

# Developing a Framework of an Innovative Supply Chain in Thai Manufacturing Firms: An Interaction of Social Capital Theory and Knowledge-Based View

Boonsri Suteerachai<sup>#1</sup>, Akarapitta Meechaiwong<sup>#2</sup>, Pornkul Suksod<sup>#3</sup>, Kittisak Jermstittiparsert<sup>\*4</sup>

<sup>#1,3</sup> *Suan Sunandha Rajabhat University, Thailand*

<sup>#2</sup> *Engineering Reward (Thailand) Co., Ltd., Thailand*

<sup>\*4</sup> *Social Research Institute, Chulalongkorn University, Thailand*

<sup>1</sup>boonsri.su@ssru.ac.th

<sup>2</sup> contactus@engineeringreward.com

<sup>3</sup>pornkul.su@ssru.ac.th

*Corresponding author:* kittisak.j@chula.ac.th

**Abstract-** The prime objective of the current study is to explore and describe an innovative supply chain for the Thai manufacturing firms. The study has examined the direct impact of SC partner innovation, product innovation strategy, organizational innovation climate (OIC) and strategic relationship on the partner innovation performance. In addition to that the mediating role of product innovation strategy in the relationship between SC partner innovation and partner innovation performance is examined. Finally, the study has examined the moderating role of organizational innovation climate and strategic relationship. The knowledge-based view and the social capital theory are used to develop the conceptual model. This idea has been extended in this research by analyzing the way in which it happens. For instance, it has been argued that there is a need for a suitable internal environment for innovation that can improve the chain of innovation linking innovativeness of partners in the supply chain with innovation strategy of the focal firm. In the next step, the right external climate can be set by establishing a strategic relation with partners in the supply chain to get innovative ideas. Lack of a cooperative environment cannot result in effective knowledge sharing with the partners in the network. This research study is unique in the sense that it complements the innovation chain with climate chain. Additions are made to the current knowledge by this study through the extension of the fact that value chains and SC for understanding the process of innovation chains. It is revealed through PIS that there is a positive influence on the performance of product innovation. There is a need to blend the internal climate for innovation and the external efforts with important suppliers to tap innovative ideas.

**Keywords:** *Supply Chain, Strategic Innovation, Product Innovation, Social Capital, Thailand*

## 1. Background

Competitive advantage can be achieved through innovation [1, 2]. It has become crucial for companies to do innovation irrespective of the challenges in managing it. A wide range of benefits has been identified by research that companies working on innovative strategies are achieving more significant market share and higher profit [3]. It is not essential to decide whether to innovate or not but the way for making strategies to achieve competitive advantage through innovation. Because of the complexity of innovation strategies, the role of customers and suppliers has become essential for the success of an innovation strategy of the firm [39].

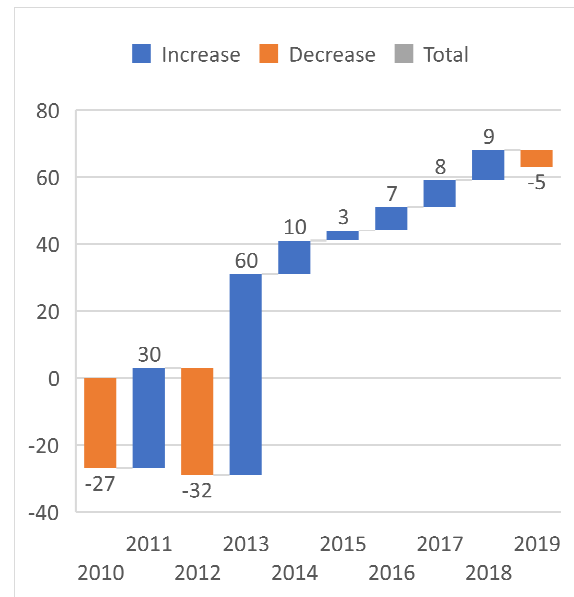
The previous research studies focused on recognizing tracing the antecedents of organizational performance and innovation capability. The literature has identified the influence created on innovation performance by leadership styles, organizational processes and human capital [4, 5]. Organizations are increasing their collaboration with each other and becoming networked for new product development and innovation. Emerging literature exists with focus on organizational networks and innovation, notably SC networks [6].

The influence of integrating suppliers into the NPD process of a firm has been analyzed by previous research studies. By engagement with the key suppliers, firms achieve full integration into the NPD

process. However, learning is made through suppliers' innovativeness. In the same way, firms depend on the expertise of customers and suppliers to avoid or prepare themselves against failing products. The sales information across the world is shared by Wal-Mart as done by Procter and Gamble with the strategic suppliers[7]. Decisions can be made about innovation strategies by Procter and Gamble and products to be offered for sale by revealing sales information [8].

