. Pertaining to ownership type, 62.15% of the managers worked for private enterprises (PEs), 20.56% worked for state-owned enterprises (SOEs), 10.75% worked for foreign-invested enterprises (FIEs), and 6.54% worked for collectively run enterprises (CREs). Regarding firm size, 50.93% of the total sample worked in companies that had more than 300 employees. In terms of total assets, 85.51% of the firms were in the category of ">30 million yuan." Regarding annual sales, 65.42% of the firms were in the category of "> 20 million yuan." Pertaining to firm age, 95.33% of the firms had been in operation for more than five years.

3.2. Measures

Service innovation performance represents the key competitive advantage in terms of firms' service innovation activities (Mennens et al., 2018). Following Johansson et al. (2019) and Thakur and Hale (2013), service innovation performance was measured using five items to evaluate the extent of customer loyalty, customer attraction, sales,

learning, absorbing, and decision-making, and they should combine this process with their own knowledge in order to generate new ideas (Yiu et al., 2020). Therefore, higher knowledge absorptive capacity might enable firms to make effective use of the heterogeneity of service knowledge by involving customers. This process allows the firms to have a thorough understanding of their customers, thereby facilitating their relationship-learning activities, which support the ability of the firms to introduce a wide array of innovations (Albort-Morant et al., 2018). In addition, when there is greater learning between firms and their involved customers, the firms can better predict and respond to their customers' needs (Wang & Hsu, 2014), which simultaneously helps reduce the monitoring transaction costs during the exchange process (Jean, Sinkovics, & Kim, 2010), allowing these firms to develop a higher level of service innovation performance. Second, customer involvement drives firms to work more closely with their customers, thereby increasing the firms' commitment to these relationships (Bhatti et al., 2020). Close and trusting company-customer relationships based on trust promote both communication and tacit knowledge sharing between a firm and its customers (Jean et al., 2010). A firm's knowledge absorptive capacity determines how the new tacit knowledge obtained from the outside is spread and utilized within the organization (Liu, 2012), and thus, how it is integrated into its innovation process to improve innovation performance (Santoro et al., 2020). Therefore, the greater the knowledge absorptive capacity, the more helpful the involved customers will be in co-creating service innovation solutions to promote the formation of relationship-specific memories between the firm and its customers (Liu, 2012; Liu & Chen, 2018). Based on the integration of internal and external knowledge, firms can develop new service products more efficiently, and in so doing,

Table 2
Construct measurement.

Variables	Item description
Customer involvement in service innovation	(Iden et al., 2020; Chen et al., 2011) UI1. We often encourage our customers to create new services with us UI2. Our customers often suggest how we can improve our established services UI3. Our customers often find solutions to problems with our services with us UI4. Our customers participate in service creation and contribute significantly to service processes
Relationship learning	(Selnes & Sallis, 2003) RL1. We and our customers frequently exchange information concerning changes of market structure, such as mergers, acquisitions, or partnering RL2. We and our customers frequently exchange information concerning changes of the technology of the focal service RL3. We and our customers frequently establish joint teams to solve service problems and discuss strategic issues in the relationship RL4. We and our customers frequently exchange and adjust our mutual understanding of end-customer needs, preferences, and behaviour in the relationship RL5. We and our customers frequently evaluate and, if necessary, adjust our routines in order-delivery processes and update the formal contracts in the relationship
Knowledge absorptive capacity	(Hsu & Fang, 2009; Xie et al., 2018) KAC1. We can identify the usefulness of external knowledge KAC2. We can correctly predict the future development of core knowledge KAC3. We have the capability to search for external knowledge KAC4. We can structure and use collected knowledge
Service innovation performance	(Thakur & Hale, 2013) SIP1. The new service improved the loyalty of the firm's existing customers SIP2. The new service enhanced the profitability of other products SIP3. The new service attracted a significant number of new customers to the firm SIP4. The new service was profitable SIP5. Total sales of the new service were high

and profitability. *Customer involvement in service innovation*, a process in which a firm has direct interaction with its customers and enables those customers to participate in service production and delivery processes in order to co-design and co-produce solutions (Anning-Dorson, 2018), was measured using an adapted scale from Iden et al. (2020) and Chen et al. (2011). The construct included a four-item scale to assess the extent to

Table 3
Pearson of correlation and descriptive statistics.

