

# Value co-creation and new product development success: the moderating effect of structural empowerment

New product  
development  
success

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## Abstract

**Purpose** – This paper aims to represent an empirical study of what role does structural empowerment play in the relationship between multi-stakeholder value co-creation (VCC) and the success of new product development (NPD).

**Design/methodology/approach** – The hypotheses developed in this paper are tested by using data from 243 manufacturing companies worldwide.

**Findings** – The results show that the VCC activities have significant positive effects on NPD success, and structural empowerment moderates the impact of VCC activities on NPD success, but the moderating effect is not significant for customer involvement.

**Originality/value** – This study contributes to the research of VCC and discusses the positive role of structural empowerment to enhance the impact of VCC activities on NPD success.

**Keywords** New product development success, Value co-creation, Customer involvement, Supplier involvement, Manufacturing involvement, Structural empowerment

**Paper type** Research paper

## 1. Introduction

The rapid development of information technology and the advancement of globalization not only reduce the barriers of technical exchange and cooperation among organizations but also bring more and more fierce business competition and a more and more complex external environment (Hsu, 2016; Yu *et al.*, 2020). In such a dynamic environment, new product development (NPD) has become an important way for firms to gain competitive advantages (Prahalad and Ramaswamy, 2004a). However, the product innovation based on goods dominant logic is increasingly failing to meet users' rapidly changing and personalized needs (Jaakkola and Hakanen, 2013). To develop innovative solutions for new challenges, value co-creation (VCC) is becoming more and more popular in manufacturing firms (Thiruvattal, 2017). Based on service-dominant logic (S-D logic), VCC focuses on firms that are making efforts to interact frequently with multiple stakeholders in the co-design and co-development activities for new products (Prahalad and Ramaswamy, 2004b, 2004a; Vargo and Lusch, 2004; Zhang and Chen, 2008; Thiruvattal, 2017).

Consistent with Nguyen *et al.* (2018), we identify three types of value co-creators in NPD: customers, suppliers and manufacturing employees. Different participants play different roles in NPD (Nguyen *et al.*, 2018). Customers are able and willing to provide ideas for new



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goods or services that may fulfill needs that have not yet been met by the market or might improve on existing offerings (Hoyer *et al.*, 2010). As a direct provider of needs, the interaction between the customer and the enterprise can help clarify the ambiguous concepts in the customer's mind thus expanding the source of new ideas for the R&D team (Coviello and Joseph, 2012; Papageorgiou *et al.*, 2017). Involving suppliers in the NPD process is critical to accelerating the pace of product development by providing key materials and technology (Song and Di Benedetto, 2008). Suppliers are more likely to identify potential technical problems such as contradictory specifications or unrealistic designs, early in the design process (Petersen *et al.*, 2005). In addition, knowledge integration and transformation between different functions is crucial to NPD, which means internal VCC activities are equally important (Parker, 2016). Manufacturing involvement in R&D has a significant promoting effect on the NPD process (Merrilees *et al.*, 2020). On the one hand, manufacturing employees have rich production experience, focusing on efficiency and cost, which complements the knowledge base of the R&D team who is in pursuit of novelty (Boothroyd and Dewhurst, 1987; Nafisi *et al.*, 2016; Nguyen *et al.*, 2018). On the other hand, interaction in the early stage of development can clarify the division of labor and cooperation which will reduce conflicts between different functions in the later stage (Fleischer and Liker, 1992).

Although Nguyen *et al.* (2018) had made an empirical test on the impact of the involvements of three partners on NPD, there are still areas in their research that could be improved. First, their research results did not support the positive effect of supplier involvement on NPD success, which is contrary to our research conclusions. This may be because they removed the samples of Switzerland and Sweden, resulting in sample selection bias. In addition, they believe that the reason why the relationship is not significant is that supplier involvement may hurt time-to-market of new products. However, according to the collaboration theory, supplier involvement is crucial for new products to enter the market (Feng and Wang, 2013; Zhang and Yang, 2016), which conflicts with the theoretical perspective they choose. According to the definition of VCC, the involvements of different participants in the process of value creation can be identified as VCC activities (Aarikka-Stenroos and Jaakkola, 2012; Bettiga and Ciccullo, 2019). Therefore, our study will re-examine this relationship based on the VCC theory to give a more appropriate explanation.

But VCC does not always lead to the success of NPD (Hsu, 2016), and there exists research finding that although some enterprises engaged in VCC, they still fail in NPD (Chan *et al.*, 2010; Hoyer *et al.*, 2010). As Nguyen *et al.* (2018) pointed out, involving different stakeholders in the R&D process could have negative effects, such as increasing coordination costs and slower decision-making and less flexibility. But their study did not address such problems. VCC is a multi-party value creation activity, whether it can play a positive role in NPD largely depends on the degree of interaction and cooperation between participants (Hoyer *et al.*, 2010). Zhang *et al.* (2018a) mentioned that when participants experience reciprocity and feel valued in VCC activities, VCC activities are more likely to be successful, while failure usually occurs when participants perceived indifference from the company's employees and confrontations with the company's representatives. Therefore, the attitude of the company's employees towards working with the participants is critical for the success of VCC (Yi and Gong, 2013). However, few empirical studies have been conducted to examine the effect of factors that facilitates the relationship between VCC and NPD, although this is crucial for enterprises to manage VCC activities to achieve higher NPD success. This study aims to fill the research gap in the current VCC literature by introducing structural empowerment. It represents a formal horizontal decentralization of authority such that decision-making power flows to employees from the executives which could encourage employees to be positive and flexible in their interactions with collaborators (Mills and Ungson, 2003).

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Therefore, based on [Nguyen et al. \(2018\)](#), we will test the moderating effect of structure empowerment on the impact of VCC activities on NPD success, and detail three different VCC activities, which is the most important contribution and originality of this study.

Examining the moderating effect of structural empowerment is theoretically based. Empowerment theory considers it as an important means to improve individual creativity, confidence and promote inter-enterprise relations ([Zhang and Chen, 2008](#)). Moreover, the elimination of knowledge transfer barriers brought about by empowerment can promote the learning process of supplier, customer, and internal firms ([Haq et al., 2020](#)) and reduce information asymmetry, which will improve the efficiency of cooperation among participants and improve the innovation performance ([Chebat and Kollias, 2000](#)). Besides, empowerment has been proved to be able to resolve conflicts and to a certain extent play a role in opportunistic behavior in VCC ([Chebat and Kollias, 2000](#)). Thus, this paper will answer the question:

- Q1. What role does structural empowerment play in the relationship between multi-stakeholders VCC and NPD success?

