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Inter-Organizational Relationships and Perceived Innovation Performance: The Moderating Role of Social Capital and Mediating Role of Knowledge Sharing

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Abstract

This study aims to analyze the role of inter-organizational relationship in boosting innovative performance of ICT enterprises through knowledge sharing supported by social capital. Gaining sustenance from Dynamic Capability View (DCV), the study investigates perceived enterprises' innovation performance as a result of inter-organizational relationships embedded with social ties and knowledge sharing among each other. Cross-sectional data were collected from managerial level employees working in ICT enterprises in Pakistan. The study findings based on Process Hayes Macro regression analysis using SPSS stated that the ICT businesses in knowledge hub are collaborating to build strong social relationships while sharing practical experiences and support each other through abstract resources for achieving higher levels of innovative outcomes. Inter-organizational relationships have an affirmative impact on innovation performance, invariably, knowledge sharing mediates the correlation between both. The influence of inter-organizational relationships on innovation performance through knowledge sharing is significant for firms with strong social capital. Consistently, social capital considerably moderates the relationships, as such organizations co-ordinate and work jointly with other organizations for driving service and product improvements. The research contributes by steers focus towards developing relationships among ICT enterprises, building ties based on faith and exchanging key information consistently to help and polish each other's innovation capabilities. Strong social ties among ICT enterprises will help acquire and capitalize on diverse knowledge to improve their innovation performance.

Keywords: ICT enterprises, knowledge hub, inter-organizational relationships, social capital, knowledge sharing, enterprise's innovation performance, Pakistan.

1. Introduction

Developing endurable knowledge sharing network is an indispensable capability of the organizations that can be anchored through exchange of knowledge locally, in order to encourage innovation and accelerate growth in Asian region (Mandry & Koubaa, 2021; Kremer, Villamor, & Aguinis, 2019). Innovation is the driving force of any country's economic development, especially in the developing context (Abdu & Jibir 2018; Zafar & Mustafa, 2017). A nation's commitment and deep level organizations' commitment are equally characterized as vital determining factors of improved enterprise's performance and eventually economic development of the country (Abdu & Jibir, 2018). Increasing competition and environmental uncertainties press firms to share intangible information assets for tapping innovative opportunities (Chen & Tian, 2022). The relational partnership helps to retrieve knowledge resources by stretching beyond organizational boundaries for developing novel ways of designing products and services for customers (Cricelli & Grimaldi, 2010). Different relationships are designed on the basis of close collaborations in product development as well as simple product or service trade (Cheng & Fu, 2013). They help organizations to gain value, manage potential risks and form superior governance for long term sustainability and all these impact firms' orientation towards innovative thinking (Pouwels & Koster, 2017).

ICT sector, usually overlooked in the developing and under-developed countries, has pronounced contribution in boosting the economic development. They have the capability to dynamically offer innovative solutions backed by strong R&D, technology orientation, information sharing and inter-organizational ties, thus ensure long-term sustainability in the economic perspective (Nam, Tuan & Van Minh, 2017; Anderson, Potočnik & Zhou, 2014). Collaborative frameworks formed in ICT sector greatly promote sharing of key information among the channel partners, thus serve as excellence center for regulating ICT sector and offering business support for future innovations (Scuotto et al., 2017; Huggins, Johnston & Thompson, 2012). Working in collaboration for their and each other's benefit, provides framework which empowers collaborating institutions and as well as community to pursue their development through sharing knowledge and experiences in the domain of ICT. It permits experts, entrepreneurs in the field of ICT to help each other to discover and transmit treasured information among different spots (Moraa & Gathege, 2013). The impacts of ICTs' inter-organizational networking are pronounced at local as well as global levels, making the mark by supporting entire country to methodically acquire and share knowledge for improved product, service and process innovations (Choesni & Schulz, 2013). Co-operations among firms lead to build frameworks supplemented with knowledge sharing, developing competencies in flow of innovative resources and new technological assistances (Ghoneim & Brown, 2011).

