



The Influence of Service Implementation and Value Co-creative on Performance

Wang Junxian¹, Xu Yuzhen², Lin Bojin³

Guangzhou Institute of Science and Technology, Guangzhou, Guangdong, China

Email: hschen98.tw@gmail.com

Received: 07 May 2026; Received in revised form: 04 Jun 2026; Accepted: 08 Jun 2026; Available online: 12 Jun 2026

Abstract— The production and service has rapid change during past decade, which brings significant impacts to customer participating in such activity. This rapid development stimulates producers and customers simultaneously efforts in co-creation process for enhancing value of products and services. Co-creation is recognized as a resource integration process involving firms, suppliers, and customers that are guided business ecosystem. Through co-creation processes, the participators share their resources and knowledge during collaborative activities and interactions, termed co-creation practices. The study develops a contingency framework on how the service implementation drives co-creation in generating firm performance. We employ 127 service-oriented firm as our empirical analysis. Results indicate two service implementation activities (service quality and service innovation) that affect value co-creation. The value co-creation plays mediating role between service implementation and firms performance.

Keywords— Service-oriented economy, service innovation, service quality, demand uncertainty, co-creation.

I. INTRODUCTION

The global economy is progressively entering a service-oriented era characterized by manufacturing servitization. Traditional passive operational approaches can no longer cope with the volatile and complex external environment and should be replaced by rapid-response and proactive service innovation. When facing a service-oriented economy and an era of demand uncertainty, firms must pursue survival, sustainable operation, and the creation of new value to explore new business opportunities. Service-oriented enterprises need to introduce innovative products, technologies, and services to attract customers and thereby strengthen their competitive advantage. In recent years, a growing body of literature has contributed to the study of service innovation, and it has been found that service innovation has drawn considerable attention from both academia and practice. In a business environment where information circulates rapidly,

the competitive pressure faced by firms is gradually intensifying. To remain competitive in such a highly competitive, service-oriented environment, firms must adopt entirely new mindsets and integrate innovative service practices[1-6].

Drejer argues that the accumulation of professional knowledge and experience in the service sector facilitates the development of new markets, contributes to understanding market demand, and promotes innovative services[3]. By adopting a problem-solving approach, firms can effectively mitigate the impact of uncertainty and create competitive advantage. Moreover, in an era of demand uncertainty, how firms ensure that the services and products they provide meet customers' genuine needs and further create value for customers can no longer be ignored. As noted by Prahalad and Ramaswamy[7], value co-creation activities between firms and customers must be built upon processes of dialogue, access, transparency, and risk assessment.

Ramaswamy and Gouillart further propose that value co-creation activities between a firm and its stakeholders must be based on mutual benefit[8], respect, interaction, and mutual support. Whether between the firm and its customers or between the firm and its stakeholders, synchronous interaction and communication coordination enable the firm to co-create value. From the above analysis, it can be inferred that service-oriented firms, by building on service innovation and service quality to strengthen relationships with customers, help reduce market demand uncertainty and enhance value co-creation between the firm and its customers, creating additional value that exceeds customer expectations. In this way, a win-win situation can be created and firm performance can be strengthened.

Based on the above background and motivation, it is evident that manufacturing servitization and a service-oriented firm era represent an inevitable trend. According to Homburg and Pflesse and Tan, innovation behavior is a key factor for firm survival[9,10]. For service-oriented firms, service innovation and quality are among the core competitive capabilities. Given today's business environment with high demand uncertainty, whether these core capabilities can create more value for customers during the delivery of service products and, through value co-creation, enhance overall firm performance and competitive advantage is a question worthy of investigation. In summary, this study aims to explore how service firms, in a service-oriented economy, employ service innovation and service quality as foundations to engage in value co-creation with customers and thereby enhance their competitive advantage. It further investigates whether demand uncertainty exerts a moderating effect on the relationship between value co-creation and firm performance. Accordingly, the research objectives are stated as follows: (1) to examine the effects of service innovation, service quality, and value co-creation on firm performance; (2) to examine the mediating role of value co-creation in the relationships between service innovation, service quality, and firm performance; and (3) to examine whether demand uncertainty moderates the effect of value co-creation on firm performance.