Variables	(1)	(2)	(3)
(1) Industry	1.000		
(2) Ownership	0.136*	1.000	
(3) Firm age	−0.233**	−0.261**	1.000
(4) Firm size	−0.236**	−0.217**	0.459
(5) Total assert	−0.266**	−0.234**	0.466
(6) Annual sales	−0.256**	−0.114	0.465
(7) Customer involvement in service innovation	−0.123	−0.045	0.087
(8) Relationship learning	−0.077	0.013	0.046
(9) Knowledge absorptive capacity	−0.040	0.040	0.085
(10) Service innovation performance	−0.046	−0.046	0.156
Mean	1.430	2.630	3.920
S.D.	0.497	0.929	0.941
VIF	1.121	1.122	1.476

Note. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Tables 2–3. Measurement items, reliability and validity results.

which the firms co-created new services with their customers, improved established services via their customers' suggestions, solved service problems together, and made significant contributions to the service process via their customers' feedback. Relationship learning emphasizes the influence of the close relationship between a firm and its customers in terms of learning outcomes, where both parties share and integrate knowledge into relational memory, which then modifies their relational behaviors accordingly (Yang & Lai, 2012; Wang & Hsu, 2014). Following Selnes and Sallis (2003), we constructed a

relationship learning scale using the three subdimensions of information sharing, joint sensemaking, and relationship-specific memory. Knowledge absorptive capacity was measured by four items adapted from Hsu and Fang (2009) and Xie, Zou, et al. (2018), namely, the identification, prediction, search, and structuration of obtained knowledge. For each of these constructs, we used a five-point Likert scale, ranging from "(1) strongly disagree" to "(5) strongly agree," to measure the perceptual items. All measurement items are listed in Table 2. Earlier investigators identified several business characteristics that could potentially influence a firm's service innovation, including firm size, firm age, ownership, industry, annual sales, and total assets (Anning-Dorson, 2018; Chen et al., 2011; Ndubisi et al., 2020). We used these characteristics as control variables to ensure that their effects did not confound the proposed relationships in our conceptual model. (a) Larger firms tend to have a variety of resources, including financial, personnel, and social capital, to conduct more service innovation activities than smaller firms (Chen et al., 2011). Therefore, we controlled for firm size (i.e., number of employees) because of its potential impact on service innovation activities. (b) Firm age has the potential to influence a company's growth rate, which might correlate to the announcement rate of new services (Chen et al., 2011). Thus, firm age was adopted as another control variable, measured by the number of years since a firm's founding (Anning-Dorson, 2018). (c) Following Anning-Dorson (2018) and Xie, Wang, and Zeng (2018), the study also controlled for firm ownership type, as assessed using the categories SOEs, CREs, PEs, and FIEs. (d) As different types of industry sectors might affect corporate service innovation differently (Ndubisi et al., 2020), we controlled for industry type (i.e., service industry sector versus manufacturing industry sector) to avoid its potential influence on service innovation activities. (e) High annual sales might indicate a firm has the financial strength to drive service innovation practices (Chen et al., 2011). Thus, annual sales were controlled for by the measure of average annual sales over the prior three years. (f) Lastly, similar to Ndubisi et al. (2020), we also controlled for total assets, since they might affect a firm's level of investment in service innovation.

3.3. Scale reliability and validity

In terms of construct reliability, our results showed that the Cronbach's alphas of all the constructs were greater than 0.6, which is considered acceptable. Regarding scale validity, first, all our measures were based on an existing maturity scale to ensure the content validity of the scale; second, we calculated the average variance extracted (AVE), and these results indicated that the square root of each AVE was greater

Table 4
Hierarchical multiple regression results of direct effect, mediated effect, and moderated effect.

Variables	Relationship learning				Service innovation performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	3.836*** (0.258)	1.738*** (0.332)	1.272*** (0.330)	1.086** (0.347)	3.710*** (0.254)	1.465*** (0.316)	0.878** (0.315)
Predictors							
Customer involvement in service innovation		0.521*** (0.061)	0.333*** (0.070)	0.357*** (0.071)		0.557*** (0.058)	0.381*** (0.063)
Relationship learning							0.338*** (0.062)
Knowledge absorptive capacity			0.325*** (0.067)	0.339*** (0.068)			
Customer involvement in service innovation × Knowledge absorptive capacity				0.192| (0.115)			
Controls							
Industry	−0.065 (0.072)	−0.014 (0.062)	−0.023 (0.059)	−0.018 (0.059)	−0.016 (0.071)	0.039 (0.059)	0.044 (0.055)
Ownership	0.007 (0.038)	0.015 (0.033)	0.003 (0.032)	0.002 (0.031)	−0.011 (0.038)	−0.003 (0.032)	−0.008 (0.030)
Firm age	0.010 (0.044)	−0.001 (0.038)	−0.017 (0.036)	−0.017 (0.036)	0.094* (0.043)	0.083* (0.036)	0.083* (0.033)
Firm size	−0.031 (0.064)	−0.016 (0.056)	0.017 (0.053)	0.012 (0.053)	−0.134* (0.063)	−0.118* (0.053)	−0.112* (0.050)
Total assets	−0.056 (0.057)	−0.037 (0.049)	−0.047 (0.047)	−0.044 (0.047)	0.017 (0.056)	0.037 (0.047)	0.049 (0.044)
Annual sales	0.113| (0.060)	0.067 (0.052)	0.061 (0.049)	0.063 (0.049)	0.054 (0.059)	0.005 (0.049)	−0.018 (0.047)
$R2$	0.025	0.279	0.353	0.361	0.047	0.341	0.424
F-value	0.880	11.408***	13.960***	12.829***	1.693	15.208***	18.850***