Social capital plays an instrumental role in bringing firms together for acquiring knowledge i.e. how network partners share key information among each other. It serves to be a key

motivator in adding value and nurturing social processes for accessing and exchanging new knowledge sources among related firms (Uzzi & Gillespie, 2002). It has been found out that strength of social relations between organizations greatly facilitate knowledge sharing among them (Inkpen & Tsang, 2005). Organizations operating in cooperative arrangements are capable of sharing rich factual information as a result of possessing durable relationships of strong acquaintances (Monavvarian et al., 2013). Social capital makes already related organizations greatly exposed to valuable knowledge assets which they readily share among partners (Yu et al., 2010). Although inter-organizational relationships positively affect knowledge sharing, however, social capital proposes conditions that enable transfer of knowledge among networks. Fatemi et al. (2021) found out a strong moderating effect of social capital on relationship between knowledge sharing and innovative behaviors. Organizations that are tightly knit, having trust and strong understanding, are capable of developing dynamic capabilities for sharing and effectively using knowledge for developing innovative tactics. Thus, social capital acts as an influential factor in boosting the effect of inter-organizational relationships on knowledge sharing (Ortiz, Donate & Guadamillas, 2018).

In developing nations, over the period of past decades, due to postponement in the process of government auction system to sell the license to ICT firms for subsequent generation investors did not exhibit any interest in making major investments in ICT and promotion of ICT based innovations, thus plagued the boom in innovation in information and technology as a whole (Navarro, 2016). Panir, Xiaolin and Zijun, (2019) found that in developing countries such as Bangladesh, knowledge sharing in presence of durable organizational relationships with primary institutions, greatly nurtures ICT innovation in public organizations and all in the interacting network. Yet, in developing nations there is less emphasis on sharing of critical knowledge in routine matters as well as during challenging situations (Mas-Tur & Soriano, 2014). The knowledge that is fundamental for innovation to take place is complicated in nature, and even the giant organizations face scarcity of key information. With this limited availability of knowledge, firms fail to innovate while bearing the biggest challenge of coping up with future trends (Wang, 2018).

n recent past years, there has been an increasing trend of in-depth investigation efforts in order to explore and explain the associations between inter-organizational relationship, social capital, knowledge sharing and innovation performance (Marchiori & Franco, 2020; Franco, Haase & Barbeira, 2015; Pérez-Luño et al., 2011). Knowledge greatly impacts innovation pursuits, however, extensive organizations are encountered with inadequacy of the knowledge which ultimately hinders their innovation performance (Casanueva, Castro & Galán, 2013; Parida & Örtqvist, 2015). Using this scarce knowledge, firms put great efforts to work in cooperation with other organizations to share knowledge, become involved in learning across the organizations for capitalizing upon innovation opportunities and eventually improve their innovation performance (Liu & Chaminade, 2010).

Grounded in Dynamic Capability View (Nahapier & Ghoshal, 1998), this research examines the role of ICT enterprises using their inter-organizational relationship in sharing their knowledge under strong social capital for enhancing their innovation performance (Subramony et al., 2018). This research theoretically opens avenues for analyzing the role of factors and capabilities associated with innovation performance. This suggests that social ties based on trust help improve effective innovation performance of the technology firms by capitalizing on their relationships with other organizations for effective knowledge sharing. The study teaches managers to invest in their companies' social capital to strengthen their knowledge hubs and innovate for reaping business profits.

The current study intends to empirically test and explain the significance of inter-organizational relationship for enhancing innovation performance through knowledge sharing with strong social ties. ICT firms in developing nations have great prospects to contribute to nation's success, but yet they are limited in unleashing their potential. The study contributes to scarce literature on the proposed theoretical model, moreover, it stretches the notion of ICTs to work together and innovate for commendable future endeavors.

2. Literature Review

2.1 Theoretical Underpinnings

Teece (2019; 2014) proposed framework comprised of identifying, grabbing and transforming dynamic capabilities that help firms to prepare for future actions under ICT upheavals. Using capabilities, these firms can adapt and cope with any hi-tech developments, ultimately achieve higher levels of innovation performance. The lens of Dynamic Capability View (DCV) provides understanding of how ICT firms (Teece, 2019) can accomplish developmental fit aligned with the needs of external environment for adapting to dynamic changes and characteristics of inter-organizational relationships in such unstable situations (Teece, 2018). From the perspective of DCV, partnering firms, including stakeholder organizations in Hi-Tech industry, engage themselves in continuous improvements; creativity and re-engineering processes to create a balance with environmental changes (Peng et al., 2019). Higher innovation performance is an outcome of effective reconfiguration of resources such as relationships and knowledge. Effective use of underlying Knowledge Management Systems and cooperative working relationships lead to improving firms' innovation performance (Petricevic & Verbeke, 2019; Giniuniene & Jurksiene, 2015). Within this framework, innovation performance requires firms' capabilities to evolve vigorously as changes hit internal and external components of organizations. This entire phenomenon involves evolution and reconsideration of dynamic capabilities by connecting ties and sharing knowledge for achieving best fit with innovation challenges (Ou, Hsu, & Ou, 2015). Social capital as a vital component of dynamic capabilities, helps to manage resources obtained from diverse sources that allow partnering

institutions to acquire and share critical information (Ruiz-Ortega et al., 2017; Svare & Gausdal, 2017).