Based on social capital theory, RDT and the KBV, it has been argued that innovativeness of partners in SC influence firms to improve their innovative performance and develop suitable strategies [9, 10]. Firms are influenced through shorter time to market, the limited capability of innovation, need for sharing risks related to innovation development for developing innovation from partners in the SC[11, 12].

The focus of this study is on the partners in the supply chain, such as customers and suppliers in the SC of the firm. Innovativeness of SC partner is defined as the level of ability possessed by a SC partner to develop innovation and new ideas. It has the capability to enable innovation for the focal firms. The basic concepts of innovation arise from the supply chain. For instance, several manufacturers of PC have been benefited by the innovation part of Intel Inside. The global pallet management has been revolutionized by the innovative business model of CHEP. This is related to the concept of "return anywhere and lease anywhere" and has basic designs' implication within the SC for customers. Therefore, it has been argued that the innovation performance of a firm is influenced by the knowledge innovativeness acquired from the partners in the supply chain. The manufacturing firms in Thailand are growing but the overall output is volatile as evident from the figure 1. The industrial output in Thailand was minimum in 2012 and maximum in 2014.



**Figure 1.** The Thailand industrial production

Source: The trading economies

Based on the research of Mackelprang, Bernardes [13] and Azadegan [14], it has been claimed that use of innovativeness of SC partner for strategizing innovation is based on two essential factors. The first factor is derived from social capital theory. It is stated that the exchange of knowledge improves through establishing strategic relation with important SC partners [9, 10]. The level of stability in a relationship is referred to as a strategic relationship with SC partners, which is a long term [9, 10]. The second factor is related to the environment provided by innovation culture for the innovativeness of SC partner to implement strategies of the product [14].

The level with which a supportive climate is developed by a firm for innovation is referred to as the innovation climate (Bu & Basse, 2016; Moyano-Fuentes et al., 2016). The extent with which new components, new features, new technologies are used by the firm in product development is regarded as PIS [15]. The amount of new developed products is referred to as product innovation performance. It is important to note that this research has used innovation performance and PIS as two separate constructs. The ways used by firms for obtaining novel products are related to PIS, such as specific activities and actions executed to get enhanced innovation performance.

In this research, it has been hypothesized that an antecedent of innovation performance is a strategy of product innovation.

1. The aim of this study is to analyze the direct influence of the innovativeness of partners in the SC on the firm's innovation strategy.

2. Moreover, the study aims at analyzing the individual and collective role of strategic relationships with the supplier as a moderator in improving the influence of innovativeness of partners in the SC on the strategy of innovation.

3. The study finds the impact of executing PIS on innovation performance of a firm.

This study aims to contribute to the current literature on firm's innovation performance by linking it with partners in the supply chain.

## 2. Hypothesis Development

### 2.1 Product innovation strategy (PIS) and Innovativeness of Partners in Supply Chain

In analyzing the relation between PIS and innovativeness of SC partner, the results are drawn through RDT (resource dependency theory) [16]. As per the RDT, relations among organizations are powerful relations, which are based on the exchange of resources [16]. For achieving and sustaining competitive advantage, not all the required resources may be available to the firm. Therefore, they establish a relation with other firms in the SC to acquire needed resources [14]. The ability of a firm to manufacture new products through creativity and innovation is referred as innovativeness, which is a crucial resource for achieving competitive advantage [13]. The lack of a firm's ability to do this by own look for developing relations with innovative partners. CHEP and Intel are the good explain in which the relationship between innovation strategy of a firm and innovativeness of SC partner is reflected. An essential factor in the prequalification process and supplier evaluation is supplier innovativeness [14]. The alignment of suppliers' innovative capabilities is the initial as well as an ongoing process.

The innovative capability of the buyer increases by engaging with suppliers' innovation [14]. The buying firms become able to get components by the innovative suppliers at the leading edge of technology that can be integrated by firms in their

production process. In a similar way, innovation can be achieved through innovative customers of the focal firm [14, 16]. Several case studies such as the innovation in the field of medicine, education, and in Japan the adoption and utilization of multimedia technology illustrate the significance of establishing strategic relations with customers having excellent knowledge of products for creating new business models. This also helps in reaching to other linked customers.

Customers have a good understanding of the market as they are linked with it. Therefore, they can offer valuable input to the innovative processes of a firm. Altogether, it suggests the ability of orchestration of a knowledge network, where every part plays its role. Organizations are considered as coalitions by Resource dependency theory (RDT) in which patterns and behavior structures are shaped for acquiring the required external resources [1, 2]. The tapping of innovativeness of partners can be investigated through RDT, which a suitable theoretical lens. As per the theory, the dependency of buyers is increased by suppliers on their operations through continuous value offered in the firm of innovation.