Significance level: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, | $p < 0.1$.

Table 5
PROCESS regression results of the mediated effect test.

Independent variable	Mediator	Dependent variable	Index	Boot SE	Boot 95% CI	
					LLCI	ULCI
Customer involvement in service innovation	Relationship learning	Service innovation performance	0.176	0.041	0.103	0.263

Note. Bootstrap resample = 5000. SE = standard error; CI = confidence interval; LLCI = the lower limit of confidence interval; ULCI = the upper limit of confidence interval.

Cronbach's alphas of all the constructs were greater than 0.6, which is considered acceptable. Regarding scale validity, first, all our measures were based on an existing maturity scale to ensure the content validity of the scale; second, we calculated the average variance extracted (AVE), and these results indicated that the square root of each AVE was greater than the cross-loadings between the constructs (see the diagonal of

dependent variables in different areas of the questionnaire to avoid the respondents from making predictions about service innovation performance. For statistical control, following Chong and Zhou (2014), we performed exploratory factor analysis (EFA) on all the items of our scales to test for potential CMV. The results showed that the first largest factor accounted for only 24.761% of the total variance, showing that no one

Tables 4–5. Regression, direct, mediated and moderated effect results.

than the cross-loadings between the constructs (see the diagonal of Table 3), thereby confirming good discriminant validity for the scales adopted. Thus, our measures were confirmed to be valid and internally consistent.

3.4. Common method variance

Given that the relationship between a firm and its customers is not directly observed, one common measurement method is to use key informants (i.e., the companies' managers as respondents of our survey) from both sides of the dyad (John & Reve, 1982; Selnes & Sallis, 2003). Furthermore, as mentioned above, service innovation performance was also measured by the questionnaire in accordance with prior studies (Johansson et al., 2019; Thakur & Hale, 2013), as some important dimensions of the service innovation performance measurement, such as customer loyalty and the attraction of new service to customers, need to be captured via subjective indicators (Thakur & Hale, 2013). However, due to the perceptual, self-reported data, there was a risk that common method variance (CMV) could occur. We thus adopted various methods to reduce CMV in our study. For the program control, first, we used multiple items to measure the variables and to ensure that the items were easily understood; second, we placed the independent and

accounted for only 24.761% of the total variance, showing that no one single factor accounted for most of the total variance. Overall, the results indicated that there was no serious concern of CMV in this study.

4. Results and analyses

4.1. Hypotheses testing

The correlations, descriptive statistics, and variance inflation factor values (VIFs) of all the constructs are presented in Table 3. The results showed that customer involvement in service innovation was positively correlated with relationship learning and service innovation performance. We also found that customer involvement in service innovation, knowledge absorptive capacity, and relationship learning was positively correlated to service innovation performance. Moreover, VIF analysis established that the VIF values of all the constructs ranged from 1.121 to 2.416; since these VIF values were much lower than the recommended threshold of 10, this confirmed that multicollinearity was not a serious concern. Table 4 presents the results of the direct effects, mediating effects, and moderating effects. Models 1 and 5 had only the control variables, while the other models added the main effect of customer involvement

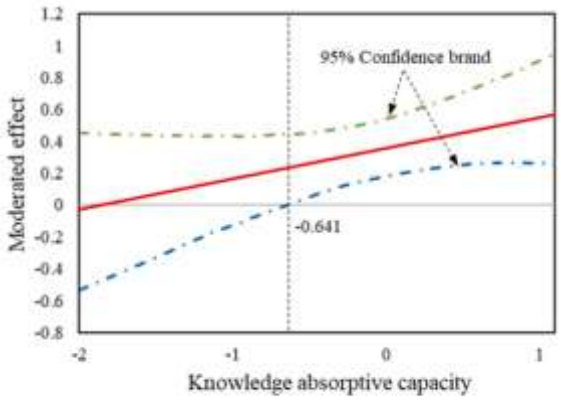

Fig. 2. The moderated effect of customer involvement in service innovation on relationship learning moderated by knowledge absorptive capacity