II. LITERATURE REVIEW

2.1 Service Innovation

Drucker pointed out that innovation refers to the systematic development of new products and new services by utilizing relevant knowledge and technology[11], combined with various training and opportunities, to create new value and improve firm performance. Drejer further defined innovation as combining old and new methods to create value for the firm and introducing new methods and new resources into efficient business models[3]. Hipp and Grupp indicated that service innovation is a new combination of organizational innovation[4], technological innovation, management innovation, and customer demand innovation; through such innovative services, firms provide customers with entirely new services, uncover potential customer needs and market development trends, and grasp the core concept of innovative services. At the same time, Hipp and Grupp also categorized service innovation into four types[4]: (1) knowledge-intensive innovation, which utilizes external research institutions or combines knowledge sources from other technologies, with very close interaction between customers and the external environment; (2) scale-intensive innovation, which standardizes service products and supplies them in large quantities to achieve economies of scale in services; (3) network-based innovation, where communication with service customers and improvements in information technology are achieved through information networks to attain innovative development and provide customers with higher-value service products; and (4) supplier-dominated innovation, where service innovation activities depend on developments by other external firms (suppliers).

2.2 Service Quality

In the economic era of manufacturing servitization, apart from innovative services, maintaining and improving service quality is also an important issue for enhancing customer satisfaction. As noted by Berry and Zeithaml and Bitner[12,13], in a fiercely competitive environment, providing excellent service quality is the primary factor for retaining existing customers and maintaining competitive advantage. Therefore, in a customer-need-centered environment,

maintaining and enhancing service quality has become one of the most critical and fundamental tasks for competitive advantage. Bebko argued that consumers' concept of quality has gradually expanded from tangible physical product quality to intangible service quality[14]. Brady et al.[15] pointed out that past research on service quality almost all tended to interpret quality in terms of technical, functional, and process aspects, whereas the current focus is more on exploring the connotation of service quality centered on customer expectations. Regarding service quality, Brady considered that it should encompass four levels[15]: intangibility, interaction quality, physical environment quality, and outcome quality. Services are intangible, so the process before, during, and after service cannot be perceived through the senses. During the service delivery process, customers must evaluate the interactive behavior between themselves and the service provider, and customers also perceive differences in service quality due to the situational and atmospheric quality of the environment. Consequently, all these factors lead customers to evaluate the final outcome regarding the actual product and intangible service quality.

2.3 Value Co-creation

Value co-creation originates from Porter's value chain concept[16], in which he posited that the products and services provided by a firm represent a process of value creation and enhancement, forming a complete value chain, and that value is generated during the process of providing products or services. Ramirez proposed the value co-creation perspective[17], shifting the role of value creation and arguing that customers should co-produce value through mutual interaction with the firm; this relationship between customers and the firm is termed value co-creation. Prahalad and Ramaswamy indicated that interaction between consumers and firms is a new model of co-creation, and that value generation occurs not only at the monetary transaction stage but at every stage of the value chain[7]. Grisseman and Stokburger-Sauer[18] found in their research that co-creating value with customers enhances both financial and non-financial performance, because when firms satisfy customer needs, customers are more willing to pay more for products and services, thereby increasing satisfaction

and even generating a willingness to reciprocate value. O'Cass and Ngo[19] argued that firms can mutually produce, integrate innovative products or services, and maintain relationships with one another, thus co-creating value for customers; they are both competitors and partners, and can jointly improve firm performance.

