

Network Embeddedness and Innovation Performance of Small and Medium Enterprises: Mediating Role of Absorptive Capacity

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Abstract

Aim of this study is to identify the effect of network embeddedness on innovative performance of small and medium enterprise (SME) firms. Further, this research also seeks the mediating role of absorptive capacity of SME firms based upon a resource-based view and social network theory. Data is analyzed by applying multiple linear regression and structural equation modeling using SPSS and AMOS respectively. Findings of this study reveal that network embeddedness and innovation performance are positively related and absorptive capacity fully mediates between network embeddedness and innovation performance. This study explains how and when network embeddedness positively influences innovation performance for developing new products and creating new technologies for competing with other players of SME firms based upon the theoretical concept of social network theory and resource-based view.

Keywords: Structural embeddedness, network embeddedness, relative embeddedness, absorptive capacity, SMEs, innovative performance.

1. Introduction

Small enterprise firms bring significant contributions to the economy of a country through imports, exports, employment generation and innovation (Tian, Iqbal, Anwar, Akhtar, Khan & Wang 2021). In this era of knowledge-based society, competitiveness of SMEs depends largely upon developing networks and innovation performance of SME firms. The process of innovation may exist in various forms including product, process, service and

business model innovation among others. Resultantly key measurements and influencing factors of innovation are considered to be as important issues (Hsueh, Lin & Li 2010). China has globally made high growth and achievements as an innovation-based economy, while other countries have observed decline in the expenditure on their planning and R&D in 2015.

In the past, there is an increasing interest in the literature on social networks of organizations and enterprise firms. Polanyi (1994) explained the concept of embeddedness “the developed or modified firms’ structure and relationships along with other related firms” by explaining how a firm is concerned with maintaining relationship across the firms (Inkpen & Tsang, 2005). Literature of network embeddedness consists of four components that are commonly explained as structural embeddedness, cognitive embeddedness, informational embeddedness and relative embeddedness that affects the innovative performance of the firm.

Various public sector organizations have adopted new ways of bringing innovation in their products and process for enhancing the quality of service provided to the users of the product and improving their performance (Pihl-Thingvad & Klausen, 2016). Processes of innovation require enterprises to develop a network with others to acquire knowledge of technologies, customers, suppliers and markets. Such enablers of knowledge require a firm to create a broader pool of information and knowledge. Described in another way enterprises equipped and embedded with networks of knowledge permit companies and firms to exchange and diffusion of knowledge to enhance their commercial and technological advantages (Collins & Hitt, 2006). Aas (2016) argued that innovation has some severe challenges and obstacles in public sector organizations due to monopolies within the organization and lacking competition to innovate. Highly rigid, complex, less collaborative and bureaucratic structures by central agencies for considering red tape are further barriers to the innovation of employees and organizations.

Network embeddedness has been largely in use in the area of strategic human resource management and in the literature of disruptive innovation. Increasing competition in the small and medium enterprises has also intensified competition within the firms on exploring ways to enhance their capacities for innovation. Hence, innovation is regarded to be an engine of progress, competitiveness and economic development. Networks are aligned and can be found in social capital theory and regarded to be as social phenomena where enterprises and entities are related to each other on specific conditions which postulate interdependence and interaction such as exchange of knowledge, kingships, friendship and so on (Carpenter, Li & Jiang 2012). With the recent advent of the knowledge based-economy and enterprises have started to rely more and more upon the innovation and development of other organizations and enterprises. Organizations and SME firms can promote their innovative behavior by developing innovative networks with other groups, departments and organizations for new product development (NPD) to share knowledge and inspire organizational learning within the firms (Yongping, Yanzheng & Haomiao 2011).

Empirical research has suggested that network embeddedness influences the innovation of firms. Even in the clutter with geographical proximities, innovation performances of users associated with channels of network structure are the key contributors. Networks and structures of network embeddedness can be considered as key contributors (Gebreyesus & Mohnen 2013). According to Beaver (2002) walls of innovation via network, and structure plays a significant role to instill economic progress and competition among firms. Innovation is also regarded as an important approach for securing competitive advantage, exploiting and searching for new opportunities and improving the productivity of an organization. In addition, O'Toole (1997) suggested the adoption of innovative practices includes the generation of new ideas, objects or practices. Innovation has generally covered a great number of concepts included as new structures of organizations, new processes in adopting technology, changes in the rate of technology, offering of new product and services, and implement new programs and plans for the employees of organizations.