## 2. Literature review and hypotheses development

### 2.1 Value co-creation activities and new product development success

VCC is a new value creation method on which the company's future competition will depend ([Tommasetti et al., 2017](#)). [Pralhad and Ramaswamy \(2004b\)](#) first found the shifting role of the customers in the core competitiveness of enterprises, and they defined VCC as customers' active participation in the R&D, design and production of enterprises, as well as contributing their knowledge and skills in consumption to create unique perceived value. VCC based on S-D Logic regards services rather than products as the fundamental unit of value exchange ([Vargo and Lusch, 2004](#); [Maglio and Spohrer, 2008](#); [Vargo et al., 2008](#)). In the theoretical framework of S-D Logic, VCC occurs when existing resources interact with available resources in the service system ([Baron and Harris, 2008](#)). Therefore, the co-creation of better customer perceived value is achieved by integrating the resources of the firm's internal departments and external partners in the enterprise ([Maglio and Spohrer, 2008](#)).

The involvement of customers in VCC activities provides an opportunity for enterprises to build a good relationship with customers and enhance customer loyalty and satisfaction ([Johnston et al., 2012](#); [Najafi-Tavani et al., 2020](#)). As market subjects, customers have potential demand which is tacit knowledge that enterprises lack. Therefore, the involvement of customers in the NPD stage will help enterprises exploit the tacit knowledge of customers by providing feedback and ideas which is typical VCC activities, and thus improve the novelty of new product ([Alam, 2006](#); [Hoyer et al., 2010](#); [Menguc et al., 2014](#)). During the conceptualization and prototype design stage, the frequent interaction between the NPD team and customers can gradually clarify the designer's misunderstanding of needs, thus improving the product-market fit, the market acceptance and success rate ([Coviello and Joseph, 2012](#); [Jiao et al., 2020](#)). In addition, in the product testing stage, customer involvement can effectively reduce the uncertainty and failure rate, thus becoming an advantage in the innovation process ([Lengnick-Hall et al., 2000](#)). Therefore, we assume that the following:

- H1a. Customer involvement has a positive impact on NPD success.

As a VCC activity between focal firms and suppliers, supplier involvement can expand focal firms' resource search scope, thus providing more substitutive NPD solutions ([Feng and Wang, 2013](#)). On the one hand, as the supplier of materials, involving suppliers in NPD is crucial to the quality and cost of new products ([Petersen et al., 2005](#); [Sinha and Anand, 2018](#)).

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Because the communication between the supplier and the R&D team in the design stage can accurately filter the appropriate materials with the good quality needed for the new product, to achieve the optimal configuration (Nguyen *et al.*, 2018). On the other hand, through frequent interaction with suppliers, the technological expertise of suppliers can be applied to NPD, thus helping enterprises to effectively identify potential problems in this process, such as some unrealistic designs (Mishra and Shah, 2009). In addition, supplier involvement can improve the cooperativity between suppliers and enterprise, thus shortening the NPD cycle and time-to-market (Alberto *et al.*, 1994; Zhang and Yang, 2016). Based on these arguments, the following assumption is made:

*H1b.* Supplier involvement has a positive impact on NPD success.

Manufacturing involvement is an internal VCC between the manufacturing team and the R&D team (Merrilees *et al.*, 2020). As Nguyen *et al.* (2018) noted, manufacturing employees can be involved in all stages of NPD, and the cooperation between different functional teams can reduce the total time from prototype to market and reduce the negative impact of defective products. Another important aspect is that R&D teams mainly focus on the novelty and quality of new products, ignoring the cost. The manufacturing team has the specific knowledge base of manufacturing, which can just make up for the lack of R&D team in this aspect, and perfectly match the product characteristics and technology capacity, resulting in more economically new product manufacturing (Boothroyd and Dewhurst, 1987; Nafisi *et al.*, 2016; Nguyen *et al.*, 2018). In addition, the manufacturing team is indispensable in the strategic planning of NPD, because new products not only need high quality, but also need to be launched as soon as possible, and co-development of the manufacturing team and the NPD team is exact key factor to determine the time-to-market (Nafisi *et al.*, 2016). Based on these arguments, the third assumption is made:

*H1c.* Manufacturing involvement has a positive effect on NPD success.

## *2.2 Moderating effect of structural empowerment*

Structural empowerment enhances employee self-efficacy (Fragkos *et al.*, 2020) by facilitating access to formal rights and informal communication. In a workplace with an empowerment structure, employees have access to information, support, resources and opportunities to learn and grow (Zhang *et al.*, 2018b). Managers shape employees' attitudes and behaviors by providing a climate of empowerment. Structural empowerment enhances employees' sense of autonomy. By involving employees in the decision-making process that is beneficial to them and enhancing the communication and close relationship between superiors and subordinates (Laschinger *et al.*, 2004), it improves employees' perception of empowerment, which ultimately leads to increased organizational commitment, reduced burnout levels, increased autonomy and increased job satisfaction.

Internal- and inter-enterprise utilization of knowledge has an important impact on enterprises' NPD activities (Williamson, 1981). Structural empowerment improves knowledge sharing (Fragkos *et al.*, 2020) by improving processing efficiency and the company's ability to absorptive capacity (Matthews *et al.*, 2003), thus promoting NPD (Pérez Sánchez *et al.*, 2017). Hierarchical organizations (with low structural empowerment) have shortcomings such as complex decision-making processes (Lee and Kim, 2020), unsmooth information transmission and low interactivity among functional departments (Jamali *et al.*, 2006), leading to increased knowledge sharing costs, and thus unable to provide effective feedback to external participants' information and make timely decisions (Lee and Kim, 2020).

For customer involvement, higher structural empowerment can help R&D employees understand customers' ideas more quickly and evaluate the feasibility of the idea in conjunction with the company's capabilities, thus reducing the time to conceptualize new products (Coviello and Joseph, 2012). Empowered employees tend to show more enthusiasm and warmth in their interactions with customers, which will increase the initiative of customer involvement and the depth of interaction, leading to better NPD success (Garcia-Juan *et al.*, 2019). According to self-consistency theory, empowered employees have a self-image of being in control and responsible for service results (Conger and Kanungo, 1988). Therefore, empowered employees will exercise initiative and imagination to provide excellent solutions when they encounter problems in VCC activities with customers in NPD (Subramony, 2009).

For supplier involvement, higher structural empowerment can help R&D employees better understand the capabilities of suppliers, to improve their efficiency in selecting suppliers (Xu and Yang, 2018). Specifically, empowered employees can quickly respond to new contingencies resulting from supplier failures, such as inventory shortages (Marin-Garcia and Bonavia, 2015), thereby improving their ability to adjust to sudden changes (Suleiman *et al.*, 2021). In addition, due to overdependence and unequal benefit sharing, supplier involvement will lead to opportunistic behavior (Suleiman *et al.*, 2021). Patterson *et al.* (2004) demonstrated that empowerment can develop know-how into an employee knowledge base to help employees successfully manage different situations. In other words, empowered employees are better positioned to identify and deal with opportunistic problems in NPD because they have the relevant knowledge and strategies to interact with suppliers and form solutions (Marin-Garcia and Bonavia, 2015).

