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**Author (s):** Iqra Hamid<sup>1</sup>, Abdul Nafay Sajid<sup>2</sup>, Zahra Batool<sup>2</sup>

**Affiliation (s):** <sup>1</sup>The Islamia University of Bahawalpur, Pakistan  
<sup>2</sup>Zhongnan University of Economics and Law, China

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University of Management and Technology, Lahore, Pakistan

# **Influence of Coopetition on Firm Financial Performance: Mediating Role of Open Innovation Performance**

Iqra Hamid<sup>1</sup>, Abdul Nafay Sajid<sup>2\*</sup>, and Zahra Batool<sup>2</sup>

<sup>1</sup>Institute of Business Management & Administrative Sciences, The Islamia University of Bahawalpur, Pakistan

<sup>2</sup>School of Accounting, Zhongnan University of Economics and Law, Wuhan, China

## **Abstract**

It is essential for a firm to take advantage of the rising phenomenon of coopetition across multiple firms and marketplaces in today's highly competitive climate to enhance its financial performance. Hence, this study contributes to the existing body of literature by probing the link between coopetition and the success of open innovation initiatives in Pakistani SMEs. The failure of Pakistani SMEs to establish a controlled method of coopetition has had a deleterious effect on financial performance. The current research is conducted to identify the low open innovation problem in Pakistani small and medium enterprises (SMEs), which has a negative effect on financial performance. It aims to investigate the impact of coopetition on financial performance and the mediating function of the firm's open innovation performance in it. To achieve this objective, a survey employing a cross-sectional research design was conducted. The respondents were selected from SMEs operating in the service sector in the cities of Bahawalpur, Multan, and Lodhran in Pakistan. A total of 155 questionnaires were distributed among managerial employees of the above SMEs. The data collected from the responses to the questionnaires was analyzed through Partial Least Square-Structure Equation Modeling (PLS-SEM). It was found that coopetition has a strong role in boosting financial performance. The importance of trust and dependence in crafting an effective coopetition strategy is also emphasized in this research.

**Keywords:** coopetition, dependency, financial performance, open innovation performance, trust

## **Introduction**

The phenomenon of coopetition between firms in a highly competitive environment is important to increase their financial performance.

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\* Corresponding Author: [abdulnafay107@gmail.com](mailto:abdulnafay107@gmail.com)

Coopetition is collaboration with competitors (Czakon & Klimas, [2020](#)). Pakistani SMEs are incapable of establishing a good coopetition mechanism and this impacts their financial performance negatively. The research is conducted to identify the problem of low open innovation in Pakistani SMEs which has a negative effect on their financial performance. The main objective of this research is to identify the impact of coopetition on financial performance and the mediating role of firm open innovation performance.

Coopetition is the linking of competition and cooperation in order to establish a new kind of relationship among firms (Kraus et al., [2022](#)). In today's hyper competitive world, a strategic competitiveness factor is represented by cooperation between competitors. Through cooperative interaction, coopetition delineates the planned or forceful method in which the economic actors mutually develop values (Bouncken et al., [2020](#)). According to Hameed and Naveed ([2019](#)), increases the activities of open innovation in the competitive environment coopetition is one of the main elements. To achieve success through coopetition, a high level of trust and dependency is required. According to Iqbal and Hameed ([2020](#)), in competition action, the trust factor is the real achievement between the challengers, because it's designed for different types of challenges.

Despite the extensive research addressing the topic of coopetition and Innovation, there remains a noticeable gap in the literature pertaining to defining the impact of open innovation and coopetition in service sector SMEs in Pakistan (Lee et al., [2019](#); Liu et al., [2021](#); McCarthy et al., [2018](#); Rodríguez et al., [2017](#)). However, the inability of Pakistani SMEs to establish a reliable coopetition system hinders the efficacy of open innovation. This study is conducted to identify the root causes of the issue of poor open innovation among Pakistani SMEs. Many companies are hesitant to share their innovation plans Lichtenthaler ([2009](#)), which is a major barrier to the success of open innovation. Resultantly, the overall performance of Pakistani SMEs is poor and lower than large-scale SMEs.

The current study postulates that to achieve the phenomenon of coopetition-based open innovation, trust and dependency are the necessary elements. Without these two factors, this phenomenon is not practicable. The study examines the role of coopetition to enhance open innovation and its impact on financial performance in Pakistani SMEs. Moreover, the intervening role of coopetition between firms' open innovation performance and trust and dependency are also examined.

From the problem statement, the following research objectives (RO) are drawn.

RO1: To examine the role of trust and dependency in coopetition.

RO2: To examine the role of coopetition in enhancing financial performance and open innovation performance of firms.

RO3: To examine how the firms' open innovation performance mediates the relationship between coopetition and its financial performance.

A study done in the past was very important for Pakistani high-tech small and medium-sized businesses that want to find more ways to encourage open innovation through cooperative business activities. Through properly managed coopetition-based open innovation, the latter helps to increase the efficiency and performance of firms. This study shows how to improve SME performance. It touches on a new relationship. This study is beneficial for SMEs because it adds value to their work by educating them about how they can increase their financial performance. Coopetition can be increased only by taking the factors of trust and dependency into consideration. Nalebuff and Brandenburger (1996) applied the game theory since it is helpful in providing an explanation through logical reasoning. In particular, they continuously use the word "coopetition" in their messages. Although, in many circumstances, the word 'cooperation' is preferable, while competition could be appropriate in others (Clark & Armstrong, 1997). In this study, methodological implications are drawn. Firstly, all variables are evaluated by using the PLS-SEM technique. Then the study evaluates 155 questionnaires by measuring convergent and discriminant validity, individual item reliability, average variance extracted, and composite reliability. The cross-sectional design is employed. Managerial employees of service sector SMEs operating in Bahawalpur, Multan, and Lodhran are targeted for data collection.