Moreover, network embeddedness seems to be related to open innovation. Openness helps to enrich firm's pool of knowledge and helps to create a strong contingent effect between the embedded networks and innovative performance of small and medium enterprise firms. Networks also seem to be important for securing a competitive advantage over other firms which can be considered a resource of important information. We can empirically and theoretically explain that resources aligned with network partners or embedded in inter-firm ties greatly contribute to innovation (Zheng, Li & Wu 2013). This study reflects the managerial implications for the top managers of small and medium enterprise firms that are based in the federal capital of Islamabad, Rawalpindi and Faisalabad. As SMEs deal in industry alliances and collaboration, they can draw upon an innovative set of information developed by the network to increase innovative activities.

A recent study by Dogbe et al., (2020) explored the effect of network embeddedness and innovative performance for SMEs by using social network theory (SNT) and resource-based view (RBV) that further relied upon and directed to carry out further research that can pay attention on absorptive capacity, organizational learning, innovation openness and mechanism of knowledge transfer. In addition to this firm absorptive capacity has paramount importance for network embeddedness and innovative performance of the firms. Absorptive capacity is important for firm competencies for collecting, transforming, diffusing and exploiting new external knowledge (Noblet et al., 2015); Teece 2012).

Absorptive capacity relates to learning processes, accumulation of skills and transfer of knowledge. Such processes help to strengthen and explore external and internal sources of information, increasing the rate of growth and innovation of the firm, responding to market changes (Cohen, & Levinthal 1990). We can, therefore, ascertain that absorptive capacity that is related to openness relating to the source of formal training and external information constitutes key success factors for commercializing innovation (Lewandowska, 2015). Hence, to address the above research gap, this study aims to fulfill and throws more light on an important unfilled research gap by assessing the mediating role of absorptive capability between components of network embeddedness to impact disruptive innovative

performance for small-medium enterprise firms that originally signifies stronger relationship, as in the past researches cognitive embeddedness of SME's were not critically assessed at various levels.

This study contributes to the body of knowledge by deepening the direct relationship between network embeddedness and innovation performance of small and medium enterprise firms. Studies on innovation performance deepen the importance of IT capability and the role of small and medium-sized enterprises. SMEs consider seeking information from external networks as a means of getting access to important information related to marketing and sales at varying stages of innovation (Xiaobao, Wei & Yuzhen 2013). Mazola et al., (2015) aim to explore the effect of network embeddedness on new product development (NPD) and explored the increasing effect on NPD through structural holes and centrality. Moreover, SME's must engage in industry collaboration and alliance from the available networks of innovation and develop effective organizational structure such as collaboration and openness to trust and so on for innovative transfer of knowledge and transformation.

2. Literature Review and Hypotheses Development

2.1 Network Embeddedness and Innovative Performance

Scholars have recently found that innovation transfers through the inter-organization networks is more productive than remaining exclusively in individual firms (Zheng, Li & Wu 2013). Network embeddedness is regarded to be a critical strength and characteristic of the internal processes, methods and structure of an organization and networks. Network embeddedness can be classified into four major types of networks; namely cognitive, structural, informational and relational networks. Relational embeddedness is defined as interdependence and social exchange relationship of resources, combinations and trust among members of actors. Information embeddedness is described as the extent to which users of a community and members of a network share fine-grained information among the actors and members of the firm (Wu & Liu, 2009).

Structural embeddedness emphasizes the structural characteristics of network members embedded in the network and depicts likely future interactions among participants. Moreover, cognitive embeddedness focuses on the shared representation norms, values, faith, goals, and experiences of the members of networks (Le Breton-Miller & Miller 2009). The traditional view of innovation arises from the argument of Schumpeterian arguments, where it has been asserted that large firms are more innovative as compared to small and medium sized corporations as large corporations also invest heavily in R & D and manufacturing of the firms thereby, they have a higher capacity as compared to small counterparts (Shefer & Frenkel, 2005).

This study also reveals that secure connections of social networks with an informal exchange of information promotes extensive and exploratory innovation. Moreover, dense networks with secure connections significantly increase the exploitative innovation (Tian, Iqbal, Anwar, Akhtar, Khan & Wang 2021). In recent times, various academicians and practitioners have introduced the concept of incremental innovation as the bases for organization innovation success. Incremental innovation aims to bring continuous

improvement to the existing innovation and technology in terms of their designs, features, functions and performance for meeting the requirements of customers. Incremental innovation at the organizational level can be used to secure an advantage over rivals that serve as a shock absorber that allows firms to adjust in response to bring change in an external environment (Shi, Lu, Zhang & Zhang 2020). Different network constructions lead to different consequences and innovative performance of the firm. Enterprises must build strong network ties among other organizations so that they can get the resources as it helps to increase the implicit and explicit knowledge, encourage innovation, service performance and service innovation of the firms that can enhance the innovative performance of the organizations (Zhaoquan, Zhuoshen & Rong 2011). Hence, based on all the aforementioned discussion, the following hypothesis can be conceptualized.

