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The Effect of Product Innovation and Technology orientation on the Firm Performance. Evidence from the manufacturing Small and Medium Enterprises of Pakistan.

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ABSTRACT

Product innovation (PDI) and technology orientation (TO) are well-known dynamic capabilities. Such capabilities aid the firms to cater the customer demand and sustainable growth. Moreover, the performance of manufacturing SMEs in Pakistan yet to receive adequate empirical attention. The theoretical framework for this study is deduce from the dynamic capability view theory. However, current empirical study investigates the relationship between product innovation, technology orientation, and firm performance. The data was collected from 381 manufacturing SMEs of Punjab, Pakistan, and analyzed using PLS-SEM 3.0. The finding of this empirical study suggests that product innovation and technology orientation have positive influence on a firm's performance.

KEYWORDS

Product innovation, Technology orientation, firm's performance, Manufacturing SMEs.

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1.0 INTRODUCTION

In the contemporary era of a globalized and dynamic business environment, the most relevant and successful firms are motivated by product innovation (Atiase & Dzansi, 2020; Fossas-Olalla et al., 2015). PDI significantly attracts new customers for the firm's growth (Wadho & Chaudhry, 2018). The current dynamic environment influences the firms to develop new products or alter current products according to the customers' expectations or needs (Adner & Levinthal, 2001). Moreover, to compete in the market, firms need PDI for sustainable growth and to achieve a competitive advantage (Tariq et al., 2021). When introducing a new product in the market, the firm faces no competition and brings high profits (Roberts, 1999). PDI gives a competitive advantage to the firm and enhances its ability to compete with other firms in the market (Younas & Rehman, 2020). Many authors emphasize that PDI can improve firm performance and provide it a sustainable competitive advantage for the long run (Atiase & Dzansi, 2020; Polder et al., 2010; Wadho & Chaudhry, 2018; Younas & Rehman, 2020).

Moreover, technology orientation has a positive impact on product innovation (Gatignon & Xuereb, 1997), as new technologies open new horizons for innovative products. Similarly, TO leads a firm towards technology infrastructure and encourages product innovation (Gatignon & Xuereb, 1997; Rezazadeh et al., 2016). Unlike the customer-pull philosophy of market orientation, a TO imitates the philosophy of "technological push," which showed that firms prefer technologically superior products (Wind & Mahajan, 1997). TO can develop technological opportunism in the new product generation through PDI (Aminu & Mohd Shariff, 2014; Srinivasan et al., 2002). Therefore, a TO organization always persists in the management concept of "technology is the backbone," and creativity and invention are the organizational norms that guide the strategies activities and product development activities (Lei et al., 2019; Urban & Heydenrych, 2015).

A good technology infrastructure consists of; research and development (R & D), which leads to new product ideas and innovation by enabling the organizations to access technological opportunities (Gatignon & Xuereb, 1997). The TO interacts with the help of invention to affect the business performance in small and medium-sized enterprises (SMEs) (Al-Ansari et al., 2013), and technologically-oriented firms spend their resources for getting new, advanced technologies and to develop a new process, products as well as services (Gao et al., 2007). The firms that change their technology rapidly can also introduce new techniques, services, and products to satisfy customer needs, and this high technology orientation increases the performance of these firms (Hamel & Prahalad, 1996). Therefore, technological innovation has

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a positive influence on SME performance. According to (Rajala & Westerlund, 2012), successful SMEs generally innovate new things by adopting different technologies to gain a competitive advantage.

Moreover, the SME sector's contribution is quite significant in the economy of many countries, especially in terms of gross domestic product and employment. For instance, SMEs contribute significantly to the UK and Thailand's GDP, with 49.8% (2018) and 43.0% (2019), respectively. Similarly, SMEs also consumed 81.6% workforce of the UK (2018), and in Thailand (2019), they generated 85.47% of employment (Kitchot et al., 2020).

According to Khan (2015), the total number of businesses is about 3.2 million, out of which 3 million are SMEs. In Pakistan, the SME sector has created 90% of the economic establishments and employing more than 80% of the non-agricultural labor force (Dasanayaka, 2011; Hafeez et al., 2012; M. W. J. Khan & Khalique, 2014). According to a report named "SME Observer", published by the Small and Medium Enterprises Development Authority (SMEDA, 2016) of Pakistan, the SMEs sector contributes around PKR 9.4 trillion in is approximately 40% of the GDP.