### Literature Review

Innovation permits companies to collaborate internally as well as externally design of firms. The plans and conditions are aimed to drive continuous innovation in accordance with its business model (Fortunato et al., 2017). Coopetition is linking competition and cooperation with the intention to establish a new kind of relationship among firms. Some previous researchers linked coopetition with open innovation ((Bouncken et al.,

[2020](#); Ritala, [2012](#); Yami & Nemeah, [2014](#)). The goal of the firms should be to reach the external source of knowledge through which innovation can be further promoted. It can be achieved by providing the tools necessary for organizational learning where the cooptation has and open innovation are positively correlated.

### **Open Innovation**

Open innovation is described as a process of distributed innovation that combines the flow of executing knowledge among organizational borders by exercising many tools (Chesbrough & Bogers, [2014](#)). The processes of inside-out and outside innovation both are the basic features of the OI approach (Natalicchio et al., [2014](#)). The model of business strengthens the cooptation of the firm and expedites internal innovation by using much instrumentation in line. Open innovation expresses that external source for achieving the portion of information also hires the external track to internally establish the commercialized source of knowledge; through this, the contemporary performance can be enhanced (Naqshbandi & Jasimuddin, [2018](#)).

### **Coopetition-based Open Innovation**

Coopetition based open innovation is an emerging phenomenon. The competitors choose the practice of cooptation that depends on trust and mutual dependency, rather than following the activities of open innovation. They should have the highest degree of dependency and trust on each other to achieve their goals in cooptation-based open innovation (Iqbal & Hameed, [2020](#)). Two techniques that combine elements of competition and collaboration can be highly beneficial to one another. Nalebuff and Brandenburger ([1996](#)) argued that a company's performance may be improved through cooptation by employing game theory.

### **Role of Trust and Dependency**

Trust and dependency play a vital role in firm performance and cooptation. In every action of cooptation, trust is the most favorable factor (Kraus et al., [2019](#)). Improvements in cooptation rely heavily on dependence performance. Dependency on others and trust in others both play important roles in open innovation. According to Uzzi ([2018](#)), trust develops a strong connection of employees with the organization, aids in handling its problems efficiently, brings about a positive and rapid change, and enhances teamwork.

## **Firm Open Innovation Performance (FOIP)**

various investigations show that various areas of organizations have open innovation and performance. Hameed et al. (2021), examines that internal and external information are the biggest components in FOIP, and one positively affects corporate OI performance (Hameed et al., 2021). If internal revolution and external knowledge are enhanced, the performance of OI increases (Brunswicker & Vanhaverbeke, 2015; Del Vecchio et al., 2020). Hence, for the development of products, open innovation takes into consideration a path of goal achievement by incorporating inputs from both internal and external sources (Bigliardi et al., 2020).

### **Hypothesis Development**

Previous researchers have highlighted the positive significant relationship between innovation activities and coopetition in many firms and organizations (Ritala, 2012). All previous researches support the argument that coopetition in innovation practices is very valuable in increasing the activities of open innovation. As discussed by many scholars (Bouncken & Fredrich, 2012; Le Roy & Czakon, 2016) Coopetition boosts incremental and dramatic innovation. So, it's hypothesized that

H1: Coopetition has a positive effect on FOIP.

H2: Coopetition has a positive effect on FP.

Coopetition is a phenomenon in which a firm uses power through many partners and the company takes information leakage (Bouncken & Fredrich, 2012). Collaboration is another major factor that promotes mutual interest and encourages people to participate. Companies create a powerful and sustainable relationship by exchanging knowledge and information with each other through the practices of fair collaboration that are based on dependency and trust (Diekola, 2016).

In every activity of coopetition, trust is of great significance (Kraus et al., 2019). Coopetition involves numerous activities that play an important role in the development of different types of competition (Devetag, 2009). Since there is a significant relationship between trust and coopetition, therefore, firm performance and open innovation performance are notably affected. Furthermore, dependency on trust is also equally important as it plays a role in coopetition achievement (Bouncken & Fredrich, 2012).

H3: Coopetition has a positive relationship with trust.

H4: Coopetition has a positive relationship with dependency.

According to Ritala (2012), in coopetition, many business partners bear the factor of risk also absence of trust with one another that reduce the value of achievement and many different activities of innovation (Nieto & Santamaria, 2009). Hence, two different dimensions of coopetition: it promotes FOIP which required reducing the chance of risk and misunderstandings, thus lowering the FOIP. The trust and dependency have a positive relationship with FOIP and this relation may encourage the performance of OI. The researcher Nestle et al. (2019) define which have a positive relation of open innovation and according to Brockman et al. (2018), suggest that in various firms' trust has direct relations with the performance of OI.

H5: There is a significant relationship between trust and FOIP.

H6: There is a significant relationship between dependency and FOIP.

H7: There is a significant relationship between FOIP and FP.

The research elucidates that there is a significant relationship between coopetition and the success of open innovation in firms. Also, there is an interrelation between trust and FOIP, coopetition and dependence, competition and trust, and FOIP and dependency. Baron and Kenny (1986) argued that the variable of coopetition could be used to bridge the gap between trust, reliance, FP, and FOIP. H8 to H13 illustrate that if companies increase coopetition and trust among their employees, they can also improve their open innovation and financial performance.

H8: Coopetition mediates the relationship between dependency and FOIP.