H₁: Network embeddedness is positively related to innovative performance.

2.2 Network Embeddedness and Absorptive Capacity

Networks consist of a set of nodes that are linked by a social relationship of specified types. The concept of the network can understand as two or more enterprises or organizations in a mutual long-term relationship with each other. Users of network could be individuals or collective group members of social units who are linked together by social ties (Binder, 2020). Accordingly, integrated networks that are embedded with the structure of the organization are developed by individual business organizations which are known as actors who are linked with each other through ties of relations known as links. This relationship involves the exchange of resources that can be classified into various categories such as membership, benefit, intensity or quality, and organizational configuration (Morrison, Lynch & Johns 2004).

Moreover, the absorptive capacity of an enterprise can be considered as a dynamic capability that is related to the creation of knowledge and its utilization that can increase the ability of firms for sustaining and securing competitive advantage along with the utilization of core competencies. Absorptive capacity can be defined as a knowledge-based resource that allows the firm to explore, identify and acquiring of external knowledge. The absorptive resource of knowledge describes the knowledge base of a firm that gives them the ability to understand, assimilate, combine and transform the acquired knowledge through various channels. The process of absorptive capacity of a firm provides the ability for the diffusion of knowledge throughout the firm (Harris, Krenz & Moffat 2021).

The absorptive capacity of a firm comprises of four components, which can be explained as ability to acquire external knowledge of firms, assimilate external source of knowledge, transform external knowledge of firm and exploitation capability to apply external knowledge of firm which can well able to affect the innovation performance of firms (Lane et al., 2001); (Jansen, 2005). Organized and composed structures of networks make the member of the enterprise increase the likelihood of accepting new knowledge that helps to enhance transformation, assimilation and application of knowledge (Yongping, Yanzheng, & Haomiao 2011). The first two components i.e., ability to acquire and assimilate external knowledge can be defined as potential absorptive capacity and the third component ability

to transform external knowledge is defined as realized absorptive capacity. Organizations use networks to internalize new knowledge and interpret and realize the benefits of knowledge gained and possess considerable in-house technical expertise. In other words, without having sufficient absorptive capacity, the formation and embeddedness of networks do not guarantee any desired benefit (Jayathilake, 2018). Based on the above discussion following hypothesis can be conceptualized as:

H₂: Network embeddedness is positively related to the absorptive capacity.

2.3 Absorptive Capacity and Performance Innovation

Enhanced knowledge and learning in any set of areas and practice can increase the knowledge base of an organization in that particular discipline which can further enhance the knowledge base and absorptive capacity in that particular domain (Autio et al., 2000). The absorptive capability of firms can be affected by both external and internal factors. Internal factors include prior knowledge bases, the organizations search engines, repositories and archives, academic qualification and educational level of employees, organizational company size and culture of the organization. Whereas, external factors are a combination of the external knowledge environment and the companies positions within the relevant knowledge network (Noblet et al., 2015). Hence, absorptive capability relates to the process of the culture of learning, compilation and assimilation of skills and transferring of knowledge. Such processes aim to increase the potential of an organization for exploring sources of external knowledge, adopting changes in the environment, increasing the degree of innovation and responding to the needs of the customer. The absorptive capability enables the firm to assess its resource base and adapt to changing environments for achieving a competitive advantage. According to Wu, Ding, Liu & Gao (2021) firm Absorptive capacity is considered to be a multidimensional construct by having two dimensions potential absorptive capacity and realized absorptive capacity.

Whereas, innovation is a mechanism through which companies can create new products and provides the best services that allow them to capitalize on competitive advantage through creating unique products and services. The capacity to innovate allows transforming knowledge in developing new products and services for improving market position by responding to different competitive advantages created by the current globalized environments. These are the sets of innovation that allows companies to produce new products, services, processes, and systems which are necessary to adapt for new markets with the concept of technological changes and new ways of competing with each other. (Sancho-Zamora, Hernández-Perlines, Peña-García & Gutiérrez-Broncano 2022). In addition, firms that represent low extent of absorptive capability are constrained from assimilating and commercializing new knowledge which inhibits the concept of innovative performance and culture of organizational learning in the literature on organization and research (Foss, Iakovleva, Kickul, Oftedal, & Solheim 2011).

Therefore, absorptive capacity is considered to be key capability of an organization for organizational innovation considering that innovation can be seen as a fundamental process for creating new knowledge and this important part of knowledge comes from an external source (Dávila, Durst & Varvakis 2018). Hence, based on the aforementioned discussion,

we, therefore propose that absorptive capacity arising from the external environment, information and formal training can be postulated as a key success factor for commercializing and institutionalizing innovation (Medase, & Barasa 2019).