For manufacturing involvement, Kouzes (2010) demonstrated that having access to the required information will make employees more creative and take on more responsibilities. Empowered employees are more likely to obtain information in the organization and participate in decision-making (Xu and Yang, 2018). Being empowered can enhance employees' confidence, reduce their uncertainty when making decisions, and make employees more willing to participate in decision-making and put forward constructive ideas (Choi *et al.*, 2016). In addition, structural empowerment can promote communication between employees in different departments within an organization (Lee and Kim, 2020). Empowered employees in different departments have a higher willingness to cooperate and share knowledge, which can promote the birth of ideas for NPD (Zhang *et al.*, 2018b).

*H2a.* Structural empowerment positively moderates the relationship between customer involvement and NPD success.

*H2b.* Structural empowerment positively moderates the relationship between supplier involvement and NPD success.

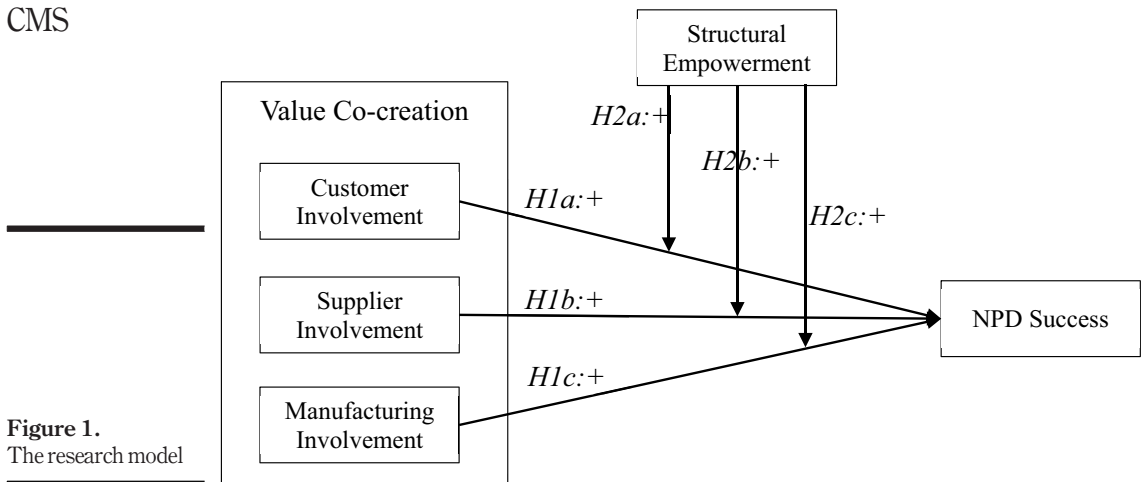
*H2c.* Structural empowerment positively moderates the relationship between manufacturing involvement and NPD success.

The research model can be seen in [Figure 1](#).

### 3. Research method

#### 3.1 Data collection

To test the proposed hypothesis, data sets from the fourth round of the High Performance Manufacturing (HPM) project were used. HPM was established in 1988 as a global research collaboration with a team of academic researchers dedicated to quantitative research on



**Figure 1.**  
The research model

manufacturing plant operations and management practices. The HPM questionnaire was prepared in English and translated into the local language by the regional coordinator to ensure a rigorous verification process. The fourth round of HPM was conducted between 2012 and 2019. The data set was collected from manufacturing companies in 15 regions to provide “diversity of cultural and economic characteristics”. For example, these regions include different economic groups: Germany, Sweden, Brazil, Spain, Israel, Italy, Finland, Japan, the USA, Switzerland and the UK are considered as advanced economies, and South Korea and Taiwan of China are regarded as recently developed economies; and Chinese Mainland and Vietnam are both seen as emerging economies. The factories surveyed were randomly selected from three industries: machinery, electronics and transportation.

In each region, the factories were randomly selected from three industries: machinery, electronics and transportation. During the research process, local members of the HPM research team contact the prospective factories by telephone. Once a company agrees to participate, questionnaires and instructions are sent to an investigator, who is responsible for distributing and collecting questionnaires in each factory. Most of the items were answered by two surveyors and then averaged to obtain a single value for each item. Respondents from different departments answered different questionnaires to collect reliable information. The response rate for questionnaires is about 65%, which reduces the need to check for non-response biases. A total of 330 questionnaires were collected. Among them, 87 samples were excluded, because their missing data exceeded 60%; thus, a total of 243 samples were used for statistical analysis. Table 1 provides an overview of the samples used in this study.

As Ye *et al.* (2018) pointed out, following Podsakoff *et al.* (2003), the organizers of the survey controlled and tested common method biases in several ways. In the design of survey procedures *ex ante*, the organizers arranged different respondents to respond to the input and output variables (Heim and Peng, 2010), to eliminate the influence of the consistent motifs and social desirability tendency, and to prevent biases in the observed relationships. In addition, the input variables are separated from the output variables in the process of questionnaire design, which controls the retrieval clues in the logical flow (Craighead *et al.*, 2011). The Harman’s single-factor assessment method was used first to

Dimension	Category	Frequency	(%)	New product development success
Countries (Region)	Brazil	12	4.94	
	Chinese Mainland	19	7.82	
	Spain	21	8.64	
	Finland	14	5.76	
	German	23	9.47	
	Israel	17	7.00	
	Italy	27	11.11	
	Japan	20	8.23	
	Korean	23	9.47	
	Sweden	6	2.47	
	Switzerland	8	3.29	
	Taiwan of China	22	9.05	
	UK	12	4.94	
	USA	8	3.29	
	Vietnam	11	4.53	
Firm size	Small (<250)	71	29.21	
	Medium (250–500)	56	23.05	
	Large (>500)	116	47.74	
Industry	Machinery	83	34.16	
	Electronics	98	40.33	
	Transportation	62	25.51	

**Table 1.**  
Samples

test the common method bias in our data (Harman, 1976). The results of EFA showed that the five significant factors with eigenvalues above 1.0 accounted for 61.02% of the total variance. The first factor explains 25.98% of the total variance but does not exceed 40%. Then, we conducted CFA with a single factor, and the results ( $\chi^2 = 1290.59$ ,  $df = 230$ ,  $RMSEA = 0.14$ ,  $CFI = 0.48$ ,  $IFI = 0.49$ ) were not acceptable, indicating that the single factor model was not appropriate. Finally, we selected another latent variable “Kanban” from the data set which was theoretically unrelated to the constructs involved in this research and used the marker variable method to test the common method bias (Williams *et al.*, 2010). The results showed that the difference of Chi square between the control group and the baseline group was 57.31, the difference of degree of freedom was 64, and the  $P$ -value was 0.71. Therefore, we believe that there is no common method bias in this study, or the impact of common method bias is very little (Williams *et al.*, 2010).

### 3.2 Variable measurement

The scales and items were developed based on the existing literature which had undergone rigorous pilot tests. A multiple-item, five-point Likert-type scale (1 = “strongly disagree”; 3 = “about the same”; 5 = “strongly agree”) was used for all constructs.