Figure 2. Moderated effect on relationship learning.

relationship learning moderated by knowledge absorptive capacity. in service innovation. The coefficient in Model 6 proved that customer involvement in service innovation had a positive effect on a firm's service innovation performance ($\beta = 0.557$; $p < 0.001$). Thus, H1 is supported. The results of Model 2 demonstrated that customer involvement in service innovation was positively correlated to relationship learning ($\beta = 0.521$; $p < 0.001$). The results of Model 7 showed that relationship learning was positively related to a firm's service innovation performance ($\beta = 0.338$; $p < 0.001$). Furthermore, after adding the mediator (relationship learning) to Model 7, the direct impact of customer involvement in service innovation on service innovation performance was shown to be weaker but still significant ($\beta = 0.381$; $p < 0.001$). Thus, these results revealed that relationship learning partially mediated the relationship between customer involvement in service innovation and a firm's service innovation performance. We also used the bootstrapping method to test the mediating effect. These results, which are shown in Table 5, indicated that the mediating index of the effect of customer involvement in service innovation on the performance of service innovation via relationship learning was significant. Therefore, H2 is supported. Models 3 and 4 in Table 4 present the results of the analysis of the moderation effect. To reduce the concern of multicollinearity, both customer involvement in service innovation and knowledge absorptive capacity were mean-centered before creating the interaction terms. The results revealed that knowledge absorptive capacity positively moderated the direct effect of customer involvement in service innovation on relationship learning ($\beta = 0.192$; $p < 0.1$). To further demonstrate the moderating effect of knowledge absorptive capacity, we plotted the interaction effects, as shown in Fig. 2. The plotted marginal effects indicated a positive moderating impact of knowledge absorptive capacity on the linear relationship between customer involvement and relationship learning. Thus, H3 is supported. Table 6 presents the results of the moderated mediation effect

pertaining to the level of knowledge absorptive capacity. The results confirmed the first-stage moderation effect, thereby providing additional support for H3. Furthermore, the findings also determined that the indirect effects of customer involvement in service innovation on firms' service innovation performance

via relationship learning were significant for low (β = 0.088; 95% CI = [0.021, 0.170]), medium (β = 0.121; 95% CI = [0.060, 0.201]), and high levels (β = 0.153; 95% CI = [0.076, 0.255]) of knowledge absorptive capacity. To better illustrate the moderated mediation effect, we plotted it by using the mean plus or minus the standard deviation to represent the level of knowledge absorptive capacity (see Fig. 3). Fig. 3 shows a positive moderated mediation effect of knowledge absorptive capacity on the indirect relationship between customer involvement and service innovation performance via relationship learning. Thus, H4 is supported.

4.2. Additional analysis

Since service firms are generally better able to sense market conditions and more effectively absorb and explain the experiences of their customers than manufacturing firms (Statsenko & de Zubielqui, 2020), we conducted an additional analysis to test whether there are differences in the moderated mediation effects of these two industry sectors. As can be seen in Table 7, the results of this analysis demonstrated that although knowledge absorptive capacity moderates the relationship of 'customer involvement-relationship learning-service innovation performance' in both the service industry and manufacturing industry sectors, the marginal effect of the service industry sector is higher. The main reason for this difference might be due to the fact that the interaction flexibility of service industry firms is stronger than that of most manufacturing industry firms (Zaborek & Mazur, 2019). Nevertheless, customers can play the role of co-producers in firms' service innovation processes no matter whether they are service industry firms or

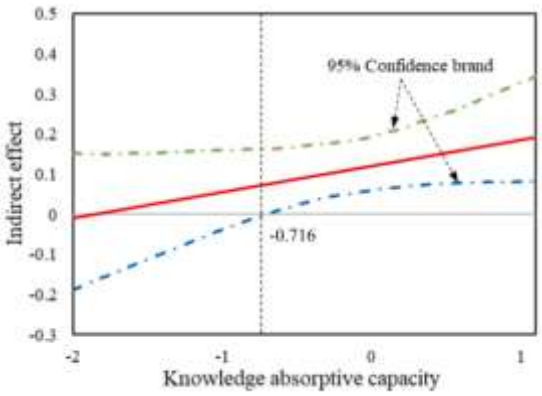

Figure 3. Moderated indirect effect on service innovation performance.

Fig. 3. The conditional indirect effect of customer involvement in service innovation on service innovation performance through relationship learning moderated by knowledge absorptive capacity.