H₃: Absorptive capacity is positively related to innovation performance.

2.4 Network Embeddedness, Absorptive Capacity & Innovation Performance

Small enterprise firms with a high capacity for network embeddedness can better collect and utilize the knowledge provided by networks whereas, firms with lower network embeddedness capacity cannot effectively assimilate and utilize the knowledge provided by other members of the network (Xue-feng, Xiao-bo, Jiong & Guan-nan 2006). Absorptive capacity helps a firm to focus on valuable information and increase the pertinence of obtaining knowledge from an external source and decrease the time consumption on the transfer of activities. Firms can combine existing knowledge along with the absorbed new knowledge and successfully share it inside the organization through the knowledge transformation process (Matusik & Heeley, 2005). If a firm has good transformation capability, then cognitive level and satisfaction to induce the knowledge in each department would be enhanced. Moreover, exploitation capability compels the organizations to be more sensitive to identifying business opportunities (Xie, Zou, & Qi 2018). Moreover, there are various underlying dimensions and classifications of firm absorptive capacity. According to Zahra & George (2002) firm's absorptive capacity can be divided and categorized into four dimensions such as acquisition, assimilation, transformation and exploitation of knowledge which can positively predict the innovation performance in firms.

Furthermore, innovation reflects a firm tendency to develop and create new ideas, newness, and novelty, creative processes that may result in new products, services and technological processes (Rhee, Park & Lee 2010). Moreover, the process of technological innovation comprises acquiring, diffusing, sharing and using knowledge. Organizations that occupy the central network position can access new knowledge from various departments of the organizations. Network embeddedness will have a more positive impact on the innovation as the output and business performances of the firm if the organizations have a high absorptive capacity (Tsai, 2001). According to Tian et al., (2021) absorptive capacity is considered to be a measure of the effective use of institutions, organizations and other external and internal strategic partners that connect with other participants through appropriate embedded networks to enhance the innovation performance of the enterprise firms. Moreover, according to Wang et al., (2016) firms' absorptive capacity has a decisive role in the inverted "U" relationship between corporate networks and Innovation performance embeddedness. Hence, based on all these viewpoints, we can postulate the below statement and can hypothesize:

H₄: Absorptive capacity significantly mediates the relationship between network embeddedness and innovation performance.

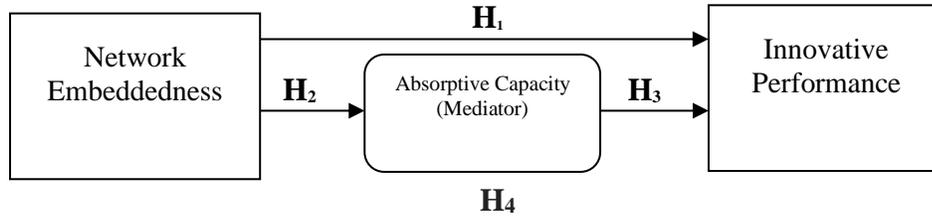


Figure 1: Research Framework

2.5 Theoretical Underpinning

Social network theory and resource-based view theory support the framework of this study. According to the resource-based view (RBV) theory when a firm acquires some immobile and non-duplicable resources and capabilities, this will add value to the firm performance. The firm capitalizes on those resources according to strategic manner to gain control and the upper hand over the competitors of the firm and those resources cannot copy capabilities (Rahman, 2015). Whereas, social network can be designed and developed through the accumulation of social capital hence the reproduction of social capital has brought expansions in the social networks. Embeddedness can be described as the baseline of social capital theory and social network theory that originated from social capital (Xin & Qin 2011).

In past studies, substantial work has been performed on network embeddedness but very less attention has been given specifically to the small and medium enterprise firms. SMEs seek information from external sources for obtaining access to marketing and sales channels at advanced stages of innovation. A current study has been undertaken to fulfill the research gap of network embeddedness and innovation performance among the top management of small-medium enterprise firms, where the innovation can be measured through developing new products and changes in technology for competing with other firms, along with the mediating effect of firm's absorptive capacity for the top management of small and medium enterprise firms as the contextual background of this study (Dogbe et al., 2000).

Theory of the resource-based view and social network theory have been used as an important underpinning and overarching theories that support and integrate the framework and linkages which asserts that external resources to the SMEs can be used to complement internal resources for securing the competitive advantage. Resultantly founded upon social network theory and resource-based view theory this study can draw an implication of innovation performance as the important dependent and outcome variable of networks and absorptive capacity that aims to affect network performance (Xin & Qin 2011).