H9: Coopetition mediates the relationship between trust and FOIP.

H10: Coopetition mediates the relationship between trust, FOIP, and FP.

H11: Coopetition mediates the relationship between dependency, FOIP, and FP.

H12: Coopetition mediates the relationship between trust and FP.

H13: Coopetition mediates the relationship between dependency and FP.

Another mediating variable namely FOIP is used between coopetition, trust, dependency and FP. The FOIP has a positive connection with the firm’s financial performance. This is because if the firm’s open innovation performance is good and the level of trust and dependency between its employers and employees is also good, it greatly impacts its financial performance. Therefore, FOIP mediates the relationship between FP, dependency, and trust.

H14: FOIP mediates the relationship between coopetition and FP.

H15: FOIP mediates the relationship between dependency and FP.

H16: FOIP mediates the relationship between trust and FP.

**Measurement of Variables**

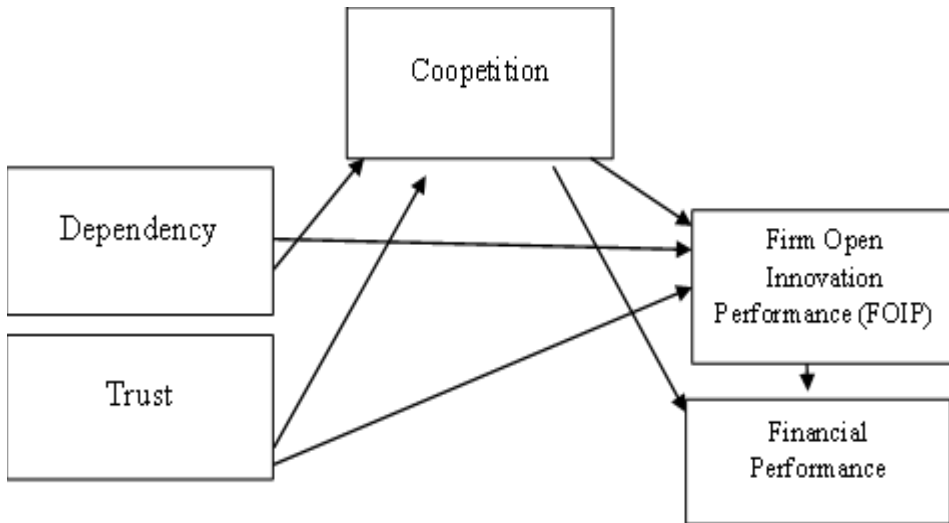
The variables are defined below according to the references and questions.

Constructs	Scale items
Coopetition (COOP)	Firms are in nearest competition between partners. Communicate with competitors to achieve a basic goal. An active competition with our competitors is beneficial to us (Bouncken & Fredrich, 2012).
Trust (TRU)	Our partner has always been equitable in its negotiations with us. Our cooperation partner is honest. Our partner’s relevance to the cooperation continues with their promises (Zaheer et al., 1998).
Dependency (DEP)	Our partner related to collaboration has a strong comparative transferable position with us. The partners related to cooperation observe minor difference those of our challengers also with our products. We must obeyed with many kind of demands of our partners (Paladino, 2009).
Firm’s Open Innovation Performance (FOIP)	New ideas are always welcomed in our union. Communication between internal and external partners takes place without any problems, which increases OI. The degree of knowledge sharing is enough to increase openness. All the partners know that knowledge is required for OI and they are able to learn from the events in this alliance (Hameed et al., 2021).



## Conceptual Framework

**Figure 1**  
*Conceptual Model*



Based on the arguments of game theory, Nalebuff and Brandenburger (1996), argue that coopetition strongly enhances the performance of an organization. This is because the firm performs many activities for the net good value of distinct shareholders, such as challengers, customers, and distributors (Bouncken & Fredrich, 2012). In business games, all companies take part in these useful networks. The firms consort with their competitors through new ideas that emerge during coopetition, which increases the performance of OI. Therefore, in the area of open innovation, they can use both competitive and collaborative relationships. According to Van den Broek et al. (2018) many companies take various types of materials from their competitive firms based on the resource dependency theory. According to Stentoft et al. (2018), competing firms draw collective resources toward innovation in coopetition.

### Research Methodology

In order to assess the connection between latent variables, the quantitative research approach is used. The researchers collected the data on participant outcomes and participant exposure using a cross-sectional research design. This research focuses on small and medium-sized enterprises (SMEs) operating in the service industry throughout Multan, Bahawalpur, and

Lodhran in Pakistan. Employees of these SMEs serve as the respondents of this study. Data was collected from the managerial staff members of these SMEs. All states will be divided up into different groups so that cluster sampling may be used. Once clusters have been chosen, data will be gathered at random from each of them.

The present study population is diverse. Cluster sampling is best for population coverage. Additionally, it is the most cost-effective method (Sekaran & Bougie, [2010](#)). The area, cluster sampling method divides all states into groups. Less than 50 participants are a weaker sample, 100 is weak, 200 is sufficient, 300 is good, 500 very good, and 1000 is exceptional. Sample sizes were 155. Over 150 surveys will be delivered to Pakistani SMEs in Bahawalpur, Multan, and Lodhran. In the current study, a 5-point Likert scale will be used to collect the data from respondents. A 5-point Likert scale increases originality and reliability by decreasing the respondent's frustration level. In this Likert scale, normally 5 categories of responses are used 5= *natural*, 4= *strongly disagree*, 3= *strongly agree*, 2 = *disagree*, and 1 = *agree*.