2.4 Demand Uncertainty

Gatignon and Xuereb[20] found that demand uncertainty further moderates the relationships between innovation and customers, competitors, and technology (or products). Sheng et al.[21] found that the difficulty in predicting customer preferences and the inability to accurately anticipate customer expectations are the main causes of demand uncertainty. Zhou and Li[22] pointed out that with intensifying global market competition and increasing demand uncertainty, fully grasping market demand and trends can help firms solve various problems and difficulties they face in the market; in addition, the impact of rapid market changes further accelerates the need for firms to fully utilize external resources for resource allocation to resist the influence of the external environment. Kindström et al.[23] argued that the introduction of innovative service practices helps firms understand real-time market dynamics and competitive situations, enhances customers' appreciation of the benefits brought by services and innovation practices, and aligns with market demand to improve the firm's competitiveness. Bebko noted that service quality is intangible and that there is a gap between consumer expectations and actual experiences[14]; therefore, firms should fully understand and grasp customer demand in the market and enhance service quality through innovative service models. Wang et al.[24], using hotels as an example, argued that with a constantly changing external environment, to improve service quality, products, and processes, firms must understand competitors' capabilities and situations to seize opportunities from external information, thereby meeting constantly changing market demands.

III. RESEARCH DESIGN

3.1 Research Framework

Through the background, motivation, and literature review, this study finds that service-oriented firms actively engage in service implementation activities—service innovation and service quality—both of which enhance customer value and further generate interactive behavioral patterns between the firm and its customers. That is, service quality and innovation possess the capability for co-creating value between the firm and its customers, and through value co-creation, they influence the firm's own performance. Therefore, this study hypothesizes that service implementation consists of two components—service innovation and service quality—and establishes the research framework shown in Fig. 1 below: with value co-creation as the mediator between service implementation and firm performance, and demand uncertainty as the moderator of the relationship between value co-creation and firm performance. Service innovation and service quality are the independent variables, value co-creation is the mediating variable, firm performance is the dependent variable, and demand uncertainty is the moderating variable. The establishment of this theoretical framework helps to understand how, under such external market forces, service innovation and service quality strengthen firms' engagement in value co-creation and enhance their competitive advantage.

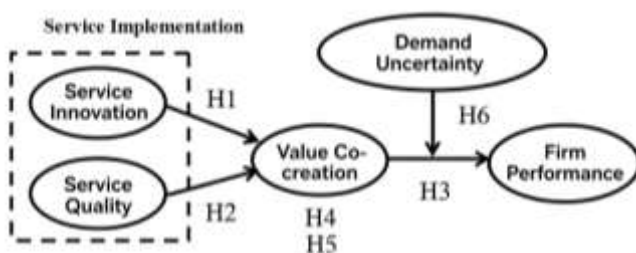


Fig. 1 Research Framework

3.2 Hypothesis Development

3.2.1 Service Innovation and Value Co-creation

Drejer proposed in his research that service innovation is usually driven by market demand, develops new markets through the accumulation of experience and combination of expert knowledge[3], and is often embedded in the close interactive

process between services and customers to create value for them. Service innovation not only provides customers with rich and novel value but also uncovers their core needs, further enabling both existing and potential customers to perceive valuable services[25]. Although there has been abundant literature on how service innovation enhances customer value, research on the relationship between the two and empirical studies remain relatively scarce. The impact of service innovation on value co-creation is an issue worth exploring, and there is a need to further establish a theoretical framework and conduct empirical research on how service innovation influences value co-creation. Therefore, this study posits that firms introduce innovative services and more novel service activities primarily to create more value for customers and attract more customers. Based on this premise, the following Hypothesis 1 is proposed:

Hypothesis 1: A firm's introduction of service innovation has a positive and significant effect on value co-creation.