3. Research Methodology

This current study is based upon the positivist paradigm of research design and the quantitative approach has been used. Resource-based theory and social network theory have been applied to identify the association between network embeddedness, absorptive

capacity and innovation performance. The data has been collected from 300 respondents of top management of small-medium enterprise firms that are based in the cities of Islamabad, Rawalpindi and Faisalabad. The data analysis technique of multiple regression analysis and structural equation modeling have been used by using SPSS (v.23) and AMOS (v.28) for analyzing the data set. Time scale dimension is cross-sectional as the data has been collected for only time from the respondents of the study.

3.1. Measures and Scales

All the responses of the respondents were gathered and self-administered on 5 points continuums of the Likert scale of our research instrument that ranges from 1 to be considered as “strongly disagree” and 5 to be considered as “strongly disagree”.

3.1.1 Network Embeddedness

Network embeddedness of respondents was measured by using 12 points item scale adopted from Dogbe et al., (2020). The Cronbach’s alpha of 12 items for narcissistic leadership was found to be .798 which is denoted by (α). Sample items for this scale include “Our partners highly trust each other”.

3.1.2 Absorptive Capacity

The absorptive capacity of respondents was assessed and measured by using 11 points item scale originally developed by Lane, Salk & Lyles (2001). The Cronbach’s alpha of 11 items for absorptive capacity was found to be .886 which is denoted by (α).

3.1.3. Innovation Performance

Innovation performance of our study participants was carried out and measured by 4 points item scale originally developed by Dogbe et al., (2020). The Cronbach’s alpha of 4 items of innovation performance was found to be .812 which is denoted by (α).

3.2 Purpose and Type of Study

The purpose of this study is to analyze the relationship between network embeddedness and firm innovative performance through the mediating effect of firm’s absorptive capacity of SMEs that are based in twin cities including (Rawalpindi and Islamabad) and Faisalabad. In this sense we are actually doing the explanatory research in order to know why this relationship happens according to the way it exists.

We have used a positivist research design by using quantitative data. This study is cross-sectional in nature for collecting data where multiple theories were applied and mapped.

3.3 Sampling and Data Analysis Technique

The method of sampling technique used in this study is simple random sampling to collect the responses from top management of small and medium enterprise (SME) firms that are based in twin cities including (Rawalpindi and Islamabad) and Faisalabad. Respondents included in this sampling frame were considered to be as true representative of the entire population of a research study.

There is a rule of thumb of subject to item ratio is 1:5 and 1:10. This technique can be used to assess whether the sample size used in the study is large or small. A ratio of 10:1 was proposed by (Hogarty, Hines, Kromrey, Ferron, & Mumford 2005). Top management of small-medium enterprise (SME) firms was considered that are based in the cities of Islamabad, Rawalpindi and Faisalabad. The size of the population of this study is unknown in this current research. Thus, subject to item ratio was 1:10 and there are 27 items in our research instruments and the calculated sample size was $10 \times 27 = 270$. Hence, we used a sample of 300 which is larger than 270 that is larger enough to ensure generalizability for broader applicability of our research findings.

For data analysis, correlation and regression were carried out by using SPSS (v.23) and SEM was carried out by using AMOS (v.28) for checking the direct and indirect estimates for the variables of the study.

4.0. Analysis and Results

In this study, all the values of mean, standard deviation, skewness, kurtosis, Pearson correlation, regression analysis and factor analysis were used for verifying the results of the research framework.

4.1. Descriptive Statistics

In the table 1, a sum of 400 unfilled questionnaires were distributed among the SMEs that are currently based in Islamabad, Rawalpindi and Faisalabad. Whereas, the number of received questionnaire forms were 350. A sum of 50 questionnaires were incompletely filled and rejected from the analysis part of the study while the remaining 300 questionnaires were usable.

Table 1: Descriptive Statistics

Variable	Mean	S.D.	Coefficient (α)	Skewness	Kurtosis
NE	8.734	3.29	0.798	0.183	0.077
AC	4.017	4.15	0.886	0.193	0.208
IP	6.6709	2.70	0.812	0.212	0.110

Valid N 300 (Listwise)

Results of these descriptive statistics were found within the acceptable range limits that are visually depicted in table 1. The Standard cut-off point to measure the reliability of measures is by default and generically 0.6. The values of Cronbach's alpha are represented by (α). The variables and constructs show that all the items of the variables are highly reliable and valid. All the assumptions of multicollinearity also duly checked with the collinearity diagnostic test and our data set supports the correlation coefficient and provides no evidence of multicollinearity in our regression model.