The VCC activities are divided into three dimensions, customer involvement, supplier involvement and manufacturing involvement. Supplier involvement and customer involvement are measured by four items respectively, adapted from the study by Mishra and Shah (2009) and Feng *et al.* (2010). These projects mainly assess the degree to which suppliers and customers are involved in the enterprise’s NPD projects. Since the staff in the NPD can provide valid information about the external participants, the product engineer, product designer, product development manager or product development team leader are

required to answer these questions. The manufacturing involvement is also measured by four items, adapted from the study by [Nguyen et al. \(2018\)](#) and [Ye et al. \(2018\)](#). These projects mainly assess the involvement of manufacturing employees in the development of new products. These questions are answered by manufacturing engineers, workshop staff and members of the NPD team. Structural empowerment was adapted from the research of [Aiken and Hage \(1966\)](#). The scale consists of five items, which measures the degree of authorization within the enterprise and corresponds by direct employees. There are several evaluation methods to measure NPD success. Based on our research content, we selected and modified the evaluation method proposed by [Nguyen et al. \(2018\)](#). The indicators to evaluate the NPD success include customer satisfaction, market share, technical performance and time-to-market. At the same time, we also added overall commercial success to measure the market performance of new products. All constructs and items are shown in the [Table 2](#).

This study controls several potential sources of heterogeneity in the sample. Companies in different industries may face different levels of competition, and large companies with high resource availability and business process capability tend to implement NPD process or R&D activities better than small companies, resulting in different NPD success ([Gustafsson et al., 2012](#); [Zhang and Yang, 2016](#); [Ye et al., 2018](#)). Companies in different countries may face different local cultures and policies, which can have an impact on NPD

	Loading
Customer Involvement (Alpha = 0.83, CR = 0.83, AVE = 0.56)	
1. We consult customers early in the design of new products.	0.77
2. We partner with customers for new product design.	0.65
3. Customers are frequently consulted about the design of new products.	0.74
4. Customers are an integral part of new product design efforts.	0.81
Supplier Involvement (Alpha = 0.84, CR = 0.84, AVE = 0.57)	
1. Suppliers are involved early in product design efforts.	0.83
2. We partner with suppliers for the design of new products.	0.78
3. Suppliers are frequently consulted during the design of new products.	0.77
4. Suppliers are an integral part of new product design efforts.	0.64
Manufacturing Involvement (Alpha = 0.80, CR = 0.80, AVE = 0.45)	
1. Manufacturing engineers are involved to a great extent before the introduction of new products.	0.69
2. New product design teams have frequent interaction with the manufacturing function.	0.76
3. Manufacturing is involved at the early stages of new product development.	0.77
4. The manufacturing function is key in improving new product concepts.	0.62
5. Manufacturing is given challenging tasks in the development of new product concepts.	0.54
Structural Empowerment (The reverse scale, Alpha = 0.78, CR = 0.79, AVE = 0.45)	
1. There can be little action taken here until a supervisor approves a decision.	0.37
2. A person who wants to make his own decisions would be quickly discouraged.	0.61
3. Even small matters have to be referred to someone higher up for a final answer.	0.72
4. I have to ask my boss before I do almost anything.	0.89
5. Any decision I make has to have my boss's approval.	0.64
NPD Success (Alpha = 0.80, CR = 0.80, AVE = 0.44)	
1. Customer satisfaction	0.74
2. Market share	0.67
3. Technical performance relative to specifications	0.64
4. Time to market	0.57
5. Overall commercial success	0.72

**Table 2.**  
Measurement and  
CFA



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success (Zhang and Yang, 2016). Moreover, research has proved that the higher investment in R&D, the higher innovation performance tends to be (Xu *et al.*, 2021). This paper includes industry, country (region), firm size (number of employees) and R&D investment as control variables.

## 4. Results

### 4.1 Reliability and validity

In this paper, the validity and reliability of the constructs involved in this study were tested by CFA. The CFA results showed that the model fitted well ( $\chi^2 = 334.90$ ,  $df = 220$ , CFI = 0.94, IFI = 0.94, TLI = 0.94, RMSEA = 0.046, RMR = 0.045). The items, factor loadings, Cronbach's alpha and AVE values are shown in Table 2. The scale used in this questionnaire is a mature scale, which has been verified by scholars in different regions and fields. Therefore, it is considered that the content validity of the scale is acceptable. The convergent validity was evaluated by the factor loading score. The higher the factor loadings are, the higher the validity of the questionnaire polymerization. CFA test results show that every Cronbach's alpha and CR is greater than 0.7, indicating that the questionnaire has good convergent validity and composite reliability. At the same time, because the square of average variance extraction (AVE) is greater than the correlation coefficients, the scale has good discriminative validity. Table 3 represents the descriptive statistics and correlations between constructs.

### 4.2 Regression analysis

Variance inflation factor (VIF) values are all below 2, indicating that multi-collinearity is not a serious problem in this data set, which is suitable for further regression analysis. To test the hypothesis, this study used hierarchical regression analysis to test the impact of VCC involving three different participants on the NPD success and the moderating effect of structural empowerment (Table 4).

Model 1 is a test of the effect of control variables on NPD success. Model 2 and Model 3 respectively add three independent variables: customer involvement, supplier involvement, manufacturing involvement and moderator variable, structural empowerment. Model 4 is the interaction item of independent variables and moderator variable added based on Model 3.

*H1* believes that customer involvement makes a positive contribution to NPD success. As can be seen from Model 2 in Table 4, customer involvement is positively correlated with NPD success ( $\beta = 0.147$ ,  $p < 0.05$ ). Therefore, *H1a* is supported. *H1b* shows that supplier involvement has a positive impact on NPD success. The results of multiple regression analysis showed that supplier involvement is positively correlated with NPD success ( $\beta = 0.184$ ,  $p < 0.01$ ). Thus, *H1b* is supported. Furthermore, *H3* believes that manufacturing involvement has a positive effect on NPD success. The results show that there is a positive correlation between manufacturing involvement and NPD success ( $\beta = 0.288$ ,  $p < 0.001$ ), thus supporting *H1c*.

