


Article

Driving Mechanism of Customer Participation in Service-Oriented Enterprises: A Perspective of Value Co-Creation

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Abstract: Based on service-dominant logic and service quality theory, this study explores the influence mechanism of customer participation on value co-creation of service-oriented enterprises. Employing a quantitative approach, the study utilized a questionnaire survey administered to 400 participants, examining the mediating and moderating effects of platform service quality and digital technology. The research results indicate that all three dimensions of customer participation have a significant positive impact on the value co-creation of service-oriented enterprises. Customer participation can also have a significant positive impact on the value co-creation of service-oriented enterprises through the mediating variable of platform service quality. Digital technology plays a significant positive moderating role between customer participation and platform service quality, as well as between platform service quality and value co-creation of service-oriented enterprises.

Keywords: service-oriented enterprise; customer participation; value co-creation; platform service quality; digital technology



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1. Introduction

As the social economy continues to develop and consumer demand undergoes constant advancement, the service industry is facing a growing trend towards personalization and diversification in consumer demand. This trend not only opens up new opportunities for service enterprises, but also poses significant challenges. Today's world is a place where "service" is omnipresent, and the digitized "global village" is increasingly interconnected. It is the advancement of digital technology that is driving the globalization of services [1]. In the past decade, service-dominant (S-D) logic has gained widespread acceptance [2–4] and has formed core axioms [3], and the current developmental trend is to make it a general theory for the development of marketing markets. Therefore, the development of new theoretical frameworks is needed: service exchange, resource integration, value co-creation, and concepts and theories related to institutions/ecosystems [3]. With the rapid development of information technology and the widespread use of personal mobile terminals, customers are able to participate in the value creation process of service-oriented enterprises through various interactive channels, including various high-quality service platforms, and to achieve common production and creation with enterprises. Advanced digital technology also provides information and technical support for customer participation in value co-creation activities of service-oriented enterprises, further accelerating the interaction process between enterprises and customers and ultimately promoting customer participation in value co-creation. However, little is known about the reasons for customers' voluntary participation in value co-creation activities in a digital background [5]. Therefore, it is necessary and urgent to study the mechanism of how customer participation continuously affect the value co-creation of service-oriented enterprises through the service quality of service platforms and the application of digital technology in the context of digitalization.

Service innovation primarily encompasses three key architectures: the service ecosystem, which offers an organizational framework for participants to offer services and collaboratively create value; the service platform, which brings about innovation by fluidifying resources, thereby enhancing resource efficiency and concentration, making it convenient to access suitable resource bundles for service exchange; and value co-creation, which views value as the outcome of the integrated resources jointly created by service providers and beneficiaries [6]. For service-oriented enterprises, a service platform is an important bridge connecting consumers and enterprises during the service process, and its real-time sharing of information, high service efficiency, and strong responsiveness widely influence customers' willingness and behavior to participate in value co-creation. This study will explore the mediating role of platform service quality and understand the role and mechanism of service platforms. The advent of the digital economy era has accelerated the reshaping of the overall value chain of enterprises through digitization and intelligent technology, while the existing research on the impact mechanism of digital technology on customer customization is still insufficient [7]. With the continuous advancement of the digitization process, enterprises can also integrate data and information from various links through building digital platforms, use customers as a source of information to understand future consumer trends, and thus accurately grasp the differentiated value demands of customers in the digital era to achieve more groundbreaking value addition [8]. This study will further verify the regulatory role of digital technology in the customer participation and value co-creation of service-oriented enterprises, and explore the unique mechanism of the role of customer customization in enterprise innovation and value co-creation in the digital era.

2. Theoretical Basis

2.1. Theoretical Research on Customer Participation

The simultaneity of production and consumption is an important feature of services, which means that customer participation is inevitable in the process of service consumption. Furthermore, with the development of the experience economy, an increasing number of customers actively participate in the design and delivery of services, thereby influencing the perception of service quality. Zeithaml and Parasuraman believe that purchasers of services participate in the specification design and delivery of services while simultaneously producing and consuming services [9]. There are three main categories regarding the concept of customer participation: the first category describes customer participation in terms of the customer's mental, intellectual, physical, and potential psychological responses [10]; the second category emphasizes customer participation as all behaviors related to service production and delivery, including both spiritual and material aspects [11]; the third category views the customer as a collaborative producer, engaging in actual cooperation and shared production behavior during the service process [12]. These perspectives all agree that customer participation is a behavioral concept, reflecting the active or passive role of the customer and involving the resources provided by the customer for service production and delivery.