A firm becomes able to come across to innovative behaviors of SC partners consistently through increased collaboration with creative partners of the supply chain. Firms acquire innovative behavior, learn, and use it for making innovation strategies. Moreover, external knowledge can be exploited and reconfigured by the firm to improve its capabilities to develop innovative products. It is supported by theoretical arguments that firms can be triggered through the innovativeness of partners in the SC to develop innovation strategies. Therefore, the following research hypothesis has been formulated.

**H1:** The innovativeness of SC partners has a significant impact on the PIS

### 2.2 The role of Social capital theory

The recent research studies have focused on the relation between manufacturing performance of a buyer and innovativeness of supplier and role of inter-organizational learning, supplier integration, supplier evaluation, and absorptive capacity as a moderator [14, 16]. However, there is a need to explore the role of contingency factors including innovation climate and role of strategic association

with the partners in the SC as moderator [17]. In order to effectively utilize and get the innovativeness of SC partner, there is a need for firms to develop complementary skills and innovation orientation through a supportive environment. The learning capability of firms improves through such orientation for innovation. Firms become able to understand and use innovative ideas of partners in the production processes. Innovative ideas are offered by suppliers to buyer firms because they own an innovative culture and develop new technologies and ideas [15]. Considering the downstream part of the innovation network, a similar statement can be made customer involvement in making efforts to innovate products [18]. These involvements happen in the focal firms, which have a strong innovation environment within the organization. Therefore, the cross-fertilisation of ideas is supported by the organizational environment. This improves the creative ideas and offers a ground for innovation to firms using innovativeness of SC partners [14, 16].

As per the KBV, when the inside and outside knowledge is intertwined, this can result in improved learning adding to innovation performance [14, 18]. It can be said that a supportive environment for innovative can improve the positive influence of innovativeness of partners in the SC on using innovative offerings in product development by the firm. In this way, the following research hypothesis has been developed:

**H2:** OIC has significant impact on the partner innovation performance

**H3:** OIC moderates t between SC partner innovation and partner IP.

It has been suggested by the social capital theory that capabilities and knowledge from other firms can be tapped effectively when social capital is built. This refers to trust and relation with partner firms [18]. There is a need to develop strategic relationships to foster the process of tapping innovative capabilities of SC partners under the social capital theory. When long-term relations are established with the SC partners, this develops mutual trust and conservativeness is shown by the partners in product offerings and patterns of behavior with the focal firm. As per KBV, suppliers and end customers become able to offer and share the expertise required by a firm that can be utilized in the development of products. In a similar way, more insight is gained by

the focal firm through the innovative processes of suppliers. This enables the tapping of knowledge of supplier partners, exploiting and using it to improve the innovative ability [9].

Joint projects can be developed and undertaken within this relationship model, which will result in the utilization of innovative offerings for the development of new products. It has been argued by Azadegan [14] that the relationships developed with the suppliers make innovativeness of suppliers to become an asset that improves the performance of the firm. In a similar way, it has been argued that there is a need for collective networks of NPD, including customers also. It can be stated that firms become able to gain and tap innovative ideas from supplier partners through establishing strategic relations with them. This improves the willingness of a firm to work on innovative strategies [14, 18].

**H4:** Strategic relationship has significant impact on the partner innovation performance

**H5:** Strategic relationship moderates between SC partner innovation and partner innovation performance.

### 2.3 The role of Knowledge based view

The product architecture can be reconfigured, and the final product can be composed through use of product innovation strategies. This results in new products and high innovation [15, 18]. The total amount of products manufactured can be improved along with the performance of final products through use of new components and materials [19]. Home products and novel furniture is resulted by the newspaper wood, which is a collection of products (novel wood). New materials are used to develop these products such as chairs, lamps, and home products. However, recycled newspapers but not the dried wood and cut can be transformed into a log and dried for making living trees in this case. Therefore, novel products can be formed through the use of new material in the development of the product. In a similar way, innovation strategies can be made by firms through the adoption of new technologies. This can result in an increase in new products and novel products developed from technologies [15]. Several products and industries have been revolutionized through the development of touch screen technology. A number of novel products, including smartphones and personal tablets, have been formed through the

use of touch screen technology such as I-Phone and I-Pad.

Active interaction is allowed through the use of computer control technology based on the gesture. The gaming industry has been revolutionized to novel products (i.e. Nintendo's Wii handled control sensor and Microsoft's Xbox Kinect body sensor) [15, 18]. The implementation of innovation strategy by incorporating technology in the development of product reveals opportunities for increasing innovation performance and novel products. Considering this, the following research hypothesis can be formed:

**H6:** Product innovation strategy has a significant impact on the PIP

The previous research studies have focused on the direct influence of innovativeness of suppliers and suppliers' integration into the process of NPD on the manufacturing performance of the focal firm [14, 15, 18]. In a similar way, several studies have analyzed the influence created on innovation performance by tapping customer innovativeness [14, 15, 18]. However, these research studies have not incorporated the processes through which the performance outcomes are influenced by the innovativeness of SC partners. In this study, the first research hypothesis explores the process of executive PIS based on advanced technology, innovative features, and components in the development of the product. These have been taken as a direct influence of acquiring innovativeness of partners in the SC[15].