Smart PLS 3 was used to analyze the data for this research. However, descriptive analysis will be performed using SPSS. The Smart PLS 3 analysis will be broken down into two sections. The first step is an evaluation of the measurement scheme. The second section will involve a structural analysis. Factor loading, AVE, composite reliability, convergent validity, Cronbach's alpha, and discriminant validity will be utilized to analyze the measurement model. According to Sekaran and Bougie ([2010](#)), the acceptable value of reliability is more than 0.7. Moreover, the factor loading value is always above 0.5. Furthermore, the average variance extracted must be more than 0.5 (Fornell & Larcker, [1981](#)). Convergent validity will be assessed through internal consistency. In the second part, Smart PLS bootstrapping will be utilized to test the mediation effect. Moreover, for the mediation effect, Smart PLS bootstrapping will be used in which direct and indirect effects will be analyzed. Furthermore, effect size ( $F^2$ ) and predictive relevance ( $Q^2$ ) will be analyzed.

### **Data Analysis and Results**

First, the results of the study that was done to find out the relevance and reliability of measures are given. Second, we prepare the data and do some basic research. Descriptive data are shown for all of the latent factors. The

results can be broken down into two main groups. Section 1 defines and discuss the measurement model used to determine item reliability, convergent validity, internal consistency reliability, and discriminant validity. Section 2 details the structural model, including the definition of the coefficient route, the R-squared value, the predictive significance, and the effect size. Finally, PLS-SEM results that complement the previous results are presented. These results analyze the mediating role of businesses' open innovation success and cooperation.

## Response Rate

**Table 1**

*Questionnaires Response Rate*

Response	Frequency/Rate
Number of distributed questionnaires	450
Backed questionnaires	160
Backed and usable questionnaires	155
Backed and unusable questionnaires	5
Questionnaires not returned	290
Rate of Response	35 %

## Normality Test

Normality tests are used to ascertain whether or not a given data set has a well-modeled, computational, and underlying normal distribution. The probability by normality test was measured using a sample selected from a non-population. For the normality test of data, Skewness and Kurtosis are used. Different methods are used to check the normality of the distribution. Kolmogorov-smirov test is another way to determine the normality of data.

**Table 2**

*Data Statistics*

	Mean	Median	Min	Max	Standard Deviation	Kurtosis	Skewness
COOP1	2.017	2	1	5	0.956	0.721	1.001
COOP2	2.023	2	1	5	1.203	0.741	1.273
COOP3	1.839	2	1	5	0.914	1.214	1.19
TRU1	1.782	2	1	5	0.883	0.828	1.1
TRU2	2.069	2	1	5	1.158	1.13	1.322
TRU3	2.069	2	1	5	1.112	0.936	1.203

DEP1	1.845	2	1	5	0.949	3.283	1.698
DEP2	1.828	2	1	5	0.973	1.898	1.409
DEP3	1.994	2	1	5	0.98	1.827	1.306
FOIP1	1.977	2	1	5	1.129	1.181	1.35
FOIP2	2.138	2	1	5	1.31	0.213	1.165
FOIP3	2.023	2	1	5	1.154	0.465	1.108
FOIP4	1.943	2	1	5	1.054	0.75	1.125
FOIP5	2.011	2	1	5	1.039	1.189	1.247
FP1	1.914	2	1	5	0.982	1.337	1.277
FP2	2.075	2	1	5	1.093	0.605	1.101
FP3	1.937	2	1	5	1.089	0.709	1.204
FP4	1.977	2	1	5	1.164	1.055	1.323

### Multicollinearity Test

Multi collinearity test was utilized to measure the strength of correlation among variables. If the value of  $r > 0.9$ , then the problem of multicollinearity exists. The value of variance inflation factor (VIF) was used as the benchmark. Preferred value is approximately 5 to VIF (Hair et al., [2006](#)). The test was run with the regression model.

**Table 3**

*Variance Inflation Factors (VIF)*

Latent Constructs	VIF
COOP	1.927
DEP	2.248
FOIP	2.651
TRU	2.248
FP	1.927

All the values for VIF were below the suggested range (Hair et al., [2011](#)). So, for the current study, multicollinearity was not a major issue.

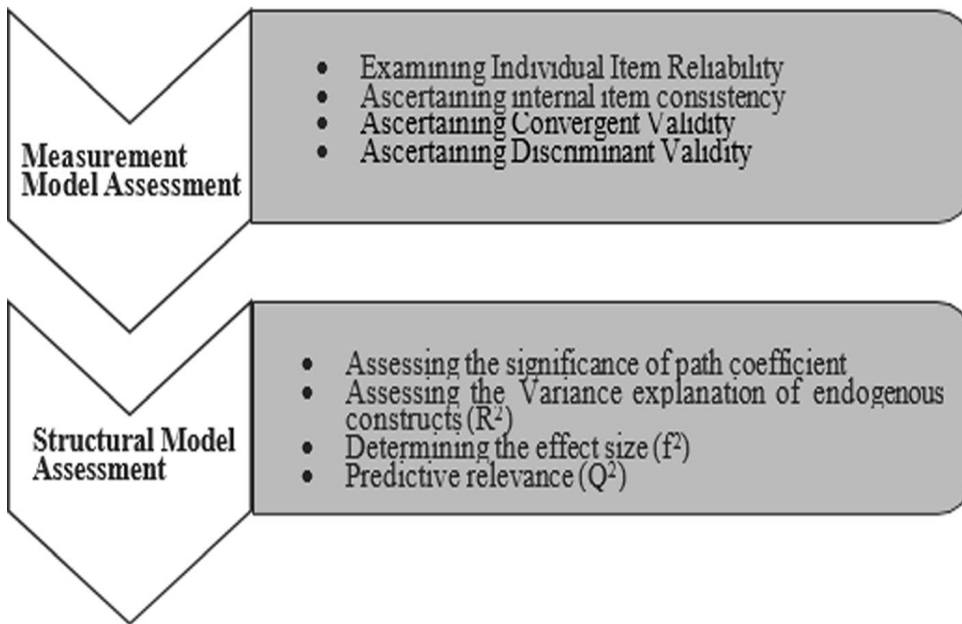
### PLS-SEM Path Model Results

The current research follows the two-stage procedure proposed by Henseler and Chin ([2014](#)) for assessing and reporting PLS-SEM findings. This is a two-stage procedure that involves evaluating the measurement model and the structural model. A two-tiered approach to evaluate the PLS