The results and impacts of customer participation mainly focus on three aspects. Firstly, the influence of customer participation on service organizations, with studies suggesting that customer participation can effectively enhance the productivity of service organizations [13]. In the recently proposed service-dominant logic, customers are co-creators of value, and organizations enhance their competitive advantage by providing cooperation opportunities and resources consistent with the level of participation expected by customers [14]. Secondly, the impact of customer participation on the customers themselves, particularly in terms of perceived quality, satisfaction, and loyalty. Prior studies have shown that customer participation and role satisfaction can influence their satisfaction with the service [15]. For example, the impact of customer participation on the willingness and satisfaction of staying in green hotels [16]. Thirdly, studies on the factors influencing customer participation (or integration). Saunila and Ukko, among others, discussed the

factors influencing customer participation from the perspective of digital services, focusing on customers (consumption goals, resources, personalities, and attitudes), businesses (time, brand, value creation, incentives), and the environment (competitors, technology, society) [17].

2.2. Research on Value Co-Creation Theory

In the early stages of studies on service economy theory in the 1970s, the concept of co-production between customers and service enterprises began to be discussed [18]. Normann and Ramirez argued that successful enterprises are increasingly not only adding value, but also reshaping value to break the distinction between products and services, and combine them into activity-based “offers” where customers can create value for themselves [19]. Lovelock and Young discussed strategies to enhance productivity in the service industry, proposing tactics to involve customers more deeply in the production process [20]. Ramirez proposed the concept of value co-production and a research framework, suggesting that customers can participate in the production of value [21]. Vargo and Maglio pointed out that service science involves the study of service systems that combine people, technology, and value, addressing the theory, processes, and participants of value co-creation, including the roles, behaviors, and environmental arrangements of participants [22]. Cova and Salle, and Vargo and Lusch, also applied service dominant logic to B2B and network marketing. Entering the digital era, the impact of customer participation on value co-creation has become a hot research topic [23]. Saunila and Rantala’s studies suggest that the characteristics of customer value creation in digital services are similar to traditional services but emphasize more openness and communication in the delivery of digital services, as well as greater customer control in cooperation and service quality [24].

Overall, studies on the theory of service value co-creation shows the following trends: First, the theory and practice of service-dominant logic (S-D) greatly promote the development of the theory of service value co-creation [2,24,25]. On the one hand, S-D logic suggests that the co-creation context is no longer limited to the interaction between the company and the customer but also includes value co-creation among other stakeholders [14]. On the other hand, scholars are paying attention to the role of customer experience in the process of customer value co-creation [26]. Second, research in service science has shifted from value co-creation in complex service systems [27] and B2B contexts [28] to value co-creation in individual [29] and public service contexts [30].

3. Developing Hypotheses

3.1. Direct Impact of Customer Participation on Value Co-Creation

As customer consumption capabilities increase and demands become more diverse, their service needs are becoming increasingly complex and variable. It is essential for businesses to promptly and accurately understand customers’ opinions and suggestions regarding products or services, and to incorporate customer needs into the value creation process [31]. Yi constructed a customer value co-creation behavior scale. The scale comprises two dimensions: customer participation behavior and customer citizenship behavior [32]. This study references the views of Chang W [33] and Morgan [34] to divide customer participation into three dimensions: information provision (IP), co-development (CD), and co-marketing (CM). Information provision refers to the use of relevant information collected from customers by enterprises to develop products or services that meet customer needs. Co-development involves customers providing ideas or feedback on products, ultimately co-designing, and developing products/services with the company. Co-marketing involves customers using their social resources in community networks to undertake the promotion and marketing of products or services. Different ways of customer participation can promote interaction and collaboration between enterprises and customers, creating sustained and growing benefits.

Specifically, from the perspective of value co-creation bringing value added and impact changes at the organizational level, this study will refer to Grönroos’s [35] research

results and borrow from Ramani's [36] dimension division of value co-creation, quantifying value co-creation into three dimensions: economic value (EV), innovation value (IV), and relational value (RV). Economic value mainly refers to its impact on the financial performance of the company, including growth in market share, profit, and other indicators. Innovation value is reflected in the innovation and development speed of new products or services by the company. Relational value involves the improvement of relationships and trust between the company and its customers. Customers can share their needs and preferences with the company or directly participate in the company's product or service development process, providing corresponding opinions or suggestions on the design, development, and process transformation of company products or services, thereby bringing economic, innovative, and relational value added to the company. Customer participation is a valuable means for service-oriented enterprises to address the issue of information stickiness caused by actively collecting information, control information costs, and bring economic benefits to the business [37]. The information provided by customers to the enterprise contains deep insights into the products or services, and frequent information interaction is also likely to stimulate new ideas or the emergence of new services, thereby enhancing the relationship between the enterprise and the customers as well as improving the innovation efficiency of the service enterprise [38]. Furthermore, customers can use their social resources and relevant social information channels to help the service enterprise recommend and introduce new services or products [39]. In summary, the different activity paradigms of customer participation can help service-oriented enterprises gain more competitive advantage and operational performance, realizing co-creation of value with customers. Therefore, the direct impact of customer participation and value co-creation can be hypothesized as follows:

Hypothesis 1 (H1): *Customer participation has a significant positive impact on value co-creation for service-oriented enterprises.*

Hypothesis 1a (H1a): *Information provision has a significant positive impact on economic value, innovation value, and relational value.*

Hypothesis 1b (H1b): *Co-development has a significant positive impact on economic value, innovation value, and relational value.*

Hypothesis 1c (H1c): *Co-marketing has a significant positive impact on economic value, innovation value, and relational value.*

3.2. The Mediating Role of Platform Service Quality

The interactivity, continuity, speed, and flexibility characteristics of service platforms make them an important bridge connecting customers and service-oriented enterprises. Service-oriented enterprises can integrate these network characteristics with good service quality to proactively attract customers to engage in information sharing, co-development, interactive communication, and comment sharing on the service platform, using cooperation and interaction to stimulate the generation of new ideas and thoughts to meet customers' needs for goods or services, thus achieving the goal of creating value together [40]. From the theoretical perspective of value co-creation and value ownership in platform governance, Xia Zhao discussed how platforms can design incentive mechanisms to induce suppliers to take the initiative to reduce customer complaints [41]. Eojina and Liang further proved through empirical study on catering enterprises that the interaction between customers and businesses is first manifested in positive dialogue and communication, representing a trend of high interactivity, high participation, and proactive behavior towards each other. The high-quality service provided by the service platform can promote a higher level of mutual understanding and interaction between businesses and customers, allowing customers to better integrate their own value concepts with the value creation process

of the business [42]. In summary, the mediating role of platform service quality can be hypothesized as follows:

Hypothesis 2 (H2): *Platform service quality plays a mediating role in customer participation and value co-creation of service-oriented enterprises.*

3.3. Mediating Role of Digital Technology

In the digital economy era, digital technologies mainly centered on big data, cloud computing, and artificial intelligence are revolutionizing the elements and processes of the production value chain in a “revolutionary” manner and continuously creating new value. The application of digital technology is also considered as an important means to achieve enterprise transformation and seize a proactive position in the market [43]. The advancement of digital technology in business processes can help enterprises swiftly gather a large amount of data from customers and intelligently analyze and process these data. This enables enterprises to quickly understand customer preferences and market demands, including both explicitly stated and potential needs, thus helping enterprises adjust the quality of platform services or rapidly achieve value co-creation [44]. On one hand, the high connectivity of digital technology can provide an effective platform for customer participation in value co-creation; improving the quality of platform services further enhances the convenience, effectiveness, and satisfaction of customer participation. Using the service platform as a carrier to guide customer participation in value co-creation is also expected to be a future trend [45]. On the other hand, digital technology in the value network empowers customers to become co-creators of value [46]. For service enterprises, the change in marketing communication media brought about by digital technology affects the way customers obtain relevant information and constitutes a key influencing factor in the business development of enterprises. In the digital economy era, customer demands are becoming increasingly transparent and tangible, allowing service-oriented enterprises to directly connect with audiences for precision marketing. At the same time, customers can, based on their own wishes, participate in the research, design, and marketing of new services or products using service platforms. This allows enterprises to obtain unique ideas from customers, feedback on products, free brand promotion, and intimate relationships with customers, shaping new competitive advantages through digitalization to achieve value co-creation with service-oriented enterprises. A hypothesis can be formulated by reviewing the content of research findings and conducting theoretical deduction:

Hypothesis 3 (H3): *Digital technology plays a positive regulatory role in the co-creation of value between customer participation and service-oriented enterprises.*

As mentioned above, customer participation has a significant impact on the value co-creation of service-oriented enterprises, and platform service quality and digital technology are important moderating factors for customer participation and value co-creation of service-oriented enterprises. Based on Vargo and Lusch [2], this paper proposes an expanded conceptual model of service innovation under the digital background, namely, the tripartite framework of service innovation: service ecosystem, service platform, and value co-creation, and Grönroos’s three-dimensional division of value co-creation: economic value, innovation value, and relational value [35]. Based on the above assumptions, this study proposes the conceptual model, as shown in Figure 1.