4.2. Demographic Profile of Respondents

Demographic factors that were used in this study were gender, age, education, monthly income and experience. The description of respondents was gathered and compiled from

the small-medium enterprise (SME) firms that are based in Faisalabad, Rawalpindi and Islamabad concerning (Gender, Age, Education, Monthly Income and Years of experience) of respondents. In this study, a total of 300 respondents filled the questionnaires that were chosen after adjusting the missing values and detecting and removing the outliers. Out of 300 respondents, there were 228 male respondents and the remaining 72 were female respondents.

For the demographic of age out of 300 respondents, 18 respondents were lying under the age bracket of below 25, and 56 respondents were between the age limit of 25-35. 91 respondents were falling under the age limit of 36-45 and 69 respondents were lying under the age limit of 46-55 and the remaining 66 were falling under the age limit of Above 56. For the third category of education level, most participants held bachelors and post-graduation degree with 77 and 75 respondents, followed by 58 respondents were held in PhD category, 35 respondents were falling in Matriculation and remaining 55 individuals were included in for Intermediate level. In the Income category, most participants held in the brackets of 40,001-50,000 years of working experience along with 95 respondents, followed by 16 respondents lying below 20,000, 48 individuals falling in between 20,000-30,000, 66 respondents lying in income level of 30,001-40,000 and remaining 75 were lying in 50,001-75,000.

For the last category of years of experience, most participants were held in the category of more than 10 years of working experience as 84 individuals were falling in this particular category. 71 individuals were lying in the category of fewer than 2 years of working experience. While 62 respondents were falling in the category of 2-5 years of working experience and the remaining 83 respondents were falling in the 6-10 years of working years.

4.3. Correlation Analysis

In the table, 2 correlation analysis was conducted to check the nature and association between the variables of the study. The analysis shows that variables move in the same direction or opposite direction. This table describes the result of correlation analysis in which the very first variable was claimed to be as positive and this was consistent with our H₁, as network embeddedness has a strong correlation with innovation performance as the reported results has ($r = .254^{**}$, $p < 0.01$).

Table 2: Correlation Matrix

Predictors	NE	AC	IP
Network Embeddedness	1	.308**	.254**
Absorptive Capacity	.308**	1	.186**
Innovation Performance	.254**	.186**	1

N = 300 and **correlation is significant at the 0.01 level (2-tailed)

H₂ was assumed to be positive, as network embeddedness is positively related to absorptive capacity and the results of this certain hypothesis were found to be supported as ($r = .308^{**}$, $p < 0.01$) has a significant and positive correlation with network embeddedness, H₃ was assumed to be positive as absorptive capacity is positively related with innovative performance and the results of this hypothesis was found to be accepted as ($r = .186^{**}$, $p < 0.01$) has a significant and positive correlation with absorptive capacity.

4.4. Regression Analysis

Output results of table 3 of simple regression analysis shows that there is a positive relationship between network embeddedness and firm innovation performance as ($\beta = .217$, $p < 0.00$, $t \text{ stat} = 4.527$). Regression results of this study are similar to the research of Li and Huang (2018) that used survey questionnaires with Chinese high-tech companies as the sample of their research shows that embedded networks of those high-tech firms enable enterprises to achieve a high degree of cooperation and trust between organizations that can significantly improve the performance of technological innovation.

Table3: Simple Regression Results

Hypothesis	Model variables	R ²	σ error	B	t-stat	P-value	F-stat	Decision
H ₁	NE → IP	.754	0.61	.217	4.527	.000	20.493	Supported
H ₂	NE → AC	.707	3.03	.413	5.594	.000	31.21	Supported
H ₃	AC → IP	.876	.136	.119	3.264	.001	10.652	Supported

IV = Network embeddedness (NE) DV= Innovative Performance (IP)
 MV= Absorptive Capacity (AC)

Our 2nd hypothesis of the study was network embeddedness is positively and significantly associated with absorptive capacity. The results of this hypothesis were found to be significant and positive as ($\beta = .413$, $p < 0.00$, $T \text{ stat} = 5.594$). Our 3rd hypothesis of the study was conceptualized between absorptive capacity and innovation performance. Results of this study were also found to be significant and positive as ($\beta = .119$, $p < 0.00$, $t \text{ stat} = 3.264$).