3.2.2 Service Quality and Value Co-creation

The domestic scholar Yang[26] pointed out that to retain existing customers, firms must not only understand the importance of the service itself but also meet customer needs, further create additional service value for customers, listen to the voice of the customer, explore service quality issues, and play the role of a service provider. In addition, Brady et al.[27] indicated that service quality is intangible, is the process in which customers personally experience the service, and is the perceived value and quality created through interactions between customers and service providers. Generally, the more a firm can improve service quality, the higher the satisfaction and value customers experience. Drejer and Kotler[28] pointed out that firms that emphasize service quality activities can not only gain competitive advantage but also establish long-term relationships with customers through the provision of high-quality products and services[3]. Based on the above literature, this study infers that promoting excellent service quality helps enhance and develop customer value; the higher the service quality, the more value can be created for customers. Thus, the following Hypothesis 2 is established:

Hypothesis 2: A firm's implementation of service

quality has a positive and significant effect on value co-creation.

3.2.3 Value Co-creation and Firm Performance

Scholars such as Prahalad and Ramaswamy and Ramaswamy and Guillard found that close interaction between firms and customers or stakeholders contributes to the emergence of value co-creation[7,8]. Saarijärvi et al.[29] also found that to improve business performance, firms must rely on the assistance of value co-creation, utilizing measures such as designing or developing new products, production, and forecasting market demand to enhance the value co-creation process between the firm and its customers. Therefore, this study infers that close collaboration between firms and customers, especially in the processes of product and service development, manufacturing, and delivery, enhances firm business performance. Accordingly, the following Hypothesis 3 is established: Hypothesis 3: Value co-creation between firms and customers contributes to enhancing firm business performance.

3.2.4 The Role of Value Co-creation between Service Implementation and Performance

Integrating the above Hypotheses 1 to 3, it can be found that value co-creation possesses a mediating role; in other words, value co-creation plays the role of a mediating variable between service implementation and firm performance. We reason as follows: service innovation and service quality both aim to provide customers with excellent products and services. The primary purpose of combining both is to offer customers novel and high-quality products and services, enhance customer satisfaction, and establish long-term good relationships with customers. Therefore, both service quality and service innovation are customer-centered, creating services that customers perceive as valuable[3,28,30]. Summarizing the above literature review and discussion on service innovation and service quality, it can be understood that service innovation and service quality are antecedent factors of value creation. Hence, this study employs the constructs of service quality and service innovation as antecedent variables and the value co-creation between firms and customers as a mediator to further explore the influencing relationships among service innovation,

service quality, value co-creation, and firm performance, and to fill the gaps in the existing literature. Accordingly, the following Hypotheses 4 and 5 are proposed:

Hypothesis 4: Service innovation positively affects firm performance through the mediating effect of value co-creation.

Hypothesis 5: Service quality positively affects firm performance through the mediating effect of value co-creation.

3.2.5 The Role of Demand Uncertainty between Value Co-creation and Performance

When firms face various changes and high uncertainty in market demand, many studies have pointed out that firms should pay attention to the impact of market demand uncertainty on their business activities and further build the capability to respond to market demand uncertainty to seek new opportunities[22]. Therefore, under high demand uncertainty, firms should be even more proactive in understanding market dynamics and demand. In other words, if firms can cultivate and establish effective mechanisms for monitoring demand and the market, it will help them respond in real time to market changes and consumer demand, effectively reducing the impact of demand uncertainty. Furthermore, because customers play a crucial role in the market of service-oriented firms, market demand uncertainty is a factor that service-oriented firms must consider, and its influence is indisputable. Based on this, the following Hypothesis 6 is established:

Hypothesis 6: Demand uncertainty positively moderates the relationship between value co-creation and firm performance.

3.3 Measurement Items and Constructs

Based on the research framework established in this study, we further examine value co-creation as a mediating variable between service implementation and firm performance, and demand uncertainty as a moderator of the relationship between value co-creation and firm performance, and elaborate the relationships among the variables. All items in this study are measured using a Likert 7-point scale, ranging from "strongly disagree," "disagree," "somewhat disagree," "neutral," "somewhat agree," "agree," to "strongly agree," where "strongly

disagree" is scored as 1 and "strongly agree" as 7. All variables are drawn from relevant literature and measured with multiple observational indicators. The items for each construct are as follows:

3.3.1 Service Innovation Dimension

The measurement of the service innovation construct in this study is based on the six items developed by Chen et al.[31] and has been appropriately modified to suit the context of this study: (1) In recent years, our company has developed new branded services; (2) In recent years, our company has improved and upgraded existing services; (3) In recent years, our company has repackaged and enhanced existing services; (4) In recent years, our company has upgraded and extended existing service lines; (5) In recent years, our company has introduced new services that competitors have not yet offered in the market; (6) In recent years, our company has attempted to reduce the risks and failures associated with new service development.