Table 6
Conditional indirect effect of customer involvement in service innovation on service innovation performance through relationship learning moderated by knowledge absorptive capacity.

Item	Moderation of first stage				Moderated mediation			
Condition	Effect	Boot SE	Boot 95% CI		Effect	Boot SE	Boot 95% CI	
			LLCI	ULCI			LLCI	ULCI
Low (−SD)	0.260	0.082	0.098	0.422	0.088	0.037	0.021	0.170
Middle (Mean)	0.357	0.071	0.217	0.497	0.121	0.035	0.060	0.201
High (+SD)	0.454	0.100	0.256	0.652	0.153	0.045	0.076	0.255

Note. Bootstrap resample = 5000. SE = standard error; CI = confidence interval; LLCI = the lower limit of confidence interval; ULCI = the upper limit of confidence interval.

Table 6. Moderated mediation effect results.

Table 7
Additional analysis for conditional indirect effect of customer involvement in service innovation on service innovation performance through relationship learning moderated by knowledge absorptive capacity.

Industry	Service industry				Manufacturing industry			
Condition	Effect	Boot SE	Boot 95% CI		Effect	Boot SE	Boot 95% CI	
			LLCI	ULCI			LLCI	ULCI
Low (−SD)	0.106	0.057	0.001	0.227	0.063	0.052	−0.033	0.173
Middle (Mean)	0.125	0.051	0.036	0.230	0.094	0.045	0.015	0.194
High (+SD)	0.145	0.060	0.038	0.274	0.126	0.055	0.032	0.251

Note. Bootstrap resample = 5000. SE = standard error; CI = confidence interval; LLCI = the lower limit of confidence interval; ULCI = the upper limit of confidence interval.

Table 8
Robustness test results of moderated effect and moderated mediation effect by changing the measure of knowledge absorptive capacity.

Variables	Relationship learning			
	Model 1	Model 2	Model 3	Model 4
Constant	3.836***	1.738***	2.164***	2.651***

manufacturing sector, they usually do not experience it firsthand (Zaborek & Mazur, 2019). Furthermore, changing routines to achieve service innovation is more difficult for manufacturing firms, which tend to gain competitive advantage through product innovation (Mennens et al., 2018). Therefore, the moderated mediation effect is shown to be weaker in the manufacturing industry.

Tables 7–8. Robustness-test measures and results.

4.3. Robustness tests

We conducted two robustness tests to further evaluate the relationships among the constructs. First, we performed additional analyses by using alternative moderated variable measures. Here, we first divided knowledge absorptive capacity into high and low levels according to its median, where the highest level was assigned 1 and the lowest level was assigned 0. We then used this dummy variable to retest both the moderating effect and moderated mediating effect. As presented in Table 8, we found no difference in the significance of the main regression coefficients compared with the results presented in Tables 4 and 6. Then, second, we reran all the models by randomly selecting subsamples of 90% of the total observations. As shown in Table 9, the results of the subsamples were highly consistent with the main results of the full sample presented in Tables 4–6. This further confirmed that the results of our study were robust.

5. Conclusions and discussion

5.1. Conclusions According to SDL and RDT, although providing meaningful and novel services is crucial for companies, no firm is truly self-sufficient in terms of the resources and capabilities it requires to successfully implement its service innovation processes (Baker, Grinstein, & Harmancioglu, 2016; Bitner, 2017; Pfeffer & Salancik, 1978). To overcome resource and capability limitations, many companies establish effective partnerships with their customers to obtain key external resources (Heirati & Siahtiri, 2019). However, there have been few theoretical frameworks or empirical studies to investigate the mechanisms of how customer engagement affects relationship-learning capabilities and, subsequently, how they might improve service innovation performance. This paper offers empirical evidence on the internal and contingent mechanisms of the relationship between customer involvement and service innovation performance. In our research, we found that customer involvement in service innovation is an effective way for firms to improve their service innovation performance, and that the direct effect of customer involvement is mediated by the level of relationship learning. Furthermore, our findings demonstrate that the extent to which a firm's relationship learning benefits from customer involvement in service innovation depends significantly on the level of the firm's knowledge absorptive capacity. Moreover, by constructing a moderated mediation model, the results show that the indirect effect of customer involvement in service innovation on firms' service innovation performance via relationship learning is stronger when a firm's knowledge absorptive capacity is greater. Overall, this study's moderated mediation

Table 9
Robustness test results of direct effect, mediated effect, moderated effect, and moderated mediation effect by random 90% sample (194).