Even though the SMEs sector's significant contribution has been observed in the previous studies (Berry et al., 1998; Ikram et al., 2019; Kureshi et al., 2009), still the performance of the SMEs sector is undermined due to several barriers (Haider et al., 2017; Haroon Hafeez et al., 2012; Imran et al., 2018). Several studies have been conducted to probe this problem. But still, Pakistan's SME sector needs improvement. This study proposes to investigate the relationship between PDI, TO and SME's performance.

In the next section, the author will explore the literature regarding the theoretical background of the study. Furthermore, hypotheses development and research methodology highlighted the research objective. The last section of this paper reports its findings and implications.

2.0 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Teece et al. (1997a) extended the Resource-Based View (RBV) by formulating a dynamic capabilities perspective. This extended Resource-Based View highlights the importance of those firms' processes that employ the firm's resources. The dynamic capabilities concept focuses on methods through which firms can integrate, gain, reconfiguring, or release resources and capabilities to produce a firm's superior performance in reply to a dynamic environment. However, it is not concerned with this dynamism's origins (Strauss et al., 2017). Eisenhardt

DOI: http://doi.org/10.48165/sajssh.2021.2213

and Martin (2000) further outline the interaction between the firm's capabilities and another external environment.

The Dynamic Capability View theory is deep-rooted and grounded in the Schumpeterian perspective. Schumpeter (1961) argued in his study, namely "Economic theory of development," how to achieve optimal performance through resources and highlighted innovation as one of the vital elements to achieve it. The author further described that an entrepreneur was a person who demolished the current economic order by introducing different new products and services by developing new organizational forms or exploiting a new type of raw materials. Within the context of SMEs, innovation refers to seeking different unique ways of doing business and looking for the introduction of new differentiated products to grasp the marketing and economic benefits such as to gain market share and achieve higher profits and sustainable competitive advantage (Schumpeter, 1961). However, PDI and TO are recognized as dynamic capabilities that integrate with firm resources to enhance firms' competitiveness and performance.

2.1 Product Innovation and SMEs performance

PDI has regarded as one of the most critical drivers of value formation in the literature of management. Schumpeter (1961) explained the innovation in two aspects: radical innovation and transnormal innovation. Firms need competitive advantage to compete in the saturated market and PDI is one of the best tools to achieve it. Scholars have spent time and effort since Schumpeter's contribution to understanding better how businesses acquire and improve technical skills and fine-tune innovation processes to produce new goods of the most significant value.

According to (Polder et al., 2010), PDI presents significant improvements in the existing products or develop entirely new products according to customer's demand. They (2010) also argued that firms used PDI to generate efficiency. The main characteristic of the PDI is; the customers should acknowledge the new product as the new product (Atuahene-Gima & Ko, 2001). The product must have unique properties concerning the firm, and product modification must represent the significant variation in the firm's existing product. The main goal of the PDI is to attract new customers by introducing new products and satisfy current customers by modifying existing products according to the needs of customers. Moreover, according to Oslo Manual (OECD, 2005), a PDI is "introducing a good or service that is new or significantly improved concerning its characteristics or intended uses. It also includes significant

DOI: http://doi.org/10.48165/sajssh.2021.2213

improvements in technical specifications, components, and materials, incorporated software, user-friendliness or other functional characteristics."

In the previous studies, researchers found that PDI is one of the determinates of firm performance (Dunk, 2011). Moreover, it has been observed in the literature that many scholars verified this theoretical proposition (Atalay et al., 2013; Dunk, 2011; Eggert et al., 2011; Gunday et al., 2011; Hanif & Manarvi, 2009; Hassan et al., 2013; Karabulut, 2015; Laitinen et al., 2016; Subhan et al., 2013; Tajeddini, 2016; Teece, 2007). However, different authors used multiple measurement models to assess the relationship between PDI and firm's performance. Consequently, it's pretty difficult to generalize the outcomes of these studies. Therefore, this study proposed to test the following proposition in the context of DCV by (Teece et al., 1997b).

H1: there is a positive relationship between PDI and SMEs performance.

2.2 Technology orientation and SMEs performance

Technology orientation is defined as "the ability and the will to acquire a substantial technological background and use it in the development of new products" (Gatignon and Xuereb 1997). The firms with a strong TO level are more likely to be R & R&D-oriented and adopt sophisticated technology to develop a new product (Gatignon and Xuereb 1997). TO allows the firm a sense of openness for new ideas and tendency to accept different new technologies (Zhou & Li, 2010). It represents "a firm's proactivity in developing new technologies and generating new ideas and its use of sophisticated technologies in new product development." (Li, 2005).