3.3.2 Service Quality Dimension

The measurement of the service quality construct in this study is based on the ten items developed by Brady et al. [15] and has been appropriately modified: (1) Generally speaking, our company's employees provide services that are reliable, consistent, and dependable; (2) Generally speaking, our company's employees are willing and able to provide timely service; (3) Generally speaking, our company's employees are competent (e.g., possessing professional knowledge and skills); (4) Generally speaking, our company's employees are friendly and easy to approach; (5) Generally speaking, our company's employees are courteous, polite, and respectful; (6) Generally speaking, our company's employees communicate with me in terms I can understand; (7) Generally speaking, our company's employees are reliable, trustworthy, and honest; (8) Generally speaking, there are no hazards in our company's employee environment; (9) Generally speaking, our company's employees make every effort to understand my needs; (10) Generally speaking, our company's physical facilities and employees are neat and clean.

3.3.3 Value Co-creation Dimension

The measurement of the value co-creation construct in this study is based on the sixteen items developed

by O'Casey and Ngo[19] and has been appropriately modified: (1) We ensure that individual consumer preferences are satisfied; (2) We deliver high-quality products; (3) The products we deliver are exactly what customers need; (4) The products we deliver meet customer expectations; (5) The products we deliver possess innovative performance features; (6) We ensure that customers can easily transact at any time; (7) We ensure quick response and handling of any customer inquiries; (8) We maintain continuous relationships with customers; (9) We deliver additional value (e.g., special features, status recognition) to retain customers; (10) We maintain long-term relationships with customers; (11) We maintain good interactions with customers; (12) We mobilize together with customers to contribute; (13) We interact with customers to design and provide products that meet their needs; (14) We co-provide products together with customers; (15) We attract customers to become members and provide products for them; (16) We provide customer support systems to help them obtain more value.

3.3.4 Demand Uncertainty Dimension

The measurement of the demand uncertainty construct in this study is based on the five items developed by Jaworski and Kohli[32] and has been appropriately modified: (1) In our type of business, customer preferences for products change considerably over time; (2) Our customers tend to constantly look for new products; (3) Sometimes our customers are very price-sensitive, but on other occasions price is relatively unimportant; (4) We are witnessing demand for our products and services from customers who have never bought from us before; (5) When the product-related needs of new customers differ from those of our existing customers, we try our best to satisfy customer needs.

3.3.5 Firm Performance Dimension

The measurement of the firm performance construct in this study is based on the four items developed by Zhou, Yin, and Tse[33] and has been appropriately modified: (1) Over the past year, our company's overall sales growth rate has been higher than that of our major competitors; (2) Over the past year, our company's overall market share growth rate has been higher than that of our major competitors; (3) Over the past year, our company's overall profit growth

rate has been higher than that of our major competitors; (4) Over the past year, our company's overall return on investment has been higher than that of our major competitors.

3.4 Research Subjects and Sampling

This study targets manufacturing service firms in the Greater China region as the sample research subjects, employing a questionnaire survey method. The top 500 service-oriented firms in the Greater China region were used as the sampling frame for a questionnaire survey, adopting a complete census, and a total of 300 questionnaires were distributed. The aim was to understand, through the questionnaires, the relationships among firms' service innovation, service quality, value co-creation, and demand uncertainty.