Path Models which is contingent upon the full procedure of PLS based structural equation modeling.

## Figure 2

### Model Specification



*Note.* Source: (Henseler & Chin, [2014](#))

### Assessing the Measurement Model

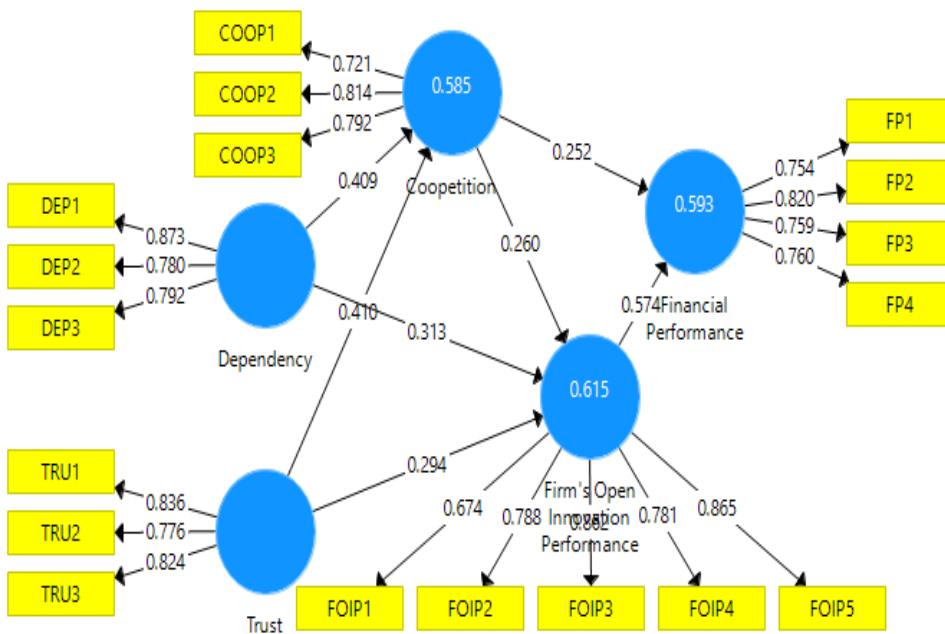
Agreeing to Henseler and Chin ([2014](#)), for assessing the measurement model, the researcher needs to 1) define internal consistency, convergent validity, content validity and discriminant validity) 2) determine individual item reliability.

### Composite Reliability, Loadings, and Average Variance Extracted (AVE)

The results depict the loading factor of all available variables of this research. According to Hair ([2014](#)), if the factor of loading items is above 0.5, then convergent validity is achieved. The current study also clarifies that the value is more than 0.5 which is described in Table 7. For each item, they determined its composite reliability, the average variance retrieved the Cronbach alpha values, and the individual values for each item (Fornell &

Larcker, 1981). The CR needs to be at least 0.70 and the AVE can't be lower than 0.50. Table 7 shows that the AVE and reliability of all the variables are more than 0.50. Cronbach's alpha was computed to examine the reliability of the data. Additionally, the guideline that specifies the value of alpha is provided by George and Marino (2011) : 0.8 is good, > 0.9 is excellent, and 0.7 is acceptable. Cronbach's alpha scores are all stated as being over 0.7, indicating that the study is very consistent.

**Figure 3**  
*Measurement Model Assessment*



**Table 4**  
*Loadings, Composite Reliability, and Average Variance Extracted (AVE)*

Construct	Indicators	Loadings	$\alpha$	CR	AVE
COOP	COOP1	0.721	0.702	0.82	0.603
	COOP2	0.814			
	COOP3	0.792			
DEP	DEP1	0.873	0.748	0.856	0.666
	DEP2	0.78			
	DEP3	0.792			

Construct	Indicators	Loadings	$\alpha$	CR	AVE
FOIP	FOIP1	0.674	0.776	0.856	0.599
	FOIP2	0.788			
	FOIP3	0.862			
	FOIP4	0.781			
	FOIP5	0.865			
FP	FP1	0.754	0.853	0.896	0.635
	FP2	0.82			
	FP3	0.759			
	FP4	0.76			
TRU	TRU1	0.836	0.742	0.853	0.66
	TRU2	0.776			
	TRU3	0.824			

According to Duarte et al. (2010), the distinction between a specific latent construct and other latent variables is known as discriminant validity. According to Fornell and Larcker (1981), the HTMT is utilized for the assessment of discriminant validity in this study.