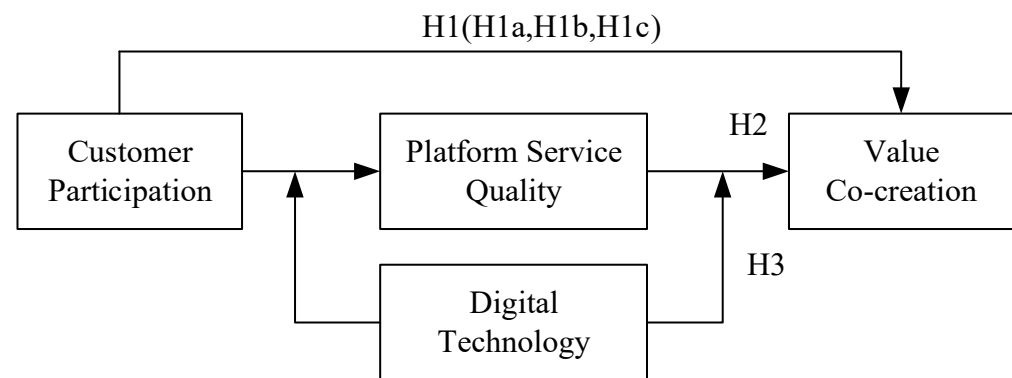


Figure 1. Study hypotheses and conceptual mode.

4. Methodology

4.1. Survey Sample and Procedure

The questionnaire was conducted between 20 October and 10 November 2023, using convenience sampling and drop-off and pick-up methods. In order to ensure the accuracy and efficiency of questionnaire delivery, we invite students who have graduated for four years and are engaged in the service industry to fill in the questionnaire. At the same time, we call on students to invite their relatives, friends, and colleagues in service-oriented enterprises to fill in the questionnaire. In addition, questionnaires were issued through online research platforms and screening questions were set to ensure the accuracy of the filling population. The main ways of questionnaire distribution include the following: (1) sending questionnaires directly through instant messaging software such as WeChat (3.9.9.43); (2) sending an email with the questionnaire attached; (3) questionnaires created through data collection platforms such as Questionnaire Star and data collection platform, and then distributed. The specific content of the questionnaire mainly includes three parts: The first part is a basic introduction to the background of questionnaire design, including the purpose of the survey, the specific research background of the survey, and the relevant filling requirements for the subjects. The second part includes basic background information of the respondents, including the specific type of service-oriented enterprise to which the subjects belong, the enterprise scale reflected by the number of employees, and the years of establishment of the enterprise. The third part consists of measurement items for the various dimensions of the corresponding variables, including the independent variable of customer participation, the intermediary variable of platform service quality, the moderating variable of digital technology, and the dependent variable of value co-creation. Mueller believed that for simple SEM analysis, the sample size standard should be at least 100 and preferably 200 [47]. If the sample size is analyzed from the number of observed variables in the model, the ratio between the number of samples and the number of observed variables should be at least 10:1 to 15:1 (Thompson, 2000 [48]). A total of 400 questionnaires were distributed for this survey, and 342 questionnaires were returned. After excluding 92 invalid questionnaires with missing items, an obvious lack of seriousness in filling out, and a failure to pass the questionnaire detection questions, a total of 250 valid questionnaires were collected, with an effective rate of 73.30%. Descriptive analysis of the characteristics of the 250 valid questionnaires is shown in Table 1.

Table 1. Descriptive analysis of the sample characteristics.

Basic Characteristics	Category	Sample Size (Units)	Percentage (%)
Type of Company	Communication Services	15	6
	Financial Services	18	7.2
	Educational Services	62	24.8
	Tourism and Related Services	53	21.2
	Healthcare and Related Services	27	10.8
	Catering Industry	75	30
Number of Employees	Fewer than 50 people	75	30
	51–200 people	95	38
	201–500 people	55	22
	More than 500 people	25	10
Years in Operation	Less than 3 years	35	14
	3–5 years	116	46.4
	5–10 years	84	33.6
	More than 10 years	15	6
Customer Type	Primarily individual customers	6	2.4
	Primarily organizational customers	175	70
	Other situations	69	27.6

4.2. Variable Measurements

(1) Customer Participation: Drawing from the development of the customer participation measurement scale by Chang W [33] and Morgan et al. [34] and adjusting and modifying it according to the research context, we formed three dimensions of information provision (4 items), joint development (4 items), and co-marketing (4 items), totaling 12 items. These include statements such as “Customers actively convey relevant information they possess to us” and “Our customers actively participate in various service products design and development activities”.