*H2a*, *b*, and *c* show that the interaction between customer involvement, supplier involvement, manufacturing involvement and structural empowerment is positively correlated with NPD success. The results of this study only support *H2b* and *H2c*, that is, structural empowerment has a positive impact on the relationship between supplier involvement and NPD success and manufacturing involvement and NPD success. The result suggests that the higher the degree of structure empowerment, the greater the supplier involvement and manufacturing involvement on NPD success ( $\beta = 0.125$ ,  $p < 0.05$ ;

**Table 3.**  
Descriptive statistics  
and correlations

Variables	Mean	SD	1	2	3	4	5	6	7	8	9
1. Country (region)	6.57	3.98	1.000								
2. Industry	1.91	0.77	0.040	1.000							
3. Firm size	2.19	0.86	0.020	-0.076	1.000						
4. R&D investment	10.33	3.67	-0.112*	0.015	0.200***	1.000					
5. Customer involvement	3.76	0.74	0.125*	0.065	0.003	0.108*	0.746				
6. Supplier involvement	3.56	0.75	0.165**	0.019	0.099†	0.101†	0.383**	0.757			
7. Manufacturing involvement	3.70	0.69	0.164**	0.018	0.052	0.097†	0.358***	0.479***	0.673		
8. Structural empowerment	3.77	0.66	-0.151**	-0.028	0.014	0.099†	-0.008	0.029	0.054	0.667	
9. NPD success	3.29	0.54	0.079	0.030	-0.046	0.147*	0.331***	0.378***	0.433***	0.070	0.664

**Notes:** Diagonal elements are square roots of the AVE values. \*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ ; † $p < 0.1$

Variables	Model 1	Model 2	Model 3	Model 4
Country (Region)	0.099 (0.09)	-0.003 (0.008)	0.003 (0.008)	0.023 (0.008)
Industry	0.017 (0.044)	0.003 (0.039)	0.004 (0.039)	-0.010 (0.039)
Firm size	-0.082 (0.041)	-0.100† (0.036)	-0.100† (0.036)	-0.098† (0.035)
R&D investment	0.175** (0.010)	0.105† (0.009)	0.101† (0.009)	0.095† (0.008)
Customer involvement		0.147* (0.045)	0.149* (0.046)	0.150* (0.045)
Supplier involvement		0.184** (0.048)	0.183** (0.048)	0.154* (0.048)
Manufacturing involvement		0.288*** (0.051)	0.285*** (0.051)	0.254*** (0.052)
Structural empowerment			0.043 (0.047)	0.059 (0.047)
Cust × Stru				-0.051 (0.078)
Supp × Stru				0.125* (0.079)
Manu × Stru				0.136* (0.069)
$R^2$	0.038	0.263	0.265	0.304
$\Delta R^2$	0.038	0.225	0.002	0.039
F	2.340†	11.973***	10.526***	9.151***
$\Delta F$	2.340†	23.916***	0.556	4.299**

Notes: \*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ , † $p < 0.1$

**Table 4.**  
Regression results

$\beta = 0.136$ ,  $p < 0.05$ ). However, the moderating effect of structural empowerment on the relationship between customer involvement and NPD success is not been supported.

## 5. Discussion

Previous studies believe that structural empowerment can promote communication between the internal and external environments of a company (Fragkos *et al.*, 2020). Therefore, we propose *H2a* and *H2b*, but the results show that the moderating effects of structural empowerment on the two are not all significant. This should be because we ignored the influence of the position of the focal firm in the social network and the firm's internal consistency. When facing customers, the managers and employees are in line with the external change, their common goal is to meet the diversified and personalized needs of customers. Therefore, the managers will be more willing to listen to the opinions of employees, and the internal consistency will be higher (Spina *et al.*, 2002), so the role of structural empowerment will be weakened. Second, if it is assumed that employees are empowered, then the lack of accountability for the employees is also one of the reasons for the lack of employee empowerment outcomes. Because of the absence of such checks and balancing systems, the empowerment will let employees pay more attention to individual interests, and ignore the better service to customers (Naeem and Saif, 2010). At the same time, to some extent, the effect of structural empowerment on performance is mediated by the intrinsic motivation of customer contact employees, which will lead to opportunism and thus offset the positive effect of structural empowerment (Proenca *et al.*, 2017). Third, according to Yagil (2006), the negative relationship between depersonalization and customer satisfaction was found stronger under a high level of empowerment, and service providers with low power motivations may find empowerment unsettling because they are expected to undertake additional responsibilities without appreciating the benefits of additional power (Foster-Fishman and Keys, 1997). So increasing empowerment does not improve their perception of customer needs, resulting in customer involvement that does not lead to new ideas or product innovations. In addition, as Ro and Wong (2012) have argued, empowering customer contact employees must be used correctly, otherwise it may have counterproductive effects. A typical example is that when compensating customers'

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wrongdoings, empowered employees or managers are likely to overcompensate to increase customer satisfaction, which is unjustified. This negative effect likely offsets the moderating effect of structural empowerment on the relationship between customer involvement and NPD success. However, with the rise of social network status, focal firms tend to put more stringent requirements on suppliers, because they have higher bargaining power, which may lead to conflicts between suppliers and focal firms (Sheu *et al.*, 2006). Structural empowerment can facilitate communication among companies, making the strategies of focal companies more inclusive and thus resolving conflicts between them. As for manufacturing involvement, a higher degree of structural empowerment can improve employees' initiative in NPD projects and enable them to make more flexible decisions when facing some temporary problems that need to be solved (Choi *et al.*, 2016; Lee and Kim, 2020). Our results support these views.

### 5.1 Theoretical implications

Previous studies have made a lot of efforts to link the relationship between VCC and innovation performance, and the promoting effect of VCC on NPD has been confirmed by scholars from multiple perspectives, such as knowledge transfer (Pralhad and Ramaswamy, 2004a), resource-based view (Jiao *et al.*, 2020) and dynamic capabilities (Zhang *et al.*, 2020). However, as (Zhang *et al.*, 2018a) pointed out, VCC tends to fail or be inefficient when participants perceive indifference from company employees and confrontation with the company's representatives. This study attempts to deal with this theoretical problem from the perspective of structural empowerment and makes contributions to the existing theoretical system from the following aspects.

First, consistent with previous studies (Hsu, 2016; Nguyen *et al.*, 2018; Zhang *et al.*, 2020), the findings of this study confirm that different VCC activities have significant positive effect on NPD success. The most prominent difference between customer involvement and the other two is that as a demand-side participant, the customer can help the R&D team to accelerate the clarification of new concepts or ideas during the conceptualization phase of NPD, thus preventing the deviation of the prototype from the customer's needs and improving the market performance (Coviello and Joseph, 2012; Papageorgiou *et al.*, 2017). Supplier involvement in VCC is often driven by market competitiveness (Melander and Lakemond, 2012). Introducing suppliers into the R&D phase can not only provide material and resource support to the focal firm, but also help the enterprise avoid the problems caused by the neglect of technical capabilities and manufacturing constraints, thus reducing technical uncertainty (Song and Di Benedetto, 2008). Manufacturing involvement in NPD is the VCC between different functions within the same organization (Merrilees *et al.*, 2020). Different from the first two kinds of VCC, manufacturing employees often focus on new product realizability, and following the principle of economy, manufacturing employees pursue the ease and optimal cost of the production of new products (Boothroyd and Dewhurst, 1987; Nafisi *et al.*, 2016). In addition, as the manufacturing staff is responsible for defection directly, the manufacturing team will also pay more attention to the new product recall, which is ignored by the R&D team (Nguyen *et al.*, 2018). These findings are in line with a case study of a classification model of demand-side and supply-side involvement in co-creation along the NPD process by Bettiga and Ciccullo (2019).