In order to formulate a hypothesis, RDT has been used. It has been argued that there is a need to reduce the dependencies by the firm on the innovativeness of SC partners by the development of innovative products on their own. This development of PIS will increase innovation performance [15, 18]. All of these arguments suggest that the PIS is the result of the innovativeness of partners in the SC and antecedent for the performance of product innovation.

It suggests that innovativeness of partners in SC influence the innovation performance of a firm and this process is referred and product innovation. It has been noted previously that the current researches have emphasized on the direct relation of innovation's external sources and firm's innovation performance [9, 14, 15]. Other than the PIS, several factors enable the direct relation between

performance and innovation's external sources. The learning of a firm improves by coordinating with innovative partners in the supply chain. This improves the absorptive capacity that leads to better innovation performance of the firm. Moreover, innovativeness of SC partners can be linked with the innovation performance of a firm in several other processes. It reflects that PIS partially mediates the relation of innovation performance and innovativeness of partners in the supply chain. In this way, the following research hypotheses have been developed:

**H7:** PIS mediates the relationship between SC partner innovation and partner innovation performance.

### 3. Methodology

The measured adopted in the research have been taken from the previous research studies to ensure the validity of the content. The reviews of Wang and Ahmed [20] and Azadegan and Dooley [10] have been used for deriving the measures of innovativeness of SC partner. Respondents were asked to focus on the most SC partner of a firm, who are valuable, in order to address this scale. It was related to the supplier with whom the maximum business was conducted in terms of dollars. The literature of SC management was used for the measure of strategic relationship [21-23]. It emphasized on the significance of establishing long-term relation and collaboration strategically with the most valuable partners in the SC for achieving benefits together. The scale developed by Prajogo and Ahmed [24] was used for measuring the innovative climate including several essential practices, i.e. resources provision for employees to work on creative and innovative ideas and adopting open communication to support sharing of knowledge and idea.

The studies of Yamin, Mavondo [25], Akgün, Keskin [26], and Gunday, Ulusoy [27] were used to derive scale for PIS . It reveals that the firms adopt different important practices for developing innovative products such as new materials, new components, and new technology. The measurement of innovation performance of merchandise is done in terms of innovativeness and a total number of manufactured and launched products in the market [28, 29]. The respondents were asked to determine

their performance as compared with the average industry using a 7-point scale of Likert scale. The number 1 represented the well below value, and number 7 reflects well above.

The present study has chosen SEM as it is a second-generation statistical technique, providing robust results. Besides, SEM-PLS allows the statistical modeling and estimation of complex phenomena. Therefore, became the most preferred method to assess the theoretical models under quantitative researches. It enables researchers to determine the sophisticated and advanced theoretical models without much dependency on statistical purposes. Finally, SEM software is also user-friendly, just as other Window-based software. The above reasoning was also supported by Hair, Hult [30]. SEM model consists of formative and reflective constructs. The objective is to determine the prediction among the constructs. For many years, researchers have been using EQS, AMOS, and LISREL as the software tools for performing such analysis. However, PLS-SEM is a useful alternative to CB-SEM, with distinctive methodological features. The estimated population size is 40000, and the selected sample size is 750. Thus, 525 survey questionnaires were distributed, and 369 questionnaires were received back. Thus, the response rate came out to be 70%, which is above the threshold level (45% -50%).

#### 4. Data Analysis

In PLS-SEM path model, the initial step is the assessment of the measurement model(MM), which is followed by the assessment of the structural model (SM) [31]. The evaluation of statistical elements in the model is referred to as an evaluation of the MM. It ensures that the model is sufficiently good enough to proceed with further statistical analysis. The validities have been measurement through the use of SmartPLS. The pre-requirement of validity is

reliability. It is related to the level of error free measures for consistency of results [32]. The focus is on reliability because of its defective influence on weakening the association between the measures. Hosany, Prayag [32] has recommended multiple item scales measurement to deal with the errors of measurement. The research can eliminate the items having measurement errors for improving the reliability of the model. In this research, there were no errors of measurement detected. All the measurements were determined by a minimum of five items.