(2) Platform Service Quality: Referring to the research on online website service quality by Zhu Li [49] and Xiong Chunlin et al. [50], and starting from the perspective of consumers’ actual perceptions of service platform quality, we divided platform service quality into three dimensions of interaction design convenience (3 items), online review effectiveness (3 items), and customer demand responsiveness (3 items), totaling 9 items. These include statements such as “Users can easily express their thoughts, suggestions, and requests to us through the service platform” and “Our service platform is secure and stable, with a fast response speed to customers”.

(3) Value Co-creation: Referring to the organizational level differential value-added process discussed by Ramani [36], we divided value co-creation into three dimensions of economic value (4 items), innovation value (4 items), and relational value (3 items), totaling 11 items. These include statements such as “Customer participation increases the sales volume of the enterprise’s service products” and “Established a good mutually beneficial relationship between customers and enterprises”.

(4) Digital Technology: With reference to the measurement scale used for the study of enterprise digital technology by Yang Zhenning et al. (2021) [51], we designed 5 measurement items tailored to the characteristics of service-oriented enterprises. These items include “Our company has applied a large number of digital services products” and “Our company’s digital infrastructure (such as digital technology tools and systems) is very sound”.

5. Data Analysis and Hypothesis Testing

5.1. Confirmatory Factor Analysis

Reliability refers to the degree of consistency in the results obtained from repeated measurements of the same object using the same method, which can reflect the authenticity

of the characteristics of the measured object. In empirical research, Cronbach's method is commonly used. The reliability coefficient (α) is an important indicator for testing reliability. According to the reliability coefficient standard proposed by Hair [52], Cronbach's α coefficient and composite reliability should generally be higher than 0.7 to indicate that the scale has sufficient credibility. Validity refers to the degree to which a measuring tool or technique can accurately measure the object being measured. The more the measured result matches the characteristics of the object being measured, the higher the validity; on the contrary, the weaker the match, the lower the validity. This study uses confirmatory factor analysis to assess the validity of the scale, and uses the square root value of the average variance extracted (AVE) to represent it. If $AVE \geq 0.5$, it indicates that the scale has good validity [53].

This study performs a confirmatory factor analysis on measurement variables, exploring the contribution of each measurement item to latent variables. The specific fitting results of the model are shown in Table 2. The standardized load of each item on the corresponding latent variable is greater than 0.5, which is significant at the $p < 0.001$ level. The Cronbach's α values are all greater than 0.7, and the combined reliability (CR) of each variable is also greater than 0.7, with AVE greater than 0.5, indicating good convergent validity.

Table 2. The measurement model statistics.

Construct	Measurement Variable	λ	AVE	α	CR
Information provision	IP1	0.828	0.782	0.861	0.862
	IP2	0.819			
	IP3	0.688			
	IP4	0.785			
Joint development	CD1	0.733	0.765	0.848	0.849
	CD2	0.786			
	CD3	0.762			
	CD4	0.777			
Co-marketing	CM1	0.759	0.739	0.825	0.827
	CM2	0.766			
	CM3	0.633			
	CM4	0.788			
Interaction design convenience	CID1	0.753	0.755	0.798	0.799
	CID2	0.728			
	CID3	0.783			
Online review effectiveness	VOR1	0.662	0.769	0.807	0.812
	VOR2	0.823			
	VOR3	0.812			
Customer demand responsiveness	RUN1	0.822	0.766	0.804	0.808
	RUN2	0.654			
	RUN3	0.809			
Economic value	EV1	0.818	0.772	0.854	0.8544
	EV2	0.733			
	EV3	0.726			
	EV4	0.805			
Economic value	IV1	0.764	0.777	0.859	0.8593
	IV2	0.781			
	IV3	0.787			
	IV4	0.777			
Relational value	RV1	0.830	0.773	0.815	0.8167
	RV2	0.759			
	RV3	0.728			

This study uses the AMOS 24.0 software package to fit the obtained data and variable models. The goodness-of-fit indices of the various variable models are shown in Table 3, with CMIN/DF less than 3, and CFI, IFI, GFI, and AGFI all greater than 0.9, and RMSEA less than 0.08, meeting the judgment criteria. This proves that each measurement scale also has good overall fit.

Table 3. Variable model fit goodness-of-fit index table.