Second, consistent with our hypothesis, structural empowerment has a significant moderating effect on the relationship between supplier involvement and NPD success, and the relationship between manufacturing involvement and NPD success. Previous studies have suggested that structural empowerment can enhance employees' creativity (Kouzes, 2010) and confidence in decision-making (Xu and Yang, 2018), which is crucial to improving

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the novelty of NPD. Moreover, structural empowerment can promote communication between employees among different departments (Lee and Kim, 2020), thus reducing conflicts and improving the efficiency of teamwork (Thiruvattal, 2017). Our findings support this view. More importantly, we find different roles of structural empowerment in the relationship between VCC by different external stakeholders and NPD success. Structural empowerment can improve the efficiency of information and knowledge sharing between the organization and the external environment (Fragkos *et al.*, 2020), thus strengthening the firm's ability to absorb heterogeneous knowledge (Matthews *et al.*, 2003). This effect is valid for the relationship between supplier involvement and NPD success, but not for the relationship between customer involvement and NPD success. And we explain this difference from the perspective of social networks and internal consistency, combined with the impact of structural empowerment on employees who contact customers.

### *5.2 Managerial implications*

Through empirical analysis, we have obtained that customer involvement positively impacts NPD success. This suggests that in the process of NPD, if companies can interact with customers more actively, ask for their opinions and invite them into the process of NPD, the uncertainty in the NPD process can be reduced, and develop a product or service that could be more satisfying to the needs of customers, thus increasing the NPD success rate.

Supplier involvement has a positive impact on the success of NPD. In the NPD process, the participation of suppliers can enable the company to obtain effective external resources. Thus interacting with suppliers in the product design stage can complement the shortage of enterprise resources in NPD. Manufacturing involvement is positive for NPD. Informal relationships among employees in different departments are crucial to understanding how new products are created and commercialized. Encouraging manufacturing employees to participate in decision-making and discussion can promote product innovation effectively, because this will help employees be more motivated in the production process and can better apply innovative ideas to the process of NPD, thereby promoting NPD success.

Structural empowerment plays an important role in preventing opportunistic behavior caused by supplier involvement. Because empowerment transforms the know-how into an employee knowledge base, it gives empowered employees knowledge and strategies beyond what they need when interacting with suppliers to better generate solutions. Therefore, managers should learn to use empowerment to enhance employees' awareness of preventing opportunistic behavior in the process of supplier involvement, to better improve the success of NPD. Structural empowerment also has a positive moderating effect between manufacturing involvement and NPD success. Structural empowerment encourages communication and sharing between members of different knowledge systems, thereby promoting cooperation and the birth of innovative ideas, and structural empowerment also improves the autonomy of employees and cultivates their sense of ownership, which is conducive for employees to adopt new working methods to improve work efficiency or reduce working hours. However, since structural empowerment has not been proved to play a significant role in the relationship between customer involvement and NPD success, managers should distinguish situations when empowering employees to avoid excessive empowerment and extra cost.

### *5.3 Limitations and future research directions*

This study only examined the impact of customer involvement, supplier involvement and manufacturing involvement on NPD success. In the innovation ecosystem, companies also

need to interact with other stakeholders, such as competitors, governments, institutions, etc. Stakeholders are not fully covered by this study. Therefore, future research could identify new types of involvement and examine their impact on innovation. Second, other factors, such as relationship learning, may influence the relationship between external involvement and NPD success, so future studies could consider examining the moderating effects of these factors. Third, the online and offline participation of stakeholders is worthwhile to be studied, which is not involved in our study. Finally, with the gradual rise of S-D logic, VCC has already appeared more important applications in the service industry. This article only discusses the relationship between VCC activities and NPD success in manufacturing enterprises. It would therefore be interesting to extend this study to the service industry to get different findings.

### References

- Aarikka-Stenroos, L. and Jaakkola, E. (2012), "Value co-creation in knowledge intensive business services: a dyadic perspective on the joint problem solving process", *Industrial Marketing Management*, Vol. 41 No. 1, pp. 15-26.
- Aiken, M. and Hage, J. (1966), "Organizational alienation: a comparative analysis", *American Sociological Review*, Vol. 31 No. 4, pp. 497-507.
- Alam, I. (2006), "Removing the fuzziness from the fuzzy front-end of service innovations through customer interactions", *Industrial Marketing Management*, Vol. 35 No. 4, pp. 468-480.
- Alberto, T., Nassimbeni, G. and Stefano, S. (1994), "Service dimensions in the buyer-supplier relationship: a case study", *International Journal of Physical Distribution and Logistics Management*, Vol. 24 No. 8, pp. 4-14.
- Baron, S. and Harris, K. (2008), "Consumers as resource integrators", *Journal of Marketing Management*, Vol. 24 Nos 1/2, pp. 113-130.
- Bettiga, D. and Ciccullo, F. (2019), "Co-Creation with customers and suppliers: an exploratory study", *Business Process Management Journal*, Vol. 25 No. 2, pp. 250-270.
- Boothroyd, G. and Dewhurst, P. (1987), *Product Design for Assembly Handbook*, Boothroyd Dewhurst Inc., Wakefield RI.
- Chan, K.W., Yim, C.K. and Lam, S.S.K. (2010), "Is customer participation in value creation a double-edged sword? Evidence from professional financial services across cultures", *Journal of Marketing*, Vol. 74 No. 3, pp. 48-64.
- Chebat, J.C. and Kollias, P. (2000), "The impact of empowerment on customer contact employees' roles in service organizations", *Journal of Service Research*, Vol. 3 No. 1, pp. 66-81.
- Choi, S.L., Goh, C.F., Adam, M.B.H., et al. (2016), "Transformational leadership, empowerment, and job satisfaction: the mediating role of employee empowerment", *Human Resources for Health*, Vol. 14 No. 1, p. 73.
- Conger, J.A. and Kanungo, R.N. (1988), "The empowerment process: integrating theory and practice", *The Academy of Management Review*, Vol. 13 No. 3, pp. 471-482.
- Coviello, N.E. and Joseph, R.M. (2012), "Creating major innovations with customers: insights from small and young technology firms", *Journal of Marketing*, Vol. 76 No. 6, pp. 87-104.
- Craighead, C.W., Ketchen, D.J., Dunn, K.S. and Hult, G.T.M. (2011), "Addressing common method variance: guidelines for survey research on information technology, operations, and supply chain management", *IEEE Transactions on Engineering Management*, Vol. 58 No. 3, pp. 578-588.
- Feng, T., Sun, L. and Zhang, Y. (2010), "The effects of customer and supplier involvement on competitive advantage an empirical study in China", *Industrial Marketing Management*, Vol. 39 No. 8, pp. 1384-1394.