Technology itself has no single objective value and economic value, and it remains latent until firms commercialize the technology in some way through their business model (Chesbrough, 2010). According to the TO literature, technology orientation can be measured differently (Chen et al., 2014). Such as developing new technologies or registered patents (García-Valderrama & Mulero-Mendigorri, 2005), up-gradation of new technologies (Schmidt & Rammer, 2006), extensive adaptation policy (Sharma & Sharma, 2014), and development of new technologies through reconfiguring existing resources.

However, Odondo et al., (2016) argued that technology orientation plays a significant role in the performance of firms, especially SME's. Rajala & Westerlund (2012), also conclude that for SMEs technology always a critical variable for growth and competitive advantage. According to (Rajala & Westerlund, 2012), successful SMEs generally innovates new things by adopting different technologies to gain a competitive advantage.

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H2: There is a positive relationship between TO and SMEs performance.

2.3 SMEs Performance

In the literature performance is characterized by using different aspect of performance like growth, profitability, and sustainability. Many researchers identified two major aspects to measure the performance of any firm: financial and non-financial aspects. According to Gill (1985), SMEs demonstrated their ability to perform by exploiting emerging and existing opportunities. Firms' performance is generally linked with efficient utilization of firm's resources and capabilities. The performance of firm witness through financial indicators like return on equity, profitability, high revenue, exports of goods and services etc. however on the other hand performance also measured through non-financial aspects like increase in number of branches, increased number of customers, product development, create new markets, number of employees, etc.

However, literature suggest that performance should be measured through both aspects of the firm. Financial and non-financial indicators are representing the true picture of the firm's performance. To conclude, SME's performance to this study can be defined in terms of both financial and non-financial.

3.0 Conceptual framework

This study proposed the following conceptual framework, based on the above-mentioned underpinning theory and holistic literature.

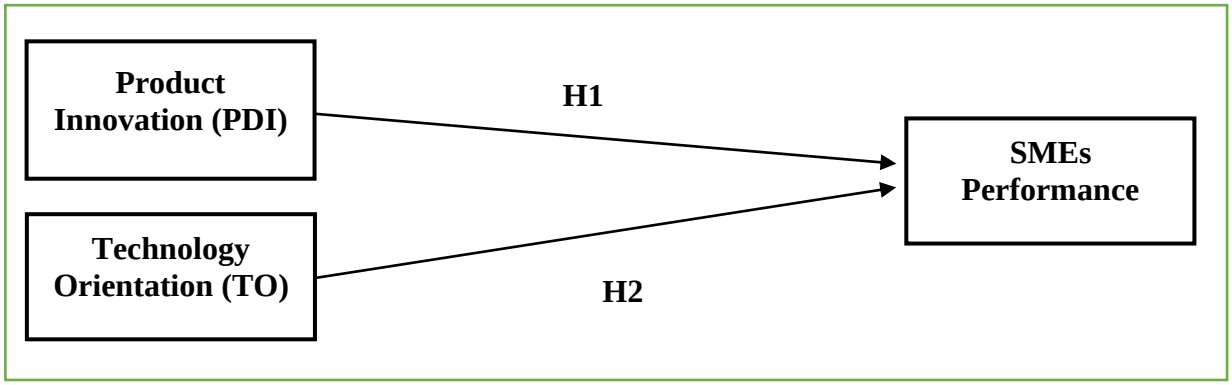

Figure 1: Conceptual framework of the study

4.0 RESEARCH METHODOLOGY

This study adopted the questionnaire approach to collect data from the manufacturing SMEs of Pakistan. The main constructs of this study are PDI, TO, and firm performance. Each construct items are modified and developed based on a holistic literature review. Moreover, all

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items in the questionnaire were validated by field practitioners and academic researchers. The questionnaire was developed in the English language and translated into Urdu. However, it was translated back from Urdu to English to ensure the equivalence of its authentic meaning. This study adopts a seven-point Likert scale for the questionnaire to measure all three constructs. For PDI, TO and Firm performance the scale consists of 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree.

This research was focused on "manufacturing SMEs of Punjab, Pakistan." The data was collected from the Punjab province of Pakistan because 60% of manufacturing SMEs are established in Punjab. To select the appropriate sample size for this study, the authors used Krejcie and Morgan table (Uma Sekaran & Bougie, 2003; U Sekaran & Bougie, 2010).