	CMIN/DF	CFI	IFI	GFI	AGFI	RMSEA
Customer Involvement	1.452	0.982	0.982	0.955	0.931	0.043
Platform Service Quality	0.784	1.000	1.007	0.983	0.969	0.000
Value Co-creation	1.105	0.996	0.996	0.969	0.951	0.021
Digital Technology	1.661	0.996	0.996	0.987	0.96	0.052

5.2. Common Method Bias Test

In the initial design stage, this measurement scale has been organized and has summarized as many items as possible based on mature scales, ruling out the possibility of insufficient expression of questionnaire information; simultaneously, anonymous filling and setting filtering options are used to ensure the authenticity and validity of the questionnaire information to the greatest extent possible. Further, the Harman single-factor method was used to test for possible common method biases in the data. Exploratory factor analysis of all items related to customer participation, platform service quality, digital technology, and value co-creation was conducted using the principal component analysis method, with results shown in Table 4. All items of the measurement scale can be divided into 10 representative factors with eigenvalues greater than 1. The explanatory power of the first factor is 21.139%, indicating that there is no factor that explains more than 50% of the total explanatory power. Therefore, the data sample does not suffer from serious common method bias issues.

Table 4. Common method bias test results.

Factors	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	7.821	21.139	21.139	7.821	21.139	21.139
2	3.147	8.507	29.645	3.147	8.507	29.645
3	2.516	6.799	36.444	2.516	6.799	36.444
4	2.335	6.311	42.756	2.335	6.311	42.756
5	2.254	6.093	48.848	2.254	6.093	48.848
6	2.079	5.619	54.467	2.079	5.619	54.467
7	2.016	5.448	59.915	2.016	5.448	59.915
8	1.708	4.616	64.531	1.708	4.616	64.531
9	1.633	4.413	68.944	1.633	4.413	68.944
10	1.232	3.329	72.273	1.232	3.329	72.273

Note: Factors with eigenvalues below 1 are presented after factor 10.

5.3. Hypothesis Testing

5.3.1. Principal Effects Test

The AMOS 24.0 software package was used to construct a structural equation model to examine the direct impact of customer participation on the co-creation of value in service-oriented enterprises (Figure 2). Based on the test results, it is evident that all fit index values meet the corresponding evaluation standards (CMIN/DF = 0.515, RMSEA = 0.000, GFI = 0.995, AGFI = 0.986, NFI = 0.965, CFI = 1.000), indicating a good model fit. The path coefficient between customer participation and value co-creation is 0.788 (sig < 0.001), indicating that customer participation significantly and positively influences the co-creation of value in service-oriented enterprises, confirming H1. Further establishment of a model to explore the impact mechanism of customer participation on the various dimensions of

value co-creation reveals a good model fit based on the calculated impact path coefficient and fit indices using the AMOS24.0 software package (CMIN/DF = 1.295, RMSEA = 0.034, GFI = 0.908, AGFI = 0.885, NFI = 0.894, CFI = 0.973), suggesting that H1a, H1b, and H1c can be presumed correct.

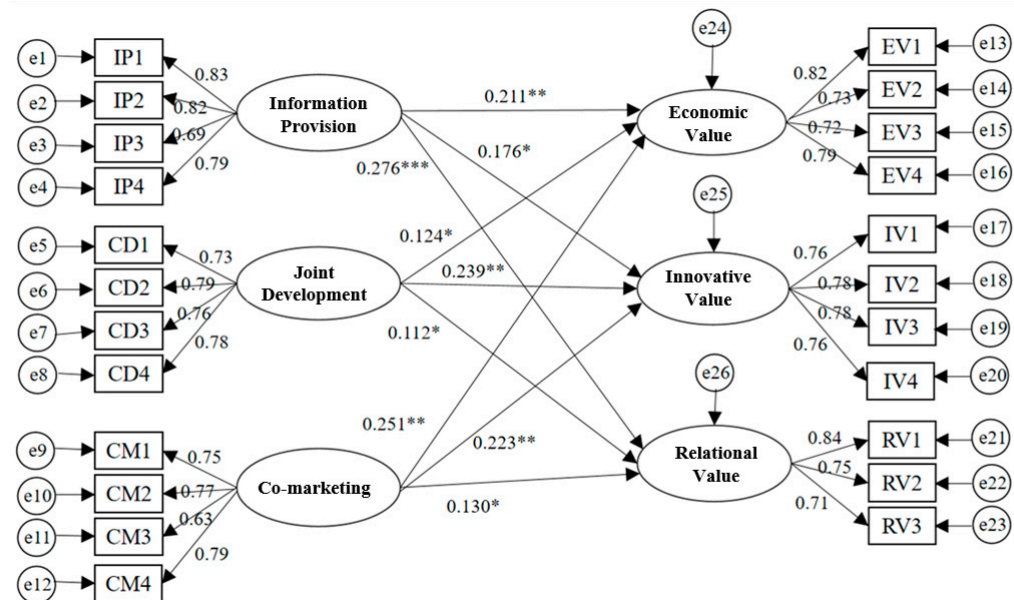


Figure 2. SEM analysis results. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5.3.2. The Mediating Effect Test of Platform Service Quality