IV. EMPIRICAL ANALYSIS

4.1 Correlation Analysis

Table 1 presents the correlation matrix among the constructs. The table shows the correlations between the five basic data variables and firm performance. The correlation coefficient between industry category and firm performance is -0.084; between company size and firm performance is 0.064; between firm age and firm performance is -0.074; between capital and firm performance is 0.74; and between revenue and firm performance is 0.362, indicating a significant positive correlation for revenue. Regarding the relationship between service innovation and firm performance, the correlation coefficient is 0.589, indicating a significant positive correlation between service innovation and firm performance. The correlation between service quality and firm performance is 0.502, indicating a significant positive correlation between service quality and firm performance. The correlation between value co-creation and firm performance is 0.756, indicating a significant positive correlation between value co-creation and firm performance. The correlation between demand uncertainty and firm performance is 0.471, indicating a significant positive correlation between demand uncertainty and firm performance.

4.2 Hierarchical Regression Analysis

This study primarily uses hierarchical regression analysis to understand the overall model among firm

performance and service innovation, service quality, value co-creation, demand uncertainty, and control variables, and to examine and validate the effects of control variables, direct effect variables, and interaction variables on firm performance. According to the recommendations of Cohen and Cohen[34], when testing moderating variables, one should separately examine the basic model of all control variables on the dependent variable, the model of control variables plus independent variables on the dependent variable (main effects), and finally the model in which control variables, independent variables, and interaction terms are all included (moderating effect test).

This study examines the effect of service innovation and service quality on value co-creation; the mediating effect of value co-creation on the relationships between service innovation, service quality, and firm performance; and the moderating effect of demand uncertainty on the relationship between value co-creation and firm performance. The results of the hierarchical regression analysis of service innovation and service quality on value co-creation show that all hypotheses of this study are supported. The empirical results are presented in Table 2, and are explained as follows:

4.2.1 Main Effects Analysis

In Table 2, with "value co-creation" as the dependent variable in Model 1 and Model 2, the main effects are analyzed. Model 1 first includes the control variables: number of employees, firm age, capital, and revenue. Among them, only "revenue" has a significant positive effect on value co-creation, while capital has a significant negative effect. Moreover, $F = 4.647$ ($p < 0.001$), indicating that Model 1 is valid. Then, in Model 2, service innovation and service quality are added; all control variables become non-significant, but service innovation ($\beta = 0.362$, $p < 0.001$) and service quality ($\beta = 0.279$, $p < 0.001$) have significant positive effects on value co-creation. The overall model $F = 21.16$ ($p < 0.001$), Model 2 is valid, and both Hypothesis 1 and Hypothesis 2 are supported.

4.2.2 Direct Effect Analysis

In Table 2, with firm performance as the dependent variable in Model 5, the direct effect of value co-creation between service innovation, service quality, and firm performance is tested (Hypothesis 3). First,

in Model 3, the control variables—number of employees, firm age, capital, and revenue—were entered. The analysis results show that capital ($\beta = -0.407, p < 0.001$) has a significant negative effect on firm performance, while revenue ($\beta = 0.668, p < 0.001$) has a significant positive effect. The overall F-value of Model 3 is 10.318 ($p < 0.001$), indicating that Model 3 is valid. In Model 5, with value co-creation as an independent variable, service innovation ($\beta = 0.134, p > 0.05$) and service quality ($\beta = -0.005, p < 0.05$) become non-significant after the inclusion of value co-creation ($\beta = 0.957, p < 0.001$), while value co-creation exhibits a positive and significant effect, indicating that value co-creation between the firm and its customers contributes to enhancing firm business performance. This validates Hypothesis 3, and the overall model F-value reaches 26.63 ($p < 0.001$), indicating that Model 5 is valid.