Table 5: Multiple Regression Analysis

Hypot hesis	Model variables	R ²	σ erro r	B	t-stat	P-value	F-Stat	Decisi on
H4	NE → AC → IP	.765	.141	.394	5.161	.000	24.44	Support ed

DV= Innovative Performance (IP)

In table 5, multiple regression analysis was performed where the relationship of network embeddedness and innovation performance were assessed for testing the proposed association along with the mediating role of the absorptive capacity of the firm by controlling the effect of many alternative variables and explanations simultaneously. The result shows that there exists full mediation between network embeddedness and innovation performance through the mediating effect of absorptive capacity of SME firms as the results of the study were also found to be positive and significant ($\beta=.394$, $p < 0.00$, $t \text{ stat} = 5.161$). Combining regression results can derive the conclusion that network structures can promote the absorptive capability that can achieve the innovation achievements. Moreover, a well-designed structure is needed to form networks to increase the absorptive capacity and innovation performance of the firms (Yongping et al., 2011).

4.5. Confirmatory Factor Analysis (Structural Equation Modeling)

Structural equation modelling was carried out by using AMOS (v.28) for examining the measurement model and paths that are associated with the constructs and factor loadings. Analysis has been carried out by using the measurement model of confirmatory factor analysis (CFA) under the light of 27 items characterized by the respective variables of network embeddedness along with three indicators and of (relative embeddedness, structural embeddedness and cognitive embeddedness), absorptive capacity and innovation performance. Measurement errors were also yielded while using structural equations modeling (SEM) which are common in some fields. Estimates that were obtained from the results of factor loading represent the correlation values $>.30$ or above choose to hold or retain items. All the items in the measurement model were observed to explore the latent variable or unobserved variables in the default model.

Table 6: Path Coefficients of Variables in Mediated Model

Relationship of Variables	Estimates	S. Error	C.R.	P-Value	Results
Network Embeddedness	.230	.096	2.410	.016	Accepted
Absorptive Capacity	.186	.038	4.941	***	Accepted
Innovation Performance	.034	.017	2.039	.031	Accepted
NE \longrightarrow AC	1.09	.294	4.224	***	Accepted
AC \longrightarrow IP	1.27	.410	3.167	.002	Accepted
NE \longrightarrow IP	0.94	.025	3.806	***	Accepted

Where *** $p < 0.0$, ** $p < 0.01$ and * $p < 0.05$

5.0 Discussion and Findings

This study has concluded that SMEs network embeddedness positively affects innovation performance for new product developments, innovativeness, speed of new product change, speed of launching new products into the markets, and offering new services and products into the markets. From the output results, it can be concluded that network embeddedness has a positive effect on the innovative performance of SME firms. Strong ties of network relations and dependence networks lead towards effective inter-firm connection as these kinds of relationships are governed by the trust that can build norms of reciprocity, quality of relationship among the members of the team, mutual trust, reciprocity, mutual gain and benefits for all users. This effect on innovation performance can be generated from the combined and cumulative effect of all three dimensions of network embeddedness which can be manifested as relative embeddedness, structural embeddedness and cognitive embeddedness. SMEs which are embedded with strategic alliances with industries and firms can implicate ideas of innovation for integrating process and operations of the firm that somehow concludes that interaction between embedded networks and openness to innovation for bringing higher impact on innovation performance of SMEs.

Moreover, according to Blyler & Coff (2003) when networks are accompanied and based upon trust there will be limited room for opportunistic behaviour which is an act and behaviour of partnership motivated by the maximization of economic interest and a chance of occasional loss for partners and those SMEs can able to receive necessary information of resources such as human (intellectual), physical, financial and technological resources to align their networks to enhance their innovation performance. Resultantly, we can predict that business corporations that are established based on trust can lead towards a sense of belonging which can help other partners innovation agenda because of reciprocal benefits. The output generated results of this study are verified by the previous study of (Dogbe et al., 2020) where network capability can regulate and govern the relationship between network embeddedness and innovation performance of the firm.

Results of our second hypothesis between network embeddedness and absorptive capacity of the firm were also found to be aligned and supported, as positive relationship was found between these two variables. Therefore, an enterprise should actively establish a relationship with external units of the organization, increase the network centrality and improve the efficiency of its enterprise resources that enhance the absorptive capacity of the firm (Sun, Hou & Hailekiros, 2021). Empirical results are derived in the light of those practices, processes and developments through organization observing, learning and acquiring and adapting and exploiting information to create dynamic organizational practices and competencies (Zahra & George, 2002). Hence, it can be derived that learning can come from the previous knowledge bases that efficiently work as pre-requisites for better compilation and absorption of novel knowledge to be integrated and aligned with the organization for bringing high efficiency in organizational learning (Sun et al., 2021).