The data used for this study were collected from the owners/managers of the SMEs belonging to the Pakistani manufacturing industry. A total of 432 questionnaires were received, out of 570 questionnaires distributed. It makes the 75% response rate; out of 432 questionnaires obtained, only 381 questionnaires were used for further analysis because 51 questionnaires were found uncompleted and ineligible for further study. The collected data showed that there were 176 (46%) sole proprietors, 163 (42%) partnerships, and 42 (11%) limited liability firms that participated in the survey.

4.1 MEASUREMENT

The firm performance instrument, which is initially developed by Tseng and Lee (2012), was adapted in this study. This scale comprised 16 items to measure the dimension of firm's performance like financial (4-items) and Non-financial (12- items). Similarly, PDI instrument was adapted from Gunday et al. (2011). Moreover, the measurement of technology orientation (TO), the study adapted 11 items scale from Aminu (2014). The scale with a seven-point Likert scale, ranging from (strongly disagree=1 to strongly agree=7) was used to collect the data for all variables.

5.1 MEASUREMENT MODEL ANALYSIS

To evaluate the measurement model as recommended by Joseph F Hair et al. (2013), we used the factor loadings, average variance extracted (AVE), and composite reliability (CR) to assess convergent validity. The recommended value for AVE and factor loading should be 0.5, and for CR value should be 0.7. Figure 2 shows that FP is conceptualized as a second-order construct. PLS literature suggested that the repeated indicator approach was used to model the

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second-order factor in PLS analysis. Table 1 and figure 2 show the measurement model's findings, which are supported the threshold values and indicate that the convergent validity of all constructs has been established.

Table 1: Loadings, Composite Reliability and Average Variance Extracted

First-Order Constructs	Second-order constructs	Items	Loadings	CA	CR	AVE
Financial		SMEP_3	0.905	0.808	0.912	0.838
		SMEP_4	0.927			
Non-Financial		SMEP_10	0.845	0.944	0.952	0.670
		SMEP_11	0.813			
		SMEP_12	0.873			
		SMEP_13	0.706			
		SMEP_14	0.730			
		SMEP_5	0.795			
		SMEP_6	0.864			
		SMEP_7	0.850			
		SMEP_8	0.835			
		SMEP_9	0.857			
	Firm Performance	FINANCIAL	0.802	0.947	0.895	0.811
		NON	0.990			
Product Innovation		PDI_1	0.679	0.704	0.817	0.529
		PDI_2	0.688			
		PDI_3	0.749			
		PDI_4	0.786			
Technology Orientation		TEC_1	0.781	0.935	0.944	0.622
		TEC_10	0.723			
		TEC_11	0.777			
		TEC_2	0.777			
		TEC_3	0.808			
		TEC_4	0.714			
		TEC_5	0.811			
		TEC_6	0.723			
		TEC_7	0.813			
		TEC_8	0.819			
		TEC_9	0.832			

Note: PDI = Product Innovation, SMEP = Firm Performance, TO = Technology Orientation, CA = Cronbach's Alpha, CR = Composite Reliability, AVE = Average Varieance Extracted.

In further, table 2 shows the result of discriminant validity by using (HTMT). As recommended by Henseler et al. (2015), the HTMT values should be less than 0.9 to assess the discriminant validity. The findings revealed that all the values of the HTMT ratio are less than 0.9, showing discriminant validity is established.

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Table 2: Heterotrait Monotrait (HTMT)

Constructs	PDI	SMEP	TO
PDI			
SMEP	0.3805		
TO	0.7667	0.3292	

Note: PDI = Product Innovation, SMEP = Firm Performance, TO = Technology Orientation