4.2.3 Mediating Effect Analysis

In Table 2, with firm performance as the dependent variable in Model 4, Model 5, and Model 6, the mediating effect of value co-creation between service innovation, service quality, and firm performance is tested (Hypotheses 4 and 5). Model 4 includes number of employees, firm age, capital, revenue, service innovation, and service quality. The analysis results show that capital ($\beta = -0.321, p < 0.01$) still has a significant negative effect on firm performance, while revenue ($\beta = 0.441, p < 0.001$) has a significant positive effect on firm performance. Service innovation ($\beta = 0.431, p < 0.001$) has a significant

positive effect on firm performance, and the overall model $F = 16.06 (p < 0.001)$, indicating that Model 4 is valid. In Model 5, when value co-creation is added to the independent variables of Model 4, service innovation ($\beta = 0.134, p > 0.05$) and service quality ($\beta = -0.005, p < 0.05$) become non-significant after the inclusion of value co-creation ($\beta = 0.957, p < 0.001$), while value co-creation shows a positive and significant effect. Value co-creation ($\beta = 0.957, p < 0.001$) has a significant positive effect on firm performance, and the overall model $F = 26.63 (p < 0.001)$, indicating that Model 5 is valid. Model 6 includes number of employees, firm age, capital, revenue, and value co-creation. The analysis results show that value co-creation ($\beta = 1.082, p < 0.001$) has a significant positive effect on firm performance, and the overall model $F = 42.43 (p < 0.001)$, indicating that Model 6 is valid. From Model 4, Model 5, and Model 6, it is evident that value co-creation partially mediates the relationships between service innovation, service quality, and firm performance, supporting Hypotheses 4 and 5.

4.2.4 Moderating Effect Analysis

In Table 2, with firm performance as the dependent variable, Model 7 tests the moderating effect of demand uncertainty (Hypothesis 6). The analysis results show that demand uncertainty has a moderating effect on the relationship between value co-creation and firm performance, supporting Hypothesis 6, with $F = 25.21 (p < 0.001)$, indicating that Model 7 is valid.

Table 1 Correlation Matrix of Constructs

Construct	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Industry category	8.83	3.82	1									
2. Company size	2.26	1.08	-.00	1								
3. Firm age	1.34	.63	-.14	.41**	1							
4. Capital	2.82	1.84	.12	.57**	.36*	1						
5. Revenue	2.72	1.78	.18*	.53**	.24**	1.78*	1					
6. Service innovation	5.22	1.14	.03	.12	-.04	.18*	.33**	1				
7. Service quality	5.71	.92	-.08	.00	-.02	.04	.20*	.63**	1			
8. Demand uncertainty	5.20	1.09	.01	.07	-.11	.09	.21*	.54**	.54**	1		
9. Value co-creation	5.46	.91	-.04	.08	-.06	.10	.29**	.67**	.59**	.56**	1	
10. Firm performance	4.76	1.49	-.08	.06	-.07	.07	.36**	.58**	.50**	.47**	.75**	1

Note: * $p < 0.1$, ** $p < 0.01$, *** $p < 0.001$

Table 2 Hierarchical Regression Analysis

	Value Co-creation		Firm Performance				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	5.29***(0.21)	1.96***(0.41)	4.43***(0.32)	0.17(0.71)	-1.446*(0.62)	-1.28(0.55)	3.38(2.14)
Number of employees	-0.01(0.09)	0.01(0.07)	-0.06(0.14)	-0.05(0.12)	-0.059(0.1)	-0.05(0.1)	-0.04(0.1)
Firm age	-0.13(0.14)	-0.07(0.11)	-0.15(0.21)	-0.01(0.18)	0.01(0.15)	-0.01(0.15)	0.01(0.15)
Capital	-0.13*(0.07)	-0.06(0.06)	0.40***(0.11)	-0.32**(0.09)	-0.26**(0.08)	-0.26**(0.08)	-0.22**(0.08)
Revenue	0.27***(0.07)	0.09(0.06)	0.66***(0.11)	0.44***(0.10)	0.35***(0.1)	0.37***(0.08)	0.32***(0.08)
Demand uncertainty				0.21(0.11)	0.03(0.10)		-1.04*(0.47)
Service innovation		0.36***(0.07)		0.43***(0.12)	0.13(0.11)		0.16(0.11)
Service quality		0.27***(0.08)		0.18(0.15)	-0.01(0.13)		0.11(0.13)
Value co-creation					0.95***(0.13)	1.08***(0.09)	-0.09(0.46)
Value co-creation × Demand uncertainty							0.19*(0.08)
R ²	0.13	0.54	0.25	0.48	0.64	0.63	0.66
ΔR ²	0.10	0.49	0.22	0.45	0.61	0.62	0.63
F-value	4.65***	21.16***	10.32***	16.06***	26.63***	42.43***	25.21***