**Table 5**

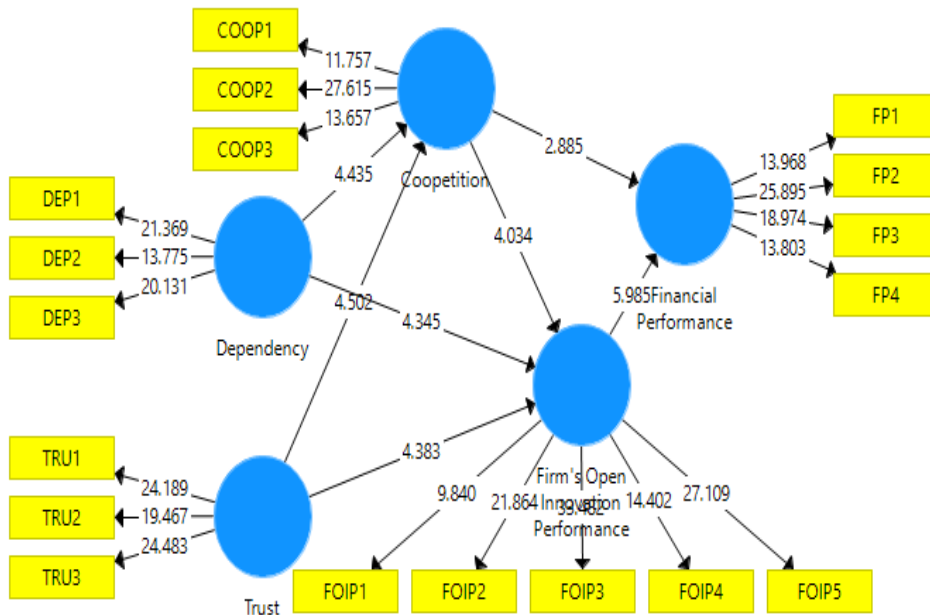
*HTMT Discriminant Validity/Fornell-Larcker Criterion*

	COOP	DEP	FP	FOIP	Trust
Coopetition					
Dependency	0.893				
Financial Performance	0.890	0.822			
FOIP	0.704	0.703	0.702		
Trust	0.697	0.695	0.643	0.637	

### Assessment of the Structural Model

The structural model was determined by using Smart PLS 3.0 after defining the measurement model. Obtaining this analysis required many processes, hypothesis testing with effect size, as well as predictive relevance and t-value of the model were measured. By examining the coefficient and 't' value the hypothesis was determined and ( $R^2$ ), ( $Q^2$ ), and ( $F^2$ ) were examined. The hypotheses with t-values greater than 1.96 were supported, whereas those with t-values less than 1.96 were not.

**Figure 4**  
*Structural Model Assessment*



**Direct Effect Results**

In the current investigation, seven hypotheses with direct relationships were examined and all were substantiated. The results reveal that all of the hypotheses are true with t-values larger than 1.96. The findings demonstrate a positive correlation between all variables. Table 4 concludes that all variables have been approved.

**Table 6**  
*Structural Model Assessment*

Relationships	Beta	M	SD	t-value	p value	Decision
H1: COOP -> FP	0.252	0.259	0.087	2.885	0.004	Accepted
H2: COOP -> FOIP	0.26	0.268	0.065	4.034	0	Accepted
H3: DEP -> COOP	0.409	0.413	0.092	4.435	0	Accepted
H4: DEP -> FOIP	0.313	0.307	0.072	4.345	0	Accepted
H5: FOIP -> FP	0.574	0.569	0.096	5.985	0	Accepted
H6: TRU -> COOP	0.41	0.414	0.091	4.502	0	Accepted
H7: TRU-> FOIP	0.294	0.291	0.067	4.383	0	Accepted



## Indirect Effects

The PLS bootstrapping technique was used to define the indirect effects for every variable. It is a non-parametric sampling technique and achieves extra adaptability due to the analyses of mediation effect, this procedure is good for a small sample (Hayes, 2009; Zhao et al., 2010). Table 5 shows trust and dependency as independent variables that have a positive relationship with FOIP and cooperation which are mediating variables. Furthermore, t value is more than 1.96.

**Table 7**

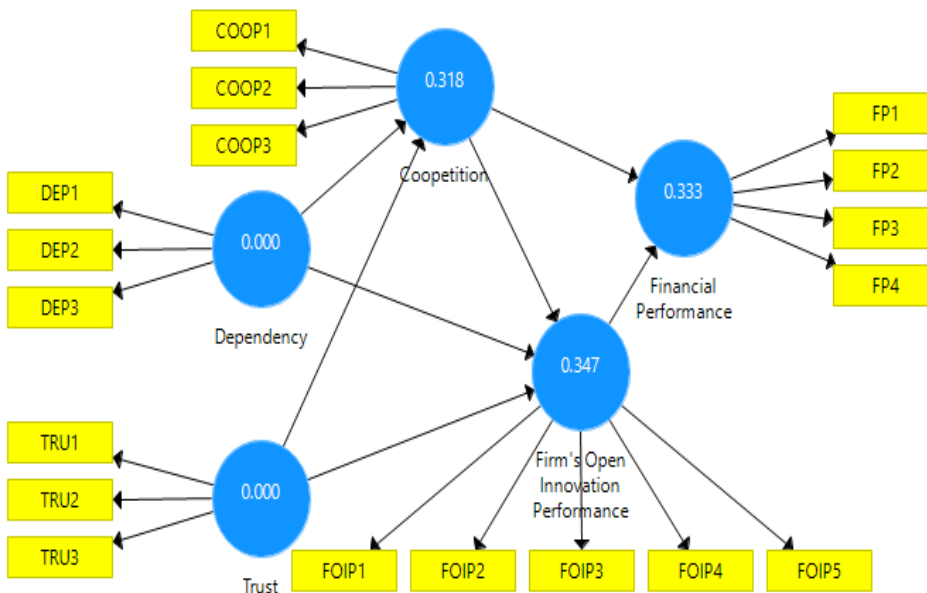
*Structural Model Assessment with Mediating Variable*