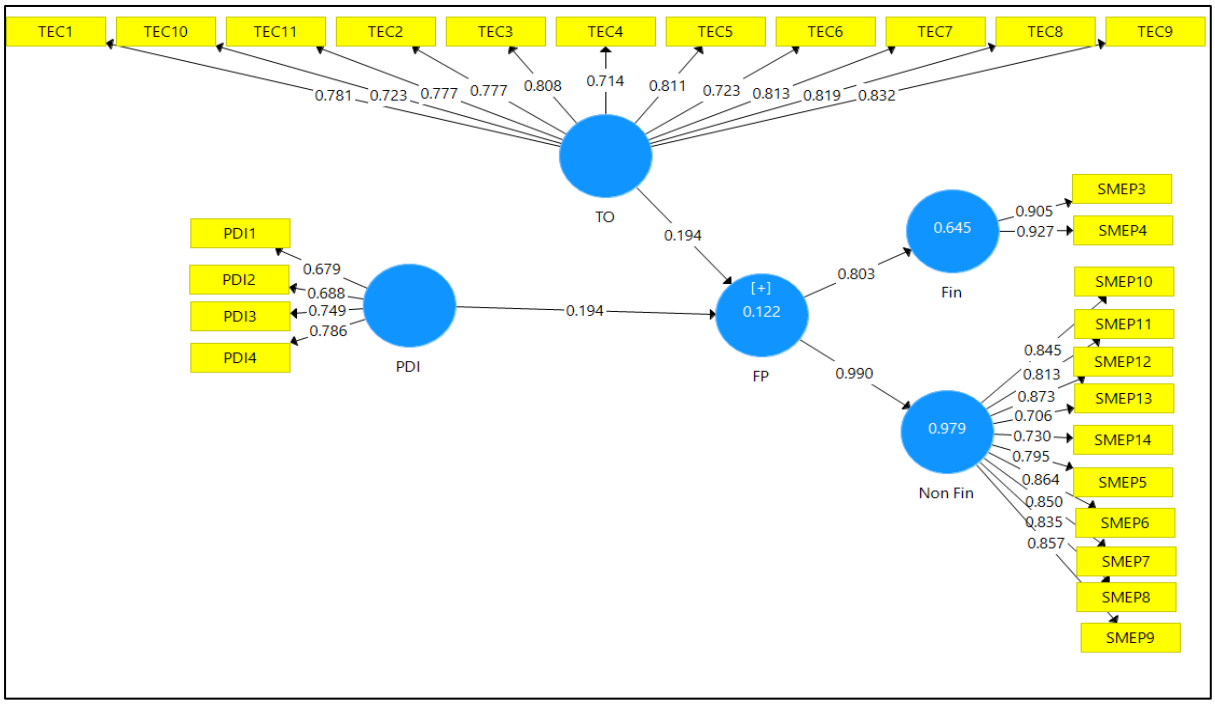

Figure 2: The PLS Algorithm Results

5.2 Structure Equation Modelling and Moderation (SEM)

To assess the structural model predicted power, we calculate the R-square; the R^2 indicates the values of variance explained by the exogenous latent construct (Hair et al., 2013), all variables together explained (12.2%) of the variance. In this study, performing the standard bootstrapping procedure with 3,000 bootstrap samples and 381 cases applied for path coefficients estimates and *t*-values were calculated for the hypothesized relationships (Hair et al., 2017). In addition, the effect size of all variables is mentioned in table 3, and this study also applied a test to examine the predictive relevance for this research by using the blindfolding technique (Hair Jr et al., 2017).As Hair Jr et al. (2017) suggested, table 3 shows that the Q^2 value of this research model is greater than zero. The findings also revealed no multicollinearity issue regarding data as VIF value is less than five as recommended by (Joe F Hair et al., 2012).

DOI: http://doi.org/10.48165/sajssh.2021.2213

Table 3: Hypothesis Testing

Hypotheses	Relationship	Beta value	Std. Error	T-value	p value	Decision	R^2	F^2	Q^2	VIF
H1	PDI-> SMEP	0.189	0.059	3.206	0.001	Supported	0.122	0.025	0.074	1.632
H2	TO-> SMEP	0.202	0.055	3.652	0.000	Supported		0.029		1.632

Note: PDI = Product Innovation, SMEP = Firm Performance, TO = Technology Orientation

The table 3 and figure 3 shows result of structural model, it was found that PDI has significant positive relationship with SMEP (PDI -> SMEP: $\beta = 0.189$; $t = 3.206$, $P < 0.001$) and supported to H1. Contrary, TO has significant positive relationship with SMEP (TO-> SMEP: $\beta = 0.202$, $t = 3.652$, $P < 0.000$) and supported to H2.