Note: * p < 0.05; ** p < 0.01; *** p < 0.001. Values in parentheses are standard errors.

V. RESULTS AND SUGGESTIONS

5.1 Conclusions

5.1.1 Service Innovation Positively Affects Firm Performance

Firms should explore, from the essence of innovation, how service innovation can meet the needs of customers and stakeholders. Value co-creation can assist firms in understanding the expectations and needs of customers and stakeholders. The empirical results of this study further reveal that when firms engage in value co-creation, it benefits their operations. Therefore, firms need to co-create more value and interaction with customers and stakeholders, so as to provide innovative services

that meet their expectations, satisfy their needs, and bring about greater profitability.

5.1.2 Service Quality Positively Affects Firm Performance

Enhancing service quality and pursuing excellence are continuous goals for firms. In the future, firms can embed the concept of service quality through value co-creation into their service innovation to enhance profitability. The empirical results of this study further show that service quality has a positive and significant influence on value co-creation, an aspect not yet explored in previous literature, which constitutes one of the contributions of this research. The study finds that using value co-creation to understand the expectations and needs of customers

and stakeholders, while strengthening service personnel's responses to various service issues raised by customers, can effectively provide appropriate service quality and lead to better evaluations of the firm.

5.1.3 Value Co-Creation Positively Affects Firm Performance

The empirical results further demonstrate that value co-creation has a positive and significant impact on firm performance. This confirms that the two-way interaction between firms and customers and stakeholders to enhance customers' and stakeholders' active participation and preference perceptions has a positive additive effect on firm performance.

5.1.4 Value Co-Creation Positively Mediates the Relationships between Service Innovation, Service Quality, and Firm Performance

The empirical results further indicate that if firms strongly support and implement the concept of value co-creation, the impact of service implementation on firm performance becomes even more pronounced. In other words, if firms can appropriately incorporate the voices, interactions, and participation of customers and stakeholders—the core perspective of value co-creation—they can generate more substantial firm performance. Judging from the positively significant influences of service innovation → value co-creation → firm performance and service quality → value co-creation → firm performance, a significant mediating effect of value co-creation exists.

5.1.5 Demand Uncertainty Positively Moderates the Relationship between Value Co-Creation and Firm Performance

The empirical results show that demand uncertainty has a positive moderating effect on the relationship between value co-creation and firm performance. When firms face high demand uncertainty, value co-creation brings about better firm performance. Under high demand uncertainty, value co-creation interactions between firms and their customers and stakeholders can successfully capture opportunities to understand their needs and preference perceptions, leading to superior firm performance. At the same time, demand uncertainty positively strengthens the relationship between value co-

creation and firm performance. When facing high demand uncertainty, firms will strengthen good interactions and communication with customers and stakeholders to create more value; therefore, value co-creation is positively influenced by demand uncertainty. That is, under demand uncertainty, a firm's value co-creation behaviors enhance its performance.

5.2 Suggestions for Future Research

This study only conducted a questionnaire survey on service providers. It is suggested that future researchers simultaneously survey firms, customers, and stakeholders and examine the cognitive gaps among them. This would also allow an assessment of the degree of value co-creation. Currently, this study only examined the relationships among service innovation, service quality, demand uncertainty, value co-creation, and firm performance. Although the research results reveal significant differences in the relationships among the variables, it cannot be determined whether there are other influencing factors that affect these variable relationships. It is therefore recommended that future researchers conduct further comparative analysis.

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