The bootstrap method was used to examine the mediating effect of platform service quality possessed by service-oriented enterprises in promoting value co-creation through customer participation. The first-order latent variables of platform service quality, “interaction design”, “effectiveness of online reviews”, and “user responsiveness”, were bundled [54] and intermediately connected in AMOS through paths indA1, indA2, and indA3, respectively. Multiple mediation effect tests on the three first-order latent variables of customer participation yielded parameter estimates of 0.1585, 0.1746, and 0.1738, with skewness-corrected bootstrap confidence intervals at 90% confidence level of (0.0899, 0.2466), (0.0948, 0.2653), and (0.0948, 0.2582), respectively. The upper and lower limits are both greater than 0, but do not include 0, indicating that platform service quality significantly mediates the relationship between customer participation in the three dimensions and value co-creation (as shown in Table 5), supporting H2.

Table 5. Non-standardized bootstrap mediation effect test.

Path	Effect Value	SE	Bias-Corrected 90% CI			Percentile 90% CI		
			Lower	Upper	<i>p</i>	Lower	Upper	<i>p</i>
indA1 (x1 × x4)	0.1585	0.0471	0.0899	0.2466	0.0005	0.0814	0.2364	0.0010
indA2 (x2 × x4)	0.1746	0.0507	0.0948	0.2653	0.0006	0.0883	0.2571	0.0010
indA3 (x3 × x4)	0.1738	0.049	0.0948	0.2582	0.0012	0.097	0.2613	0.0010

Note: indA1: information provision → platform service quality → value co-creation; indA2: co-development → platform service quality → value co-creation; indA3: co-marketing → platform service quality → value co-creation.

5.3.3. The Moderation Effect of Digital Technology

Based on five indicators of digital technology, 250 samples were classified into two groups using K-means clustering analysis with the SPSS 24.0 software package. The results of the analysis showed that the mean of Group A (N = 104) was significantly lower than the mean of Group B (N = 146); Group A was classified as low digital technology application, while Group

B was classified as high digital technology application. Model fitting was performed for the two groups separately, and the fitting results are shown in Table 6. Both groups showed a significant positive impact of customer participation on platform service quality, with platform service quality having an impact on value co-creation in the high digital technology group, while the impact was not significant in the low digital technology group.

Table 6. Grouping model estimation of the degree of application of digital technology.

Impact Path	Group A		Group B	
	Coefficient of Path	p-Value	Coefficient of Path	p-Value
Customer Involvement → Platform Service Quality	0.8385	***	1.4389	0.0017
Platform Service Quality → Value Co-creation	0.1470	0.3074	0.9844	0.0149

*** $p < 0.01$.

Group comparison analysis by using the AMOS 24.0 software package revealed differences in the moderation effect of digital technology in various path coefficients in the two groups. Through an analysis of the impact model of customer participation on platform service quality, the absolute values of the path cross-grid statistics were found to be 2.2678 for b3_1 and b3_2; the absolute value of the statistics for the impact model of platform service quality on value co-creation was 2.0472 for b1_1 and b1_2. Therefore, at a significance level of 0.05, there are significant differences between the two groups of high and low digital technology application in the impact of “customer participation” on “platform service quality” as well as the impact of “platform service quality” on “value co-creation”. When the level of digital technology application shifts from low to high, there is a gradual increase in the impact of customer participation on platform service quality and an increasing trend in the role of platform service quality on value co-creation, thus verifying H3.