2.2 Inter-organizational Relationships and Innovation Performance

With the rising interest in Knowledge Hubs, organizations which work in collaboration are bound to have strong inter-organizational relationships (Park, 2020). In the presence of highly turbulent and volatile business setting, organizations inclusive of all sectors realize the need to deeply focus on and pursue effective techniques for coping up with ongoing change (Oliva et al., 2018; Moraa & Gathege, 2013). One of the tactics to respond is to adopt emerging organizational structures, which transform firms into more effectively in ever evolving administrative trends of digital transformation, innovation and global existence (Matricano et al., 2019). Many firms work in various inter-organizational settings, building strong relationship ties that help them to launch interactions for sharing knowledge, strategies, resources, suppliers and customers to develop innovative products and services (Pouwels & Koster, 2017; Boughzala & Szostak, 2023). Affiliations between organizations let firms use their dynamic capabilities to be prepared for developing products and services to meet market's digital innovation needs (Del & Maggioni, 2014; Davis, 2016; Nieto & Santamaría, 2010; Nam et al, 2017). In the context of MNCs, inter-organizational relationships followed by rigorous knowledge sharing are critical in value creation (Del & Maggioni, 2014) and enhanced innovativeness (Jiménez-Jiménez, Martínez-Costa & Sanz-Valle, 2014). Hajek, Henriques and Hajkova (2014) precisely investigated the role of institutions, involved in network oriented cooperative work arrangements for promoting their innovation performance. Firms' participative working style in joint networks makes them capable of having shared reflection on new working processes and enhances their potential to innovate (García-Villaverde et al., 2017). An extensive literature states that innovation performance of firms greatly depends upon how closely the organizations are working defined by spatial characteristics (Carnabuci & Operti, 2013). In light of literature, following hypothesis H_1 can be stated as follows:

- H_1: Inter-organizational relationships significantly improve innovation performance of ICT firms.

2.3 Effect of Inter-Organizational Relationships on Innovation Performance with Knowledge Sharing as Mediator

Many scholars have studied the effect of knowledge management on innovation performance and business competitive advantages, especially in case of industry clusters (Gnyawali & Srivastava, 2013). One of the key factors critical in knowledge clusters of knowledge management is knowledge sharing, which certainly acts as a driving factor for innovation (Wen & Qiang, 2016). Innovation and creativity take place with transmission of up-to-date information. Sharing of knowledge empowers dissemination of learning, experiences and key notions that assist organizations in avoiding possible failures and rather foster to bring newness to the processes (Wu, 2013). Institutions, regulating ICTs;

offering ICT products and services and those delivering education on ICT, altogether serve as a learning platform that provides opportunity to all participants to incorporate multi-contextual expertise (Mas-Tur & Soriano, 2014). Zheng, Wu and Xie (2017) and Lai et al. (2014) also examined the mediating role of knowledge sharing in the relationship between leadership types and firm innovation performance. Birasnav (2014) analyzed the mediating role of knowledge sharing on the positive relationship between inter-organizational relationship and organizational performance. Firms working together accompanied with instant knowledge sharing greatly enhance their productivity through innovation (Noruzy et al., 2013). Firms team up with inter and intra-sectorial organizations aiming to seek and secure knowledge resources which they are incapable of developing internally due to potential constraints. They must extend their affiliations to allow maximum collaboration for improving innovation performance via efficient knowledge sharing (Carayannis, Barth & Campbell, 2012). This leads to development of following hypothesis H_2:

- H_2: Knowledge sharing significantly mediates the association between inter-organizational relationships and innovation performance of firms operating in knowledge hub.