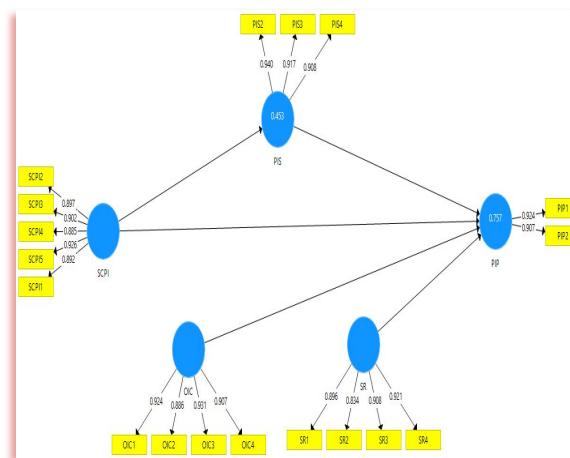


Figure 2. MM

According to the recommendation of Hair, Hult [30], the value of outer model loading equal to or greater than 0.50 is considered as sufficient and acceptable. However, the value of outer model loading less than 0.50 should be deleted in order to improve the quality of data. The loading values of this research according to the constructs have been presented in Table 5.14. It has been indicated that the value of loading for all indicators is in the range 0.749-0.950. Therefore, it ensures that there is sufficient construct validity in the MM.

	OIC	PIP	PIS	SCPI	SR
OIC1	0.924				
OIC2	0.886				
OIC3	0.931				
OIC4	0.907				
PIP1		0.924			

Table 1. Outer Loading

PIP2	0.907
PIS2	0.940
PIS3	0.917
PIS4	0.908
SCPI2	0.897
SCPI3	0.902

SCPI4	<b>0.885</b>
SCPI5	<b>0.926</b>
SR1	<b>0.896</b>
SR2	<b>0.834</b>
SR3	<b>0.908</b>
SR4	<b>0.921</b>
SCPI1	<b>0.892</b>

The reliability is tested in internal consistency through homogeneity of a set of items [30, 32]. The level of items measuring a similar construct is assessed in reliability [33]. In order to determine reliability of data, composite reliability (CR) is frequently used by most of the researchers [30]. The value of composite reliability is interpreted similarly to the value of Cronbach's alpha (CA). All the reliability values are shown in the reveal that they are above the standard value of 0.70 [31, 34]. This indicates that there is high internal consistency shown by every construct. According to the recommendation of Nunnally and Bernstein [35], the values of reliability in the range of 0.70-0.90 are considered sufficient. The values of Cronbach's alpha to be greater than 0.9 or 0.95 are considered as inappropriate. It reflects that there is a change of indicator variables to determine the similar phenomenon [36]. The discriminant and convergent validity determine the construct validity. The evaluation of loadings and cross-loadings ensure the validity of specific items in constructs along with serving as a requirement for determining convergent validity. When the item is highly loaded within the construct, it is considered as a good indicator of the construct. Moreover, when the item is high loading under a different construct, it reflects some issue with the item.

**Table 2.** Reliability

	Cronbach's Alpha	rho_A	CR	(AVE)
OIC	<b>0.933</b>	<b>0.935</b>	<b>0.952</b>	<b>0.832</b>
PIP	<b>0.808</b>	<b>0.814</b>	<b>0.912</b>	<b>0.839</b>
PIS	<b>0.911</b>	<b>0.913</b>	<b>0.944</b>	<b>0.850</b>
SCPI	<b>0.942</b>	<b>0.943</b>	<b>0.955</b>	<b>0.811</b>
SR	<b>0.913</b>	<b>0.917</b>	<b>0.939</b>	<b>0.793</b>

According to the suggestion of Tzempelikos and Gounaris [37], there is need to assess AVE (average variance extracted) as a standard should be greater than 0.50 [30]. Moreover, there is a need to determine CR (composite reliability), factor loadings and AVE and the values of loadings should be greater than benchmark 0.70. The value of CR should be above 0.50 and CR should be greater than 0.70. When the value of AVE comes to be 0.50, it means that half of the variation in the manifest variable is because of the latent variable [31]. Another measurement linked with convergent validity is discriminant validity. The differences among the measurement tools of different constructs are assessed through discriminant validity. The DV is evaluated to ensure the external consistency of the model. It was noted by Tzempelikos and Gounaris [37] that when the value of the square root of every construct is greater than the highest correlation, it confirms the discriminant validity.

**Table 3.** Validity Matrix

	OIC	PIP	PIS	SCPI	SR
OIC	<b>0.912</b>				
PIP	0.613	<b>0.916</b>			
PIS	0.626	0.861	<b>0.922</b>		
SCPI	0.880	0.661	0.673	<b>0.901</b>	
SR	0.885	0.666	0.670	0.895	<b>0.890</b>

After the assessment of the MM, the SM is assessed. It determines the correlation between the variables and regression. In the process of SM assessment, there are five steps [36]. Initially, the issue of collinearity is determined. After this, the significance and SM relevance are determined. The coefficient of determination is assessed along with the effect size. Coefficient of determination is regarded as R2 and effect size is F2. The predictive relevance (Q2) is assessed, as well. Moreover, mediation influences are determined before the completion of data analysis. This has been discussed in detail in the next sections. It is essential to decide on the issues of collinearity in the assessment of the SM. This refers to a high level of association among the indicators [36]. The results have been depicted in Table 5.12, which show that standard collinearity values having tolerance higher than 0.20 and value of VIF to be less than 5. Therefore, it is revealed that

there is no multicollinearity. The VIF and tolerance of all the variables lie in the range of 2.278-4.122 and 0.243-0.439, respectively.