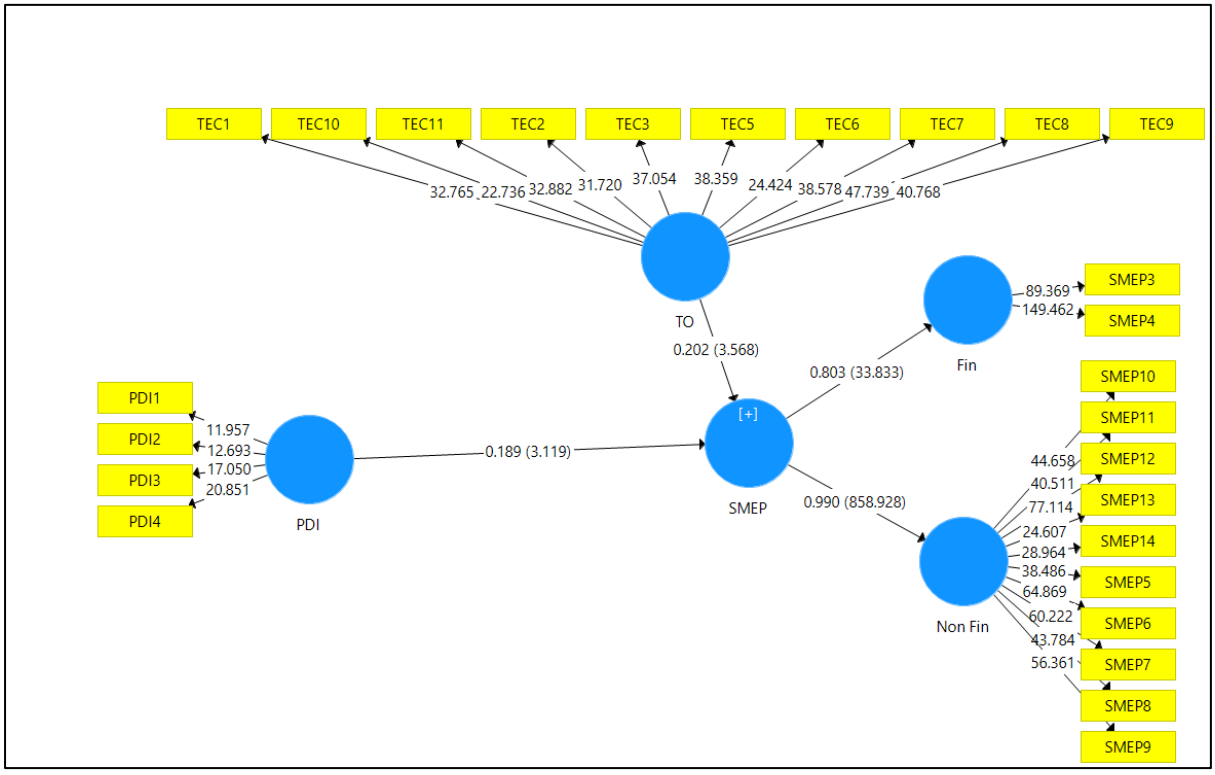

Figure 3: Structural Equation Modelling (SEM)

6.0 DISCUSSION AND CONCLUSION

This study aimed to identify the role of product innovation and technology orientation in the development of SME's performance among manufacturing SMEs in Punjab, Pakistan. Previously, the scarcity of studies examined minor deviance in the context of this study. Also, this issue becomes a neglected section of the Pakistani industry (Hafeez et al., 2013; Tariq et al., 2021). The prior studies were focused on different aspects of performance (Tariq et al., 2021), to address this issue suggested that empirical deviance needed to be studied in the

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context of the present research, especially on manufacturing SME's of Pakistan with the combined effect of product innovation, technology orientation and SME's performance.

The findings of this study show that product innovation had a significant positive effect on firm's performance with $\beta = 0.189$; $t = 3.206$, $P < 0.001$ and supported H1, the finding of hypothesis 1 (H1) aligned with prior to recent studies of (Gunday et al., 2011; Gupta, 2021; Shaukat et al., 2013; Younas & Rehman, 2020). The results of these studies revealed that positive product innovation plays a significant role to developed and sustain the SME's. On the other hand, technology orientation is also positively associated with SME's performance with ($\beta = 0.202$, $t = 3.652$, $P < 0.000$) and supported to hypothesis 2 (H2). The findings of hypothesis 2(H2) aligned with previous studies (Aminu & Mohd Shariff, 2014; Do Hyung & Dedahanov, 2014).

The dynamic capability theory (DCV) argued that firm performance is directly linked to firm's internal and external capabilities. This study empirically tests DCV phenomena, and the results of H1 and H2 provide the evidence. In the light of DCV theory, this study will contribute to the literature of management. However, the study revealed that product innovation and technology orientation have a significant positive relationship with SME's performance. Moreover, the implication of this study is critically important for manufacturing industry, government policymakers, researchers and data scientist. For further research, it is suggested that future studies should focus on the moderating effect of technology orientation and organizational learning behavior. Moreover, the literature also offered many other critical variables for SME's performance like process innovation, intellectual capital, and market orientation.

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