Variables	Relationship learning				Service innovation performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	3.810*** (0.295)	1.838*** (0.404)	1.417*** (0.367)	1.194** (0.368)	3.731*** (0.305)	1.450*** (0.394)	0.782* (0.372)
Predictors							
Customer involvement in service innovation		0.492*** (0.075)	0.326*** (0.087)	0.353*** (0.093)		0.570*** (0.073)	0.391*** (0.078)
Relationship learning							0.364*** (0.070)
Knowledge absorptive capacity			0.294*** (0.074)	0.312*** (0.076)			
Customer involvement in service innovation × Knowledge absorptive capacity				0.260* (0.124)			
Controls							
Industry	−0.055 (0.074)	0.000 (0.067)	−0.008 (0.063)	−0.003 (0.064)	−0.020 (0.075)	0.043 (0.066)	0.043 (0.062)
Ownership	0.000 (0.041)	0.006 (0.039)	−0.008 (0.037)	0.000 (0.036)	−0.018 (0.045)	−0.011 (0.036)	−0.013 (0.032)
Firm age	0.016 (0.045)	−0.000 (0.039)	−0.014 (0.040)	−0.013 (0.040)	0.098* (0.046)	0.079* (0.037)	0.079* (0.036)
Firm size	−0.028 (0.078)	−0.016 (0.071)	0.018 (0.065)	0.009 (0.065)	−0.137* (0.071)	−0.123* (0.061)	−0.117* (0.055)
Total Assets	−0.085 (0.061)	−0.055 (0.053)	−0.063 (0.051)	−0.059 (0.050)	0.013 (0.065)	0.048 (0.053)	0.068 (0.051)
Annual sales	0.139* (0.065)	0.089† (0.056)	0.079 (0.052)	0.081 (0.052)	0.056 (0.061)	−0.002 (0.052)	−0.034 (0.050)
$R2$	0.036	0.267	0.331	0.347	0.051	0.339	0.429
F-value	1.167	9.668***	11.429***	10.871***	1.658	13.615***	17.398***

Item	Moderation of first stage				Moderated mediation			
Condition	Effect	Boot SE	Boot 95% CI		Effect	Boot SE	Boot 95% CI	
			LLCI	ULCI			LLCI	ULCI
Low (− SD)	0.220	0.101	0.010	0.408	0.080	0.040	0.012	0.171
Middle (Mean)	0.353	0.094	0.185	0.550	0.128	0.039	0.066	0.221
High (+ SD)	0.485	0.124	0.283	0.762	0.176	0.051	0.094	0.294

Significance level: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$. Bootstrap resample = 5000. SE = standard error; CI = confidence interval; LLCI = the lower limit of confidence interval; ULCI = the upper limit of confidence interval.

Table 9. Robustness-test regression results.

Table A1 Analysis of variance (ANOVA). Variables Sum of df Mean F Sig. squares square Firm size Between 0.002 3 0.001 0.003 1.000 groups Within 83.152 346 0.240 groups Total 83.154 349 Ownership Between 0.004 3 0.001 0.006 0.999 groups Within 83.150 346 0.240 groups Total 83.154 349 Industry Between 0.000 1 0.000 0.000 0.989 groups Within 83.154 348 0.239 groups Total 83.154 349 Firm age Between 0.009 4 0.002 0.009 1.000 groups Within 83.146 345 0.241 groups Total 83.154 349 model provides us with a deeper understanding of how the combination of internal and external capabilities might facilitate the customer involvement necessary for the promotion of service innovation performance.

5.2. Theoretical implications

On the whole, our findings bridge the knowledge gap and expand the existing literature in four ways. First, this research contributes to the literature on service innovation (e.g., Casidy et al., 2020; Johansson et al., 2019; Thakur & Hale, 2013) by emphasizing customer involvement in service innovation as the main source of firms' acquisition of knowledge that is used to meet customers' needs and improve firms' service innovation performance. Many earlier theoretical and empirical studies suggested that customer involvement is valuable for achieving innovation and economic success (Cui & Wu, 2016; Najafi-Tavani et al., 2020), but few empirically examined the impact of customer involvement on service innovation performance for both manufacturing and service firms. We thus examined this relationship in these two sectors. Our work revealed that promoting the involvement of customers in the service innovation process enables firms to better understand their customers' needs so that the solutions the firms provide will advance the market acceptance of new services, reduce market uncertainty, and overcome technical barriers (Tjahjono & Cao, 2020). In turn, customers involved in the service innovation process can evaluate service specifications and provide feedback to the firms, thereby helping the firms match service functions to their needs (Heirati & Siahtiri, 2019). This general process might lead to a better fit between service products and the market, as well as to the improvement of a firm's innovative service

performance. This finding provides good insight into the challenges faced by companies when allowing customers to provide a lot of feedback about their operations in order to positively influence their service

Table A2
Independent samples test.