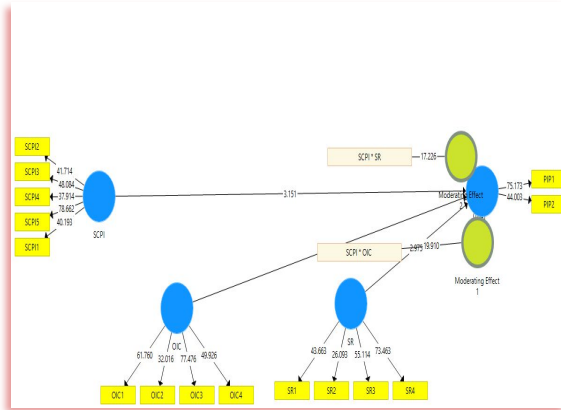


Figure 3. Structural Model (Moderation)

Similarly, the next step is the determination of relationships in the SM and the significance of the variables. The SM path coefficients are examined [36]. The relationship between the constructs, t-values, and path coefficients are assessed in PLS-SEM. The use of path coefficient in PLS-SEM is equivalent to the standardized beta coefficient used in regressions. Using a re-sampling iteration of 5000, t-values were calculated [36]. A sample of 5000 bootstraps was selected to ensure the empirical sampling distribution by every parameter model and standard deviation of the distribution to be used as empirical standard error [30]. The one-tail test was done, and the critical values were used to determine the level of significance. The critical values were 2.33, 1.65 and 1.28 at the significance level of 1%, 5%, and 10% respectively. The split model approach is used to reach the objectives of the research i.e the mediation and moderation has is tested separately

Table 4. Results of moderating model

	O	M	STDEV	O/STDEV	P Values	Status
Moderating Effect 1 -> PIP	0.008	0.017	0.190	3.041	0.001	Accepted
Moderating Effect 2 -> PIP	0.084	0.074	0.175	3.476	0.001	Accepted
OIC -> PIP	0.072	0.071	0.118	3.612	0.001	Accepted
SCPI -> PIP	0.405	0.404	0.129	3.151	0.001	Accepted
SR -> PIP	0.445	0.445	0.150	2.975	0.001	Accepted

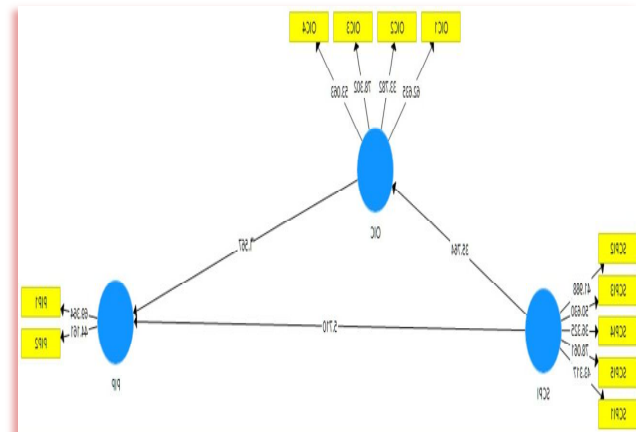


Figure 4. SM (Mediation)

All the hypothesis of a model, depicting the direct and moderating role are accepted significantly.

Table 5. Direct relationships

	(O)	(M)	(STDEV)	(O/STDEV)	P Values	Status
OIC -> PIP	0.137	0.144	0.088	7.567	0.000	Accepted
SCPI -> OIC	0.881	0.880	0.025	35.764	0.000	Accepted
SCPI -> PIP	0.660	0.662	0.065	10.097	0.000	Accepted

Table 6. Mediation

	(O)	(M)	(STDEV)	(O/STDEV)	P Values	Status
SCPI -> OIC -> PIP	0.121	0.127	0.079	5.534	0.000	Accepted

The predictive accuracy of the model is assessed by the coefficient. It is determined by the square value of the correlation between a specific actual and predicted value of the dependent construct. The value of R2 is in the range of 0-1 and the higher the value, the greater is the predictive accuracy. The greater the paths reflecting towards a target construct, the greater is the value of R2 of the construct.