- 
- Feng, T.W. and Wang, D. (2013), "Supply chain involvement for better product development performance", *Industrial Management and Data Systems*, Vol. 113 No. 2, pp. 190-206.
- Fleischer, M. and Liker, J.K. (1992), "The hidden professionals – product designers and their impact on design quality", *IEEE Transactions on Engineering Management*, Vol. 39 No. 3, pp. 254-264.
- Foster-Fishman, P.G. and Keys, C.B. (1997), "The person/environment dynamics of employee empowerment: an organizational culture analysis", *American Journal of Community Psychology*, Vol. 25 No. 3, pp. 345-369.
- Fragkos, K.C., Makrykosta, P. and Frangos, C.C. (2020), "Structural empowerment is a strong predictor of organizational commitment in nurses: a systematic review and meta-analysis", *Journal of Advanced Nursing*, Vol. 76 No. 4, pp. 939-962.
- García-Juan, B., Escrig-Tena, A.B. and Roca-Puig, V. (2019), "Roca-Puig V. The empowerment-organizational performance link in local governments", *Personnel Review*, Vol. 48 No. 1, pp. 118-140.
- Gustafsson, A., Kristensson, P. and Witell, L. (2012), "Customer co-creation in service innovation: a matter of communication?", *Journal of Service Management*, Vol. 23 No. 3, pp. 311-327.
- Haq, M.Z.U., Gu, M. and Huo, B. (2020), "Enhancing supply chain learning and innovation performance through human resource management", *Journal of Business and Industrial Marketing*, Vol. 36 No. 3, pp. 552-568.
- Harman, H.H. (1976), *Modern Factor Analysis*, The University of Chicago Press, Chicago IL.
- Heim, G.R. and Peng, D.X. (2010), "The impact of information technology use on plant structure, practices, and performance: an exploratory study", *Journal of Operations Management*, Vol. 28 No. 2, pp. 144-162.
- Hoyer, W.D., Chandy, R., Dorotic, M., Krafft, M. and Singh, S.S. (2010), "Consumer cocreation in new product development", *Journal of Service Research*, Vol. 13 No. 3, pp. 283-296.
- Hsu, Y. (2016), "A value cocreation strategy model for improving product development performance", *Journal of Business and Industrial Marketing*, Vol. 31 No. 5, pp. 695-715.
- Jaakkola, E. and Hakanen, T. (2013), "Value co-creation in solution networks", *Industrial Marketing Management*, Vol. 42 No. 1, pp. 47-58.
- Jamali, D., Khoury, G. and Sahyoun, H. (2006), "From bureaucratic organizations to learning organizations: an evolutionary roadmap", *The Learning Organization*, Vol. 13 No. 4, pp. 337-352.
- Jiao, Y., Wu, Y. and Lu, Q.S. (2020), "Improving the performance of customer participation in new product development: the moderating effect of social media and firm capabilities", *Asian Journal of Technology Innovation*, Vol. 28 No. 2, pp. 284-304.
- Johnston, W.J., Khalil, S., Jain, M. and Cheng, J.M.S. (2012), "Determinants of joint action in international channels of distribution: the moderating role of psychic distance", *Journal of International Marketing*, Vol. 20 No. 3, pp. 34-49.
- Kouzes, J.M. (2010), "Encouraging the heart: a leader's guide to rewarding and recognizing others", *The Jossey-Bass Business and Management Series*, Vol. 7 No. 9, p. 56.
- Laschinger, H.K.S., Finegan, J.E., Shamian, J. and Wilk, P. (2004), "A longitudinal analysis of the impact of workplace empowerment on work satisfaction", *Journal of Organizational Behavior*, Vol. 25 No. 4, pp. 527-545.
- Lee, H.W. and Kim, E. (2020), "Workforce diversity and firm performance: relational coordination as a mediator and structural empowerment and multisource feedback as moderators", *Human Resource Management*, Vol. 59 No. 1, pp. 5-23.
- Lengnick-Hall, C.A., Claycomb, V.C. and Inks, L.W. (2000), "From recipient to contributor: examining customer roles and experienced outcomes", *European Journal of Marketing*, Vol. 34 Nos 3/4, pp. 359-383.

- 
- Maglio, P.P. and Spohrer, J. (2008), "Fundamentals of service science", *Journal of the Academy of Marketing Science*, Vol. 36 No. 1, pp. 18-20.
- Marin-Garcia, J.A. and Bonavia, T. (2015), "Relationship between employee involvement and lean manufacturing and its effect on performance in a rigid continuous process industry", *International Journal of Production Research*, Vol. 53 No. 11, pp. 3260-3275.
- Matthews, R.A., Michelle Diaz, W. and Cole, S.G. (2003), "The organizational empowerment scale", *Personnel Review*, Vol. 32 No. 3, pp. 297-318.
- Melander, L. and Lakemond, N. (2012), "Sourcing technology from suppliers in new product development – purchasing's role as a trouble shooter", *IPSERA Conference, Italy*.
- Menguc, B., Auh, S. and Yannopoulos, P. (2014), "Customer and supplier involvement in design: the moderating role of incremental and radical innovation capability", *Journal of Product Innovation Management*, Vol. 31 No. 2, pp. 313-328.
- Merrilees, B., Miller, D. and Yakimova, R. (2020), "Building brands through internal stakeholder engagement and co-creation", *Journal of Product and Brand Management*, Vol. 30 No. 6, pp. 806-818.
- Mills, P.K. and Ungson, G.R. (2003), "Reassessing the limits of structural empowerment: organizational constitution and trust as controls", *Academy of Management Review*, Vol. 28 No. 1, pp. 143-153.
- Mishra, A.A. and Shah, R. (2009), "In union lies strength: collaborative competence in new product development and its performance effects", *Journal of Operations Management*, Vol. 27 No. 4, pp. 324-338.
- Naeem, H. and Saif, M.I. (2010), "Employee empowerment and customer satisfaction: empirical evidence from the banking sector of Pakistan", *African Journal of Business Management*, Vol. 4 No. 10, pp. 2028-2031.
- Nafisi, M., Wiltonsson, M. and Rosio, C. (2016), "Manufacturing involvement in new product development: an explorative case study in heavy automotive component assembly", in Wang, L. and Kjellberg, T. (Eds), *26th CIRP Design Conference, Amsterdam*, Elsevier Science Bv.
- Najafi-Tavani, Z., Mousavi, S., Zaefarian, G. and Naudé, P. (2020), "Relationship learning and international customer involvement in new product design: the moderating roles of customer dependence and cultural distance", *Journal of Business Research*, Vol. 120, pp. 42-58.
- Nguyen, H.A., Nguyen, H., Nguyen, H.T., Phan, A.C. and Matsui, Y. (2018), "Empirical study on the role of collaboration in new product development in manufacturing companies", *International Journal for Quality Research*, Vol. 12 No. 2, pp. 363-384.
- Papageorgiou, G., Efstathiades, A. and Milikouri, G. (2017), "Innovation, co-creation and the new product development process in small to medium-sized enterprises (SMEs)", in Loue, C. and BenSlimane, S. (Eds), *Proceedings of the 12th European Conference on Innovation and Entrepreneurship, Nr Reading*, Acad Conferences.
- Parker, H. (2016), "Team effectiveness and open discussion of conflict in collaborative new product development: a cross-national study", *Journal of Business Research*, Vol. 69 No. 11, pp. 4757-4762.
- Patterson, M.G., West, M.A. and Wall, T.D. (2004), "Integrated manufacturing, empowerment, and company performance", *Journal of Organizational Behavior*, Vol. 25 No. 5, pp. 641-665.
- Pérez Sánchez, E.O., Toro Jaramillo, I.D. and Hernandez Sánchez, B.Y. (2017), "Measurement of potential absorption capacity in Colombia's innovative companies", *Espacios*, Vol. 38 No. 26, pp. 1307-1321.
- Petersen, K.J., Handfield, R.B. and Ragatz, G.L. (2005), "Supplier integration into new product development: coordinating product, process and supply chain design", *Journal of Operations Management*, Vol. 23 Nos 3/4, pp. 371-388.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903.