Variables		Levene's test for equality of variances		*t*-test for equality of means						
		F	Sig.	*T*	*df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Customer involvement in service innovation	Equal variances assumed	0.616	0.433	0.681	212	0.496	0.045	0.067	−0.086	0.177
	Equal variances not assumed			0.681	207.483	0.497	0.045	0.067	−0.086	0.177
Relationship learning	Equal variances assumed	1.423	0.234	0.862	212	0.390	0.058	0.068	−0.075	0.192
	Equal variances not assumed			0.856	201.290	0.393	0.058	0.068	−0.076	0.193
Knowledge absorptive capacity	Equal variances assumed	0.205	0.651	−0.152	212	0.880	−0.010	0.069	−0.147	0.126
	Equal variances not assumed			−0.152	208.370	0.880	−0.010	0.069	−0.147	0.126
Service innovation performance	Equal variances assumed	2.612	0.108	1.206	212	0.229	0.071	0.059	−0.045	0.187
	Equal variances not assumed			1.192	193.964	0.235	0.071	0.060	−0.046	0.188

innovation performance (Chong & Zhou, 2014). Overall, our findings expand the application of SDL theory in customer-involvement research (e.g., Peltier, Dahl, & Swan, 2020; Zaborek & Mazur, 2019) by providing a more fine-grained understanding of the role of customer involvement in service innovation.

Second, this work contributes to the research on service innovation domains by opening up the "black box" on the relationship between customer involvement in service innovation and firm service innovation performance from the perspective of relationship learning. Previous research focused on the internal mechanisms of how customer involvement contributes to a firm's service innovation performance was unclear in this respect (e.g., Feng & Ma, 2020; Johansson et al., 2019; Storey & Larbig, 2018). Moreover, although relationship learning has received increased attention in the new product innovation literature

Third, our findings contribute to the organizational learning literature (e.g., Bhatti et al., 2020) by determining the boundary conditions by which customer involvement in service innovation affects relationship learning from the perspective of knowledge absorptive capacity. Although there have been some studies that have focused on the antecedents of relationship learning, such as trust (Yang & Lai, 2012) and learning intent (Liu, 2012), the questions of how and under what circumstances customer involvement in service innovation motivates relationship learning have been neglected. To bridge this gap, we developed an integrated model of how knowledge absorptive capacity and customer involvement jointly affect a firm's relationship learning based on the perspectives of RDT and organizational learning. Our results suggest that firms with highly intensive knowledge absorption capacity may be more responsive to customer needs (Martínez-Sánchez

Table A2. Additional measurement and validity results.

(Fang et al., 2011; Najafi-Tavani et al., 2020), there has been a lack of research examining the process of linking the antecedents of relationship learning and determining the performance of service innovation. Thus, we developed and tested the argument that relationship learning mediates the relationship between customer involvement in service innovation and service innovation performance. By collaborating with customers to yield innovative services, firms can exchange knowledge and develop relationship learning to identify and shape opportunities. These firms can then use this knowledge and reorganize internal resources to diversify their service scope, which, ultimately, will lead to the improvement of service innovation performance (Statsenko & de Zubielqui, 2020). Drawing on organizational learning theory (e.g., Liu, 2012), this study not only contributes to a broader understanding of relationship learning that occurs during the interaction between firms and their customers but also empirically provides data on the antecedents and outcomes of relationship learning in the service innovation domain (e.g., Bhatti et al., 2020; Fang et al., 2011; Kohtamäki & Partanen, 2016; Yang & Lai, 2012). Taking relationship learning as a mediating factor also clarifies that the weakness of direct influence is attributable to knowledge learning between organizations. Additionally, this study has responded to the appeal of Bhatti et al. (2020), who suggested that researchers should investigate other factors that might influence relationship learning and that they use quantitative methods to explore learning through relationship interactions. Moreover, we explored the neglected relationship learning of service companies that produce intangible products, thereby responding to Wang and Hsu's (2014) call for more research on the relationship between relationship learning and innovation.