Table 7. R-Square

	R Square
PIP	0.757
PIS	0.453

### 5. Discussion and Conclusion

For analyzing the relation between innovativeness of partner in the supply chain, PIP, and execution of PIS, the theoretical concepts of KBV, RDT and SCT were used. It is in line with the research of Prajogo, Oke [38], which found that positive influence is



created on performance through including customers and suppliers. In this study, the notion that there is a positive relation between innovativeness of SC partner and PIP through the role of PIS is supported. In order to make innovation, firms are dependent on their partners in the supply chain.

Firms are triggered through dependence on the innovativeness of partners in the SC to implement innovative strategies for a product developed on their own. This is done to reduce their dependency on partners. Moreover, the exposure of firm to innovative partners and relationships with them enable the firm to develop processes and use appropriate knowledge. This external knowledge is intertwined with internal knowledge to develop innovative products using new technologies, components, and materials. However, the important relation which association the innovativeness of partners in the SC with the innovation strategy of the focal firm is justified through theoretical arguments.

Additions are made to the current knowledge by this study through the extension of the fact that value chains and SC for understanding the process of innovation chains. It is revealed through PIS that there is a positive influence on the performance of product innovation. The findings are in line with the research of Azadegan and Dooley [10]. Several possibilities and options for the development of novel products are offered through the use of advanced components and technologies in the development of the product. This increases the number of products developed. Moreover, it is crucial to state that the innovativeness of partners in the SC has a positive and direct influence on the performance of product innovation. It suggests that there is the only process through, which innovativeness of SC influences the firm's innovation performance, which is the PIS.

## References

- [1] C. Burnett and D. Paul, Reali and, 2016.
- [2] M. Muethel and M. Hoegl, *Expertise coordination over distance: Shared leadership in dispersed new product development teams*, Leadership Lessons from Compelling Contexts (Monographs in Leadership and Management, Vol 8. 2016, Emerald Group Publishing Limited.
- [3] G. Azar and F. Ciabuschi, "Organizational innovation, technological innovation, and export performance: The effects of innovation radicalness and extensiveness," *International Business Review*, Vol. 26, No. 2, pp. 324-336, 2017
- [4] F. Damanpour, R.M. Walker, and C.N. "Avellaneda, combinative effects of innovation types and organizational performance: A longitudinal study of service organizations," *Journal of Management Studies*, Vol. 46, No. 4, pp. 650-675, 2009.
- [5] D.S. Chong, "Bringing employees closer: The effect of proximity on communication when teams function under time pressure," *Journal of Product Innovation Management*, Vol. 29, No.2, pp. 205-215, 2012.
- [6] C.L. Wang and H. Chugh, *Entrepreneurial learning: Past research and future challenges*, in *Entrepreneurial learning*, Routledge, pp. 11-44, 2015.
- [7] E.M. Mitchell and J.V. Kovach, "Improving supply chain information sharing using Design for Six Sigma," *European Research on Management and Business Economics*, Vol. 22, No. 3 pp. 147-154, 2016.
- [8] J. Jayaram and K. Xu, "The relative influence of external versus internal integration on plant performance in China," *International Journal of Production Economics*, Vol. 146, No. 1, pp. 59-69, 2013.
- [9] A. Esfahbodi, Y. Zhang, and G. Watson, "Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance," *International Journal of Production Economics*, Vol. 181, pp. 350-366, 2016.
- [10] A. Azadegan and K.J. Dooley, "Supplier innovativeness, organizational learning styles and manufacturer performance: An empirical assessment," *Journal of Operations Management*, Vol. 28, No. 6, pp. 488-505, 2010.
- [11] P. Bu and F. Basse, "An empirical study on the effect of knowledge management on ramp-up performance in the SME sector," in *European Conference on Knowledge Management*. 2016. Academic Conferences International Limited.