Relationships	Beta	M	SD	t Value	p- value	Decision
DEP -> COOP -> FP	0.103	0.106	0.04	2.395	0.017	Accepted
TRU -> COOP-> FP	0.103	0.108	0.05	2.211	0.027	Accepted
DEP -> COOP -> FOIP -> FP	0.061	0.064	0.03	2.211	0.024	Accepted
COOP -> FOIP -> FP	0.149	0.154	0.05	2.82	0.005	Accepted
TRU -> COOP -> FOIP -> FP	0.061	0.064	0.03	2.289	0.022	Accepted
DEP -> FOIP -> FP	0.18	0.172	0.04	4.293	0	Accepted
TRU -> FOIP-> FP	0.169	0.163	0.04	4.55	0	Accepted
DEP -> COOP ->FOIP	0.106	0.111	0.04	2.867	0.004	Accepted
TRU -> COOP -> FOIP	0.107	0.111	0.04	2.841	0.005	Accepted

## Construct Cross-Validated Redundancy ( $Q^2$ )

According to Hair (2014),  $Q^2$  uses variable measurements to quantify the model.  $Q^2$  defines model ranges for predictive relevance of internal variables and model efficacy. Table 8 forecasts the pertinence of 0.318 for COOP, 0.333 for the use of FP, and 0.347 for FOIP which ensure the model's predictive relevance, as  $Q^2$  is greater than zero.

**Figure 5**  
*Predictive Relevance ( $Q^2$ )*



**Table 8**  
*Predictive Relevance ( $Q^2$ )*

	Total	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Cooperation		522	356.092	0.318
Dependency		522	522	
Financial Performance		696	464.505	0.333
FOIP		870	568.223	0.347
Trust		522	522	

**Estimation of Variance in the Endogenous Latent Variable ( $R^2$ )**

Coefficient of determination, or  $R^2$ , has been studied extensively (Hair 2014; Henseler & Chin, 2014). According to Chin (2009), an R-squared value of 0.10 is considered satisfactory in PLS-SEM, 0.60 may be well justified, 0.33 is considered intermediate, and 0.19 is considered poor. Table 7 demonstrates that variance is 58% for cooperation, 61% for FOIP, and 59% for competition.

**Table 9**  
*Variance Explained in the Endogenous Latent Variable*

Latent Variable	Variance Explained ( $R^2$ )
COOP	58%
FOIP	61%
FP	59%

### Assessment of Effect Size ( $F^2$ )

According to Chin (2009), effect size is the variable effect on variables by the source of variations in R-square values. The calculation of impact based on the supplied formula (Callaghan et al., 2007; Hedeker et al., 2012). Table 10 shows that the effect sizes of cooperation, Dependency and Trust with FP, and FOIP are respectively.

**Table 10**  
*Effect Sizes of the Latent Variables*

R-Squared Cooperation	FP	FOIP
Cooperation	0.081	0.073
Dependency	0.179	0.096
Trust	0.18	0.084

## Discussion and Conclusion

### Recapitulation of the Key Findings

The aim of this research is to explore the vital effects of firm performance and define the mediating role of cooperation and firm open innovation performance. Moreover, the impact of trust and dependency is also determined through the mediating role of cooperation and FOIP in Pakistani SMEs.

The result of PLS path modeling proposes that trust and dependency are significantly related to cooperation and firm open innovation performance. Statistically, the result also support the relationship between cooperation, firm open innovation performance, and financial performance. Moreover, the results found that all the variables have a significant positive relationship and all hypotheses are supported.

## Comprehensive discussion on findings

The results express that coopetition is a very important factor of financial performance in Pakistan SME's. Statistical analysis proves that coopetition and FP are significantly related ( $\beta = 0.252$ ,  $t = 2.885$ ). The results support H1. It shows that coopetition and FP are highly interrelated with one another. As coopetition increases, financial performance also improves. Coopetition also has a significant relationship with innovation as argued by (Bouncken & Fredrich, [2012](#)). Coopetition moderates the firm's open innovation performance relationship ( $\beta = 0.26$ ,  $t = 4.034$ ). The relationship between FOIP and dependency ( $\beta$ -value is 0.313 and  $t$ -value is 3.345) indicates that the latter is a very beneficial factor in increasing the firm's open innovation performance. Dependency also has a significant positive relationship with coopetition ( $\beta = -0.409$ ;  $t = 4.435$ ), which shows that increasing the level of dependency directly increases the coopetition practices among Pakistani SMEs.

## Open Innovation Performance of a Firm Mediates the Relationship between its Financial Performance and Coopetition

The results showed that coopetition and FOIP mediate the relationship between trust, dependency, and financial performance ( $\beta = -0.061$ ;  $t = 2.289$ ). In the case of the second sub-objective, equal outcomes occurred. It was determined that coopetition intervenes in the relationship among trust and FP with a  $t$ -value of 2.395 and a  $\beta$ -value of 0.103. It establishes that coopetition and FOIP increase the positive impact on FP. Thus, coopetition activities and FOIP make a major contribution to FP.

## Influence of Dependency in Coopetition

Coopetition expresses that the firm in a competing market gains the competitive edge. According to the Ritala ([2012](#)), a company engaged in coopetition needs to promote the position of competitors by capitalizing on the resources of its partners'. According to the Bouncken and Fredrich ([2012](#)), dependency significantly affects the activities of coopetition among Pakistani SMEs. In a coopetition system, to enhance the method of open innovation, many competing firms depend on each other. Trust and dependency are the most important factors for the success of coopetition. The current research on PLS statistically tests those relationships. The level of dependency has a positive relationship with coopetition ( $\beta = -0.409$ ;

$t=4.435$ ) which shows that increasing the level of dependency directly increases cooptation practices among Pakistani SMEs.