The empirical results of our third hypothesis were also found to be aligned to our conceptualized hypothesis 3, as positive relationship was found between absorptive capacity and innovation performance. The findings of this study are in line with the

previous research of Yongping et al., (2011) in which the main conclusion of the research was that network structure can promote absorptive ability and innovative achievement of organizations that need an effective structure for the network to improve absorptive capacity and innovation performance. Also in another study, it was found that absorptive capability can be measured by formal training and openness that aims to support the compilation and assimilation of internal and external knowledge that encourages innovation performance of the firms (Medase, & Barasa 2019). Consequently, there are four sub-elements of absorptive capability which can be stated as acquisition capability, assimilation capability, transformation capability and exploitation capability can well able to affect the innovation performance of the firm. Along with these capabilities, firms are continuously learning their knowledge and use multiple channels to strengthen the mechanism of knowledge utilization and also improve the rate of information utilization. The stronger the knowledge, absorptive capacity would be more helpful. Hence resultantly absorptive capacity is very important for the innovation performance of the enterprise (Liu, Hu, & Kang 2021).

Empirical findings of our fourth hypothesis were found to be consistent, where absorptive capacity significantly mediates between embedded networks and the innovative performance of the firm. The results of our study are compliant and verified with prior study of Jayathilake, 2018. Concentrating on the knowledge network and establishing trust among knowledge partners by sharing goals and culture with the members of the knowledge network promotes disruptive innovation performance by recognizing their capacities (Wang & Chen 2012). Moreover, the firm uses the network to institutionalize and internalize new knowledge and it must have considered in house technical expertise as a resource of sufficient absorptive capacity that guarantees the formation of a network for the desired benefit. Also, the structure of networks allows the members of enterprise firms to increase the likelihood to accept new knowledge and innovation in firms for promoting absorption, application, diffusion, mapping and transformation of knowledge in terms of new product development innovativeness, launching of new products into the markets.

Linking of supported theory and important underpinnings with the results of the hypotheses we used the framework of resource-based-view and social network theory in the support of our theoretical framework. We extend the strategic management's literature on network embeddedness to secure the competitive advantage of network capability. Alternatively speaking embedded resources contribute positively toward innovation performance and capability accumulation (Zheng, Li & Wu 2013). The proposed extension of the resource-based view offers a bridge between RBV and social network theories on which networks can be found and established. This integration and extension of RBV and social network theories (SNT) allow for ego networks based on the attributes of another partner rather than structure measures. The term social capital was first coined by Alfred Marshall and John Hicks to distinguish between permanent stock and temporary operation of real capital. Social networks can be considered as a relatively stable system that can be constructed with the social link of individuals (Xin & Qin 2011). Hence, resultantly social network theories can shed light on the configuration and evolution of alliance networks that can

help to alliance accessibility of a firm to seek new knowledge, technologies and opportunities for entering into new markets (Lavie, 2006).

5.1. Managerial Implication

As SMEs deal in industry alliances and collaboration, they can draw upon the innovative set of knowledge in the networks for achieving the innovative performance. Knowledge-based perspective describes that innovative knowledge plays a crucial role in creating and securing the competitive advantage of firms. With this set of perspective findings on the management of small-medium enterprises is advised to put special intention and action to practice transferring knowledge by making up investments in external innovative factors to achieve successful innovation performance. Moreover, management of industries and SME firms are directed to develop organizational structures that are conducive to trust, effective knowledge transfer and diffusion into the processes and operations of the organizations, openness to collaboration and innovation performance of the firms. Secondly in the era of a complex and changeable network economy, enterprises and small business firms must actively embed the network environment and play their full role to take initiative to construct strategic network structure. In addition, to control the flow of information, knowledge, opportunities and resources, SMEs need to attain core network structures for effective network relations with any enterprise firm. SMEs should also strengthen relations with partners and actively expand the scale of networks to ensure access to more heterogeneous resources.

5.2. Limitations and Future Directions

Considering the drawbacks and limitations of this study, future investigations and further explorations are needed to perform by taking this study as the baseline. Data was collected from 300 respondents of top management employees of SME firms and the time horizon of this study is cross-sectional. In future research, it is strongly recommended to focus on the longitudinal data, to assess if there is any disparity in the results. Secondly, this research explored the effect of network embeddedness on innovation performance through the absorptive capacity of the firm. In the future firms can combine the models of existing knowledge and newly absorbed knowledge to be successfully shared inside and outside the knowledge through the knowledge transformation process that will provide new insight into the literature of advance strategic management. Thirdly, this study also didn't place much importance on the levels of network embeddedness and open innovation, as various levels of cognitive embeddedness were not critically assessed.

Future studies may pay more attention to various levels of network embeddedness. Moreover, futuristic research can shed more light on some other influential predictors and outcome variables such as the culture of organizational learning, open innovation, disruptive innovation, technological capability, and transferring of existing and new knowledge such as knowledge assimilation, knowledge acquisition and knowledge exploitation.

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