6. Discussion and Conclusions

This study takes service-oriented enterprises as the research object and conducts an in-depth exploratory study on the internal influence mechanism of customer participation in co-creating value based on service innovation, service quality theory, and value co-creation. The main conclusions drawn are as follows: (1) Service-oriented enterprises can transform customers into cooperative partners who win together with the service-oriented enterprise through three paradigms of customer participation, continuously empowering the growth and development of the service-oriented enterprise through the process of value co-creation. This finding supports prior studies [6]. (2) The platform service quality of service platforms during customer participation in value co-creation can enhance customers' satisfaction with the enterprise and promote customers' positive willingness to participate in value co-creation when customers have a better understanding of the basic information of products or services. Prior studies has shown that customers by maintaining a good interactive service platform, to improve the customer participation intention [17,42]. This is consistent with the results of our study. (3) The degree of application of digital technology can positively regulate the impact relationship between customer participation and value co-creation with service-oriented enterprises. Digital technology to increase the efficiency of the service platform and information collected by intelligent processing ability, etc., so as to promote value co-creation of all parties [46,55–57].

6.1. Theoretical Contributions

(1) This study has constructed a theoretical model of customer participation influencing the value co-creation of service-oriented enterprises in the digital era. Based on the service quality theory, value co-creation theory, and relevant research results, a theoretical model

of the influence of customer participation on value co-creation from the perspective of the enterprise is constructed, breaking through the previous research limitations that focused more on the consumer perspective. At the same time, with the platform service quality as the mediating variable, the mediating path of customer participation in value co-creation is determined. By introducing digital technology as a moderating variable in the era of digital economy, it strengthens the research and practice of digital service innovation, showing some degree of innovation in model construction.

(2) This study has revealed the role of customer participation in value co-creation for service-oriented enterprises in the digital era. Building upon previous research, this study analyzes three paradigms of customer participation, categorizing them into the dimensions of information provision, co-development, and co-marketing. It further expands on how customer participation in the digital context influences the mechanisms of value co-creation and service innovation for service-oriented enterprises, enhancing the understanding of the impact of digital technology on service innovation and enriching the S-D logic theory.

6.2. Managerial Implications

The conclusions of this study have the following managerial implications for service-oriented enterprises:

First, service-oriented enterprises should focus on effectively managing the three paradigms of customer participation. In the future, enterprises should engage with customers in a meaningful way through multiple levels such as ideology, strategy, and technology, establishing diverse and long-term relationships to influence customer behavior and further enhance the spontaneity of customer participation. Additionally, they can consider implementing corresponding reward measures to create incentive factors for more customers to actively participate in the entire process of service production and delivery. Furthermore, differentiated incentive measures should be implemented based on different forms or processes of customer participation to encourage more customers to actively co-create value with the enterprise using their information, capabilities, social resources, and other means. By meeting the personalized needs of customers, customer customization can better utilize resources, reduce waste, and thus reduce the impact on the environment, further promoting sustainable development.

Second, service-oriented enterprises should pay attention to providing good support mechanisms for customer participation in the value co-creation process. The service-oriented enterprises need to regularly adjust the service platforms they build, first by optimizing the interface interaction and design of the service platform operating end, with a greater emphasis on the convenience of platform use. Then, they should adopt appropriate flexible reward mechanisms such as a points redemption system to encourage customers to more comprehensively and objectively describe their experiences from multiple perspectives. Finally, they should establish an effective evaluation response mechanism to increase employees' awareness of customer service, prompt employees to promptly view, respond to, provide feedback on, and address customer needs on the service platform, making it a good communication support mechanism.

Lastly, digital technology is an important determining factor in promoting sustainable development of enterprises, service-oriented businesses should promote and actively implement the digital technology application of the enterprise. In the future, these businesses need to pay more attention to and increase investment in the development of digital technology, establish departments related to digital technology, and create a mechanism for the cultivation of professional talents. At the same time, they should strengthen the deep integration of digital technology with the business operation mode, actively combine emerging technologies such as big data and cloud computing to create more opportunities for customers to participate in the value co-creation process, obtain sustainable profit points in line with customer needs, better tap into customer potential, and monetize potential data resources into the actual economic benefits and innovative value enhancement of the enterprise.

6.3. Limitations and Future Research Directions

The current study has some limitations. First, the scope of investigation and research should be further expanded and sample data should be increased. For example, the research object should not only be limited to the managers of enterprises, but also consider including customers in the scope of research, and improve the multi-angle value co-creation research. Future studies should aim for a more balanced and representative sample. The second is to introduce other variables for more in-depth study. The conceptual model of this study introduces the service quality of the service platform and digital technology as the mediating and regulating variables, respectively. Future research may consider more in-depth exploration from the aspects of customer diversity, such as user characteristics, leading customer orientation, and organizational level, such as platform capabilities. The third is to expand the research perspective. Future research perspectives can consider measuring customer participation and value co-creation from the two levels of enterprises and customers, respectively, and try to add more situations into the research for cross-regional and cross-cultural comparative analysis.

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