### **Influence of Trust in Cooptation**

Between competitors, SMEs need a level of trust in which cooptation can work easily. In cooptation, one person trusts another and, therefore, runs the operation smoothly. To run operations without any interruption and with good communication, a high level of dependency and trust is required. The manager creates an environment of trust in a firm by promoting values, such as being truthful and encouraging, being silent time to time, imitating manners, taking responsibility, and being diligent in developing trust. In the relationship between cooptation and trust, the  $t$ -value is 4.502 and  $\beta$ -value is 0.41.

### **Mediating Effect of Cooptation in the Relationship between FP and (FOIP)**

Generally, cooptation with partners among competing firms plays a positive role in achieving firm's technological growth and increasing the capabilities of innovation (Gnyawali & Park, [2011](#)). Due of high uncertainty in markets, competitors must engage in flexible activities of collaboration to speed up the performance of open innovation (Bengtsson & Kock, [1999](#)). Further Raza-Ullah ([2017](#)), showed that the role of cooptation is significant in enhancing the performance of firms, as it has a positive relationship with the performance of the market and indicates significant results for SMEs (Kraus et al., [2022](#)). Cooptation mediates the FOIP and FP relationship ( $\beta=0.149$ ,  $t=2.82$ ). As discussed by many researchers (Bouncken & Fredrich, [2012](#); Le Roy & Czakon, [2016](#); Ritala, [2012](#)), cooptation has a positive mediating role between FOIP and financial performance (Bouncken et al., [2018](#)).

### **Conclusion**

This study is based on Pakistan's SMEs operating in the service sector. In this study, literature strongly supports the exploration of FP-related factors. This study contributes to the literature by proving that trust, dependency, cooptation, and firm open innovation performances are the key factors influencing financial performance. Firstly, it describes the character of cooptation in (FOIP) through the data collected from the surveys conducted using a cross-sectional design with the employees of SMEs in Multan, Bahawalpur, and Lodhran. Cooptation is the most

important factor that increases open innovation activities in a competitive environment. Coopetition must be placed to expedite innovation. This eventually enhances the performance of open innovation (Bengtsson & Kock, 1999). To achieve success in competition, the coopetition partners need a great level of trust and dependency. Evidence proves that trust and dependency enhance the firm's open innovation performance since they are the most important factors in acquiring success and accomplishment. Pakistani SMEs need success in coopetition by speeding up OI practices. The highest level of trust and dependency is needed by Pakistan SMEs to increase the firm's open innovation performance and financial performance.

### **Methodological Implications**

From the current study, the following methodological implications are drawn. Firstly, to evaluate the all-construct variables by using the PLM-SEM modeling in the present study. Particularly, this study evaluated the 155 sample data of questionnaires by measuring discriminant validity, average variance extracted, individual item reliability and composite reliability. Moreover, AVE was measured to make sure convergent validity for each variable. The discriminant validity determines the correlation among variables that compared with square root of AVE. So, robust approaches such as PLS modeling are used for measuring every variable to contribute methodologically.

### **Theoretical Implications**

This study attempts to fill the gap in existing literature by defining the role of coopetition based open innovation in Pakistani SMEs. Trust and dependency are two main points of this study, as these are very essential for coopetition and firm open innovation performance. Pakistan's SMEs struggle to embrace open innovation. Hence, this research gives the solution that, by starting coopetition-based open innovation, an increase in the FOIP and the financial performance of firms will be witnessed. Moreover, coopetition mediates the relationship between firm open innovation performance (FOIP) and financial performance (FP). Hence, the present study brings value to Pakistani SMEs by suggesting that they should focus on these elements to speed up the firm's open innovation performance through coopetition activities.

## Limitations

By defining the role of cooperation based open innovation in Pakistan SME's, one of the attempts of this study which filled the gap. Trust and dependency are two main components of this study and these two factors are very essential to perform the cooperation and firm open innovation performance. The Pakistan SME's are struggle to take OI, So, this research gives the solution by starting cooperation-based OI that will increased the (FOIP) also the financial performance of firm. Moreover, cooperation mediates the relationship between FOIP and FP. Hence, the present study has major positive impact for Pakistani SMEs to focus on element to speed up the Firm open innovation performance through cooperation activities. But, still has few limitations of this study which could be based on some future directions. Particularly, it is very difficult for SMEs to adopt the open innovation. Therefore, future researcher should focus on large SMEs and not small and future study must also focus on comparison of SME's with those who are working on model of close innovation and those who already adopt the open innovation. It will be good for companies to understand the benefits of open innovations. To achieve the accurate results, the longitudinal research design is more beneficial as compared to cross-sectional design. Finally, the current framework of the study is mixed with the SMEs those working with cooperation activities and those do not work with cooperation activities. Results may different if one type of SMEs will be selected. Therefore, future research should be on cooperation-based SMEs or without cooperation-based SMEs.

## Recommendations

To increase the performance of open innovation, it is recommended that Pakistani SMEs should concentrate on cooperation. Moreover, to increase their overall performance, it is necessary for SMEs to establish a good and well-managed cooperation mechanism and develop good relation with their challengers. Finally, by studying human characteristics like communication to establish a good platform for cooperation with competitors. Using human capabilities as a moderate variable. various academics can analyze the performance of various firms before and after cooperation to get a solid idea of its impact on open innovation.

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