- [12] J. Moyano-Fuentes, M. Sacristán-Díaz, and P. Garrido-Vega, "Improving supply chain responsiveness through advanced manufacturing technology: The mediating role of internal and external integration," *Production Planning & Control*, Vol. 27, No. 9, pp. 686-697, 2016.
- [13] A.W. Mackelprang, "Supplier innovation strategy and performance: A matter of supply chain market positioning," *Decision Sciences*, Vol. 49, No. 4, pp. 660-689, 2018.
- [14] A. Azadegan, "Benefiting from supplier operational innovativeness: The influence of supplier evaluations and absorptive capacity," *Journal of Supply Chain Management*, Vol. 47, No. 2, pp. 49-64, 2011.
- [15] E. King and R. Boyatt, "Exploring factors that influence adoption of e-learning within higher education," *British Journal of Educational Technology*, Vol. 46, No. 6 pp. 1272-1280, 2015.
- [16] T. Laamanen, "Business models, ecosystems, and society in the sharing economy," *Academy of Management Discoveries*, Vol. 2, No. 2, pp. 218-221. 2016
- [17] A.L. Thayer, A. Petruzzelli, and C.E. McClurg, "Addressing the paradox of the team innovation process: A review and practical considerations," *American Psychologist*, Vol. 73, No. 4, pp. 363, 2018.
- [18] X.A. Koufteros, G.E. Rawski, and R. Rupak, "Organizational integration for product development: the effects on glitches, on-time execution of engineering change orders, and market success," *Decision Sciences*, Vol. 41, No. 1, pp. 49-80, 2010.
- [19] H. Ahmadi, A. O'Cass, and M.P. Miles, "Product resource-capability complementarity, integration mechanisms, and first product advantage," *Journal of Business Research*, Vol. 67, No. 5, pp. 704-709, 2014.
- [20] C.L. Wang and P.K. Ahmed, "The development and validation of the organisational innovativeness construct using confirmatory factor analysis," *European Journal of Innovation Management*, Vol.7, No. 4, pp. 303-313, 2004.
- [21] I.J. Chen and A. Paulraj, "Towards a theory of supply chain management: The constructs and measurements." *Journal of Operations Management*, Vol. 22, No. 2, pp. 119-150 2004.
- [22] B. Fynes, C. Voss, and S. de Búrca, "The impact of supply chain relationship quality on quality performance," *International Journal of Production Economics*, Vol. 96, No. 3, pp. 339-354, 2005.
- [23] S. Li, "Development and validation of a measurement instrument for studying supply chain management practices," *Journal of Operations Management*, Vol. 23, No. 6, pp. 618-641, 2005.
- [24] Prajogo and P.K. Ahmed, "Relationships between innovation stimulus, innovation capacity, and innovation performance," *R&D Management*, Vol. 36, No. 5, pp. 499-515, 2006.
- [25] S. Yamin, "A study of competitive strategy, organisational innovation and organisational performance among Australian manufacturing companies," *International Journal of Production Economics*, pp. 52, No. 1-2, pp. 161-172, 1997.
- [26] L.W. Daniel, "Mixing methods: Creative collaboration in mobile moviemaking," *International Journal of Innovation, Creativity and Change*, Vol. 3, No. 2, pp. 84-96, 2017.
- [27] L. David and M. Jake, "Towards the teaching school: Partnering to create an exciting new future in teacher education," *International Journal of Innovation, Creativity and Change*, Vol. 3, No. 2, pp. 115-128, 2017.
- [28] L. David and M. Jake, "Unpacking the strategic teaching improvement agenda," *International Journal of Innovation, Creativity and Change*, Vol. 3, No. 2, pp. 39-48, 2017.
- [29] J. Spanjol, W.J. Qualls, and J.A. Rosa, "How many and what kind? The role of strategic orientation in new product ideation," *Journal of Product Innovation Management*, Vol. 28, No. 2, pp. 236-250, 2011.
- [30] O. O. David and Y. Mohammed, "The Perceived Relations between Development Reforms, Stock Market Performance and Economic Growth in Nigeria: 1984-2014," *Economy*, Vol. 3, No. 1, pp. 31-39, 2016.
- [31] P. David, "Razzle-dazzle and Razz-ma-tazz: A report into creative writing in a Taipei University," *International Journal of*

- Innovation, Creativity and Change, Vol. 3, No. 1, pp. 105-140, 2017.
- [32] S. Hosany, "Measuring tourists' emotional experiences: Further validation of the destination emotion scale," *Journal of Travel Research*, Vol. 54, No. 4, pp. 482-495, 2015.
- [33] L. Clossey, "Exploratory factor analysis of peer support workers job obstacles and barriers survey (PSWJOBS)," *Social Work in Mental Health*, pp. 1-13, 2019.
- [34] M. Sarstedt, "Estimation issues with PLS and CBSEM: Where the bias lies!," *Journal of Business Research*, Vol. 69, No. 10, pp. 3998-4010, 2016.
- [35] J.C. Nunnally and I.H. Bernstein, *Psychological theory*. New York, NY: MacGraw-Hill, pp. 131-147, 1994.
- [36] Hair, "Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research," *European Business Review*, Vol. 26, No. 2, pp. 106-121, 2014.
- [37] N. Tzempelikos and S. Gounaris, "A conceptual and empirical examination of key account management orientation and its implications—the role of trust, in the customer is not always right? Marketing orientations in a dynamic business world," Springer. pp. 673-681, 2017.
- [38] A. Prajogo, Oke, and J. Olhager, "Supply chain processes: Linking supply logistics integration, supply performance, lean processes and competitive performance." *International Journal of Operations & Production Management*, Vol. 36, No. 2 p. 220-238, 2016.
- [39] K. Jermisittiparsert and S. Rungtornchaisri, "Impact Strategic Sourcing, Supplier Innovativeness, and Information Sharing on Supply Chain Agility," *International Journal of Innovation, Creativity and Change*, Vol. 5, No. 2, pp. 397-415, 2019.