2.4 Effect of Inter-Organizational Relationships on Knowledge Sharing with Social Capital as Moderator

Social capital i.e. the degree of sharing information and critical resources among organizations and people within a relationship network (Agyapong, Agyapong & Poku, 2017), is established to get access to essential resources for adoption of emerging technological trends and subsequent advancements (Wang & Ho, 2017). Chowdhury et al. (2020) found out that by incorporating social capital, organizations develop their knowledge resources that help them to accomplish their organizational mission and objectives (Bhatti et al., 2021; Qamariah & Muchtar, 2019). The three most significant attributes of social capital including mutual trust, reciprocity and institutional bonds are directly and positively related to increased organizational performance and innovation (Robertson, Caruana & Ferreira, 2021). Kim and Shim (2018) found that relational, structural and cognitive dimensions of social capital urge organizations to vigorously share knowledge among entities for their improved competitiveness and innovation performance (Martínez-Pérez, García-Villaverde & Elche, 2016; Tsai, 2016; Wang & Wang, 2012; Lefebvre et al., 2016). The positive effect of inter-organizational relationships on knowledge sharing is contingent on the existence of strong social capital among firms (Robertson, McCarthy & Pitt, 2019). Strong ties between these organizations can only provide basis for real time knowledge sharing in the presence of social capital which further offer to unleash innovation potential (Teixeira, Veiga & Fernandes, 2019). Social capital increases the likelihood of network firms to exploit knowledge sharing strategy for anchoring on the existing information and capturing new knowledge (Singh et al., 2021; Tsai & Hsu, 2018). DCV enables organizations to implement proactive approach in order

to manage emerging ICT changes, thereby becoming more optimist regarding technological uncertainties (Maietta, 2015). The underlying phenomena enable organizations to engage in transfer of information for undertaking innovation and creativity. This greatly emphasizes that social capital takes on moderating role in the association between inter-organizational relationships and knowledge sharing (Fan & Wu, 2011) and increased innovation performance (Chen et al., 2014). Consequently, the relationship between inter-organizational relationships and knowledge sharing moderated by social capital can be hypothesized as follows in H_3:

- H_3: Social capital significantly moderates the association between inter-organizational relationships and knowledge sharing among ICT firms.

2.5 Inter-organizational Relationships and Innovation Performance, Moderated Mediation of Social Capital and Knowledge Sharing

Social capital in its dimensions of relational, structural and cognitive capital, significantly affects organizational innovation performance. It leads to positively influence innovation in service sectors (Martínez-Pérez et al, 2016). Developing inter-organizational relationships is a way forward for transferring knowledge for innovative outcomes, however, social capital greatly encourages the extent to which organization go for sharing critical information (Mandry & Koubaa, 2021; Braun, 2015). Interaction among firms empowers them to exchange knowledge for sparking the innovation process, but this materializes only when the firms have strong social, trust based, cooperative mechanisms. Social capital comes into play to influence the connection between firms to a greater level that make them to rigorously exchange all types of formal and informal information (Kim & Shim, 2018). Innovation can never take place within silos as it emerges as a result of interaction with other sector organizations. It occurs within the firm and through interface among institutions (Wang & Wang, 2012). The nexus provides infrastructure to develop strong relational ties and share and transfer knowledge (Qian et al., 2019). This synergistic effect is deemed highly crucial for improved innovation performance of partnered firms (Pikkemaat & Weiermair, 2007). In order to accomplish sustainable competitive advantage, instituting robust associations between knowledge and market has become a dare need to thrive, whereas, without succeeding in innovation organizations are unable to sustain in the competitive battle (Gunawan, Jacob & Duysters, 2016). Firms valuing innovation for ultimate competitive advantage using knowledge as a key resource, assess the entire process with general understanding that they can no more operate in silos, rather they pursue innovation while dynamically socializing with each other (Van Wijk, Jansen & Lyles, 2009; Janssen & Van Yperen, 2004),). Studies encompassing innovation performance found that social capital and firms' networks promote approach towards knowledge management practices that use superior knowledge for bringing innovative boost for the organization, especially for those existing in same physical vicinity (Broekel & Boschma, 2011; Zhang et al., 2017; Ghaedi & Madhoushi, 2018; Carrasco-Hernández

& Jiménez-Jiménez, 2013). The literature leads to hypothesize the following statement as H_4:

- H_4: Social capital and knowledge sharing have significant moderated mediation effect on association between inter-organizational relationships innovation performance of firms operating in knowledge hub.