- 
- Prahalad, C.K. and Ramaswamy, V. (2004a), "Co-creating unique value with customers", *Strategy and Leadership*, Vol. 32 No. 3, pp. 4-9.
- Prahalad, C.K. and Ramaswamy, V. (2004b), "Co-creation experiences: the next practice in value creation", *Journal of Interactive Marketing*, Vol. 18 No. 3, pp. 5-14.
- Proenca, T., Torres, A. and Sampaio, A.S. (2017), "Frontline employee empowerment and perceived customer satisfaction", *Management Research: Journal of the Iberoamerican Academy of Management*, Vol. 15 No. 2, pp. 187-206.
- Ro, H. and Wong, J. (2012), "Customer opportunistic complaints management: a critical incident approach", *International Journal of Hospitality Management*, Vol. 31 No. 2, pp. 419-427.
- Sheu, C., Yen, H.R. and Chae, B. (2006), "Determinants of supplier-retailer collaboration: evidence from an international study", *International Journal of Operations and Production Management*, Vol. 26 No. 1, pp. 24-49.
- Sinha, A.K. and Anand, A. (2018), "Development of sustainable supplier selection index for new product development using multi criteria decision making", *Journal of Cleaner Production*, Vol. 197, pp. 1587-1596.
- Song, M. and Di Benedetto, C.A. (2008), "Supplier's involvement and success of radical new product development in new ventures", *Journal of Operations Management*, Vol. 26 No. 1, pp. 1-22.
- Spina, G., Verganti, R. and Zotteri, G. (2002), "Factors influencing co-design adoption: drivers and internal consistency", *International Journal of Operations and Production Management*, Vol. 22 No. 12, pp. 1354-1366.
- Subramony, M. (2009), "A meta-analytic investigation of the relationship between Hrm bundles and firm performance", *Human Resource Management*, Vol. 48 No. 5, pp. 745-768.
- Suleiman, M.A., Huo, B.F. and Ye, Y.X. (2021), "Linking supplier Jit to flexibility performance: the moderating impact of advanced manufacturing technology and human resource empowerment", *Industrial Management and Data Systems*, Vol. 121 No. 11, pp. 2237-2253.
- Thiruvattal, E. (2017), "Impact of value co-creation on logistics customers' loyalty", *Journal of Global Operations and Strategic Sourcing*, Vol. 10 No. 3, pp. 334-361.
- Tommasetti, A., Troisi, O. and Vesci, M. (2017), "Measuring customer value co-creation behavior: developing a conceptual model based on service-dominant logic", *Journal of Service Theory and Practice*, Vol. 27 No. 5, pp. 930-950.
- Vargo, S.L. and Lusch, R.F. (2004), "Evolving to a new dominant logic for marketing", *Journal of Marketing*, Vol. 68 No. 1, pp. 1-17.
- Vargo, S.L., Maglio, P.P. and Akaka, M.A. (2008), "On value and value co-creation: a service systems and service logic perspective", *European Management Journal*, Vol. 26 No. 3, pp. 145-152.
- Williams, L.J., Hartman, N. and Cavazotte, F. (2010), "Method variance and marker variables: a review and comprehensive CFA marker technique", *Organizational Research Methods*, Vol. 13 No. 3, pp. 477-514.
- Williamson, O.E. (1981), "The economics of organization: the transaction cost approach", *American Journal of Sociology*, Vol. 87 No. 3, pp. 548-577.
- Xu, J., Wang, X.H. and Liu, F. (2021), "Government subsidies, R&D investment and innovation performance: analysis from pharmaceutical sector in China", *Technology Analysis and Strategic Management*, Vol. 33 No. 5, pp. 535-553.
- Xu, Z. and Yang, F. (2018), "The cross-level effect of authentic leadership on teacher emotional exhaustion: the chain mediating role of structural and psychological empowerment", *Journal of Pacific Rim Psychology*, Vol. 12, p. 11.
- Yagil, D. (2006), "The relationship of service provider power motivation, empowerment and burnout to customer satisfaction", *International Journal of Service Industry Management*, Vol. 17 No. 3, pp. 258-270.

- 
- Ye, Y., Huo, B., Zhang, M., Wang, B. and Zhao, X. (2018), "The impact of modular designs on new product development outcomes: the moderating effect of supply chain involvement", *Supply Chain Management: An International Journal*, Vol. 23 No. 5, pp. 444-458.
- Yi, Y. and Gong, T. (2013), "Customer value co-creation behavior: scale development and validation", *Journal of Business Research*, Vol. 66 No. 9, pp. 1279-1284.
- Yu, C.H., Tsai, C.C., Wang, Y., Lai, K.K. and Tajvidi, M. (2020), "Towards building a value co-creation circle in social commerce", *Computers in Human Behavior*, Vol. 108, pp. 1-10.
- Zhang, H.Y. and Yang, F. (2016), "The impact of external involvement on new product market performance an analysis of mediation and moderation", *Industrial Management and Data Systems*, Vol. 116 No. 8, pp. 1520-1539.
- Zhang, X. and Chen, R. (2008), "Examining the mechanism of the value co-creation with customers", *International Journal of Production Economics*, Vol. 116 No. 2, pp. 242-250.
- Zhang, X., Ye, H. and Li, Y. (2018b), "Correlates of structural empowerment, psychological empowerment and emotional exhaustion among registered nurses: a meta-analysis", *Applied Nursing Research*, Vol. 42, pp. 9-16.
- Zhang, H., Gupta, S., Sun, W. and Zou, Y. (2020), "How social-media-enabled co-creation between customers and the firm drives business value? The perspective of organizational learning and social capital", *Information and Management*, Vol. 57 No. 3, p. 17.
- Zhang, T., Lu, C., Torres, E. and Chen, P.J. (2018a), "Engaging customers in value co-creation or co-destruction online", *Journal of Services Marketing*, Vol. 32 No. 1, pp. 57-69.

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