et al., 2020), as such capacity promotes the closeness and commitment of the relationships generated by customer involvement. Our findings extend the understanding of internal and external organizational learning capabilities (see, e.g., Bhatti et al., 2020; Schweisfurth & Raasch, 2018) by clarifying the nature and the role of knowledge absorptive capacity in service innovation activities. Furthermore, the

contingency effect provides substantial support for considering knowledge absorptive capacity as an important moderator that affects the relationship between customer involvement and relationship learning, which presents us with better guidance on when it might be appropriate to involve customers in service innovation in order to promote the relationship-learning activities between a firm and its customers. Fourth, this work provides us with a more comprehensive understanding of the contingent mechanisms of customer involvement to promote service innovation performance via relationship learning. Although there have been many studies on the importance of customer involvement in product innovation (e.g., Cui & Wu, 2016), there has been a lack of research on the conditions under which organizational capabilities like knowledge absorptive capacity motivate the process of customer involvement in improving service innovation performance. Fortunately, the research of Mennens et al. (2018) has pushed this study forward, as they suggested that it is first necessary to recognize and absorb external knowledge before using that external knowledge to achieve service innovation performance. Following their conclusions, we theoretically and empirically explored how knowledge absorptive capacity moderates the process of customer involvement in service innovation, thus affecting firms' service innovation performance via relationship learning. Our findings reveal that firms with higher

knowledge absorptive capacity are able to identify, comprehend, and incorporate the knowledge from customers involved in the service innovation process (Feng & Ma, 2020; Ndubisi et al., 2020; Yiu, Ngai, & Lei, 2020), thereby accumulating joint sensemaking and relationship-specific memories. In this process, firms effectively integrate external and internal knowledge to develop new service knowledge, which then improves their service innovation performance. Thus, our work extends the existing research (e.g., Mennens et al., 2018; Storey & Larbig, 2018) by providing a more comprehensive picture that allows us to better understand customer involvement and organizational learning in service innovation by identifying the boundary conditions of this relationship. This study also responds to the call by Statsenko and de Zubielqui (2020), who suggested that future studies should examine the impact of corporate absorptive capacity on improving service firms' innovation performance.

5.3. Practical implications

This study has several practical implications for firms and firm managers. First, the results of this work show that firms should promote high levels of customer involvement in the service innovation process to ensure that new services meet real market demands and effectively improve service innovation performance. On the one hand, firms must understand the needs of their customers so that they can work with them to solve service-related problems while also adapting to the rapidly changing marketplace. Additionally, firms need to provide a platform for customers to be involved in service innovation to promote effective interaction, reduce cognitive failure, and decrease cognitive distance. On the other hand, managers should actively work to establish good cooperation with their customers through both formal (e.g., meetings) and informal (e.g., consultations) means to further promote the involvement of their customers in the service innovation process. Second, firms should strengthen their relationship-learning capabilities to promote knowledge sharing with their customers. A firm's relationship-learning activities will help to develop collective relationship memories with customers involved in service innovation. Actively promoting knowledge sharing and joint sensemaking provides a bridge for customers to transform their involvement in service innovation into valuable returns for both them and the company. Furthermore, managers should look for key customers that might be able to provide constructive feedback and then establish cooperative learning activities with them. By establishing such relationships, managers can form a favorable learning culture and an atmosphere of cooperation with their customers to promote information sharing and knowledge creation. Third, in addition to external relationship learning, firms should also develop their knowledge absorptive capacity to actively acquire and internalize external knowledge. Specifically, firms can cultivate diversity in their knowledge bases by learning about, acquiring, and absorbing knowledge outside their boundaries to successfully innovate new services that can meet customers' needs better than existing services. Moreover, because a company's knowledge absorptive capacity depends on the knowledge and skills of its employees, firms should enhance employee training programs to improve employees' capacities to absorb knowledge, which will enhance the ability to obtain valuable knowledge.

6. Limitations and future research directions

Several limitations of this study need to be addressed. First, we only explored the moderating effect of knowledge absorptive capacity as a whole construct. Future research could explore the roles of multiple dimensions of knowledge absorptive capacity, such as both potential and realized absorptive capacity on the indirect relationship of 'customer involvement-relationship learning-service innovation performance' (Miroshnychenko, Strobl, Matzler, & De Massis, 2020). Second, we only analyzed service and manufacturing firms in our sample.

Because the extensive introduction of new digital technologies provides opportunities for firms to innovate digital services (Iden et al., 2020), future research could also incorporate digital technology firms to conduct a fuller in-depth exploration of the conceptual model we presented here. Third, due to the cross-sectional data, the possibility of causal inference in this study was limited. Future research could use panel data sources to evaluate the internal mechanisms between customer involvement and service innovation performance. Fourth, the context of the present study, which was China, limits the generalizability of our findings. Pursuing this research topic in the context of other countries would likely further increase our understanding of the conceptual framework of customer involvement in service innovation, perhaps proving its universality and global importance. Lastly, fifth, given that the interaction between customers and brands can increase the intention of brand co-creation through information sharing, social support, and relationship quality (Mina, Marie-Odile, Yichuan, & Nick, 2020), future investigators might wish to examine the topic of customer involvement in service innovation from the perspective of brand cocreation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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