In view of the foregoing literature studies and resultant hypotheses, following theoretical framework has been designed such that the effect of inter-organizational relationships and innovation performance of ICT firms is denoted by H1. H2 shows the mediating role of knowledge sharing between inter-organizational relationships and innovation performance. Likewise, the moderating role of social capital in relationship between inter-organizational relationships and knowledge sharing is represented by H3. Lastly, H4 signifies moderated mediation of social capital and knowledge sharing in relationship between inter-organizational relationships innovation performance of firms operating in knowledge hub. These relationships have been exemplified in the following Figure 1:

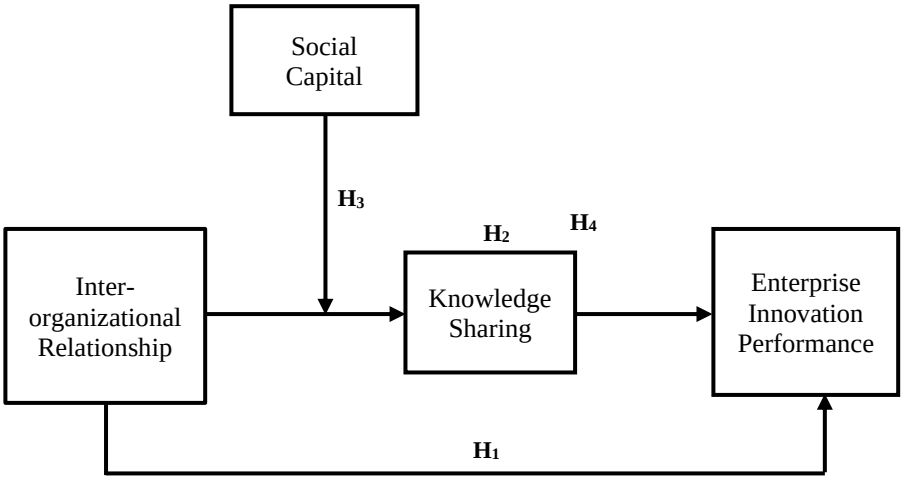

Figure 1: Theoretical Framework

3. Methodology and Research Design

The underlying study comprises of a correlational, quantitative and cross-sectional research. A deductive strategy was used with purpose of explaining the relationships between inter-organizational relationships, knowledge sharing, social capital and innovation performance in ICT firms in Pakistan.

3.1 Population, Sampling Procedure and Measures

The population consisted of managerial level employees working in ICT firms in Lahore, Pakistan. While deciding about target population, it was assured that respondents are qualified enough to understand the terms used in the questionnaire. Data was collected using purposive sampling technique. Due to unavailability of list of respondents, the survey was distributed among a total of 300 employees working in all ICTs in Lahore, capable of understanding and filling the survey forms, from which 273 useable surveys were obtained. With the objective of rejecting scholars' bias and explaining the cause-and-effect relationship among the variables, the method of primary data collection was applied by administering self-administered survey questionnaire. The members' perceptions regarding 'Inter-organizational Relationships' were determined on 7 Point-Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7). The instrument was adapted from Golicic (2003) based on constructs of trust, commitment and dependence. Four items of 'Knowledge Sharing' were adapted from the scale embraced by Kim and Shim (2018). The items assess employees' perceptions on 7-point Likert scale of agreement. The employees' perceptions about organizational 'Social Capital' were determined on 7 Point-Likert Scale extending from "strongly disagree" (1) to "strongly agree" (7). The instruments involved three dimensions namely structural, relational and cognitive scopes originally developed by Nahapiet and Ghoshal (1998) and the 9-items scale was adapted from Leana and Pil (2006). The scale of 'Innovation Performance' was adopted from Vukšić, et al., 2015), included five items appraised on 7-point Likert scale oscillating from very "bad" (1) to "excellent" (7).

4. Results

Process Macro by Andrew Hayes for Regression based analysis was used to analyze the results. The tests conducted on the data collected involved reliability and validity analyses, correlation analysis and regression analysis, including mediation, moderation and moderated mediation tests SPSS statistical tool. Regression analysis was preferred for analyzing and interpreting results because of its proficiency in determining the degree of variation caused by one unit variation in predictor variable in the criterion variable. As opposed to determining a composite analysis based latent variable modeling, regression analysis provided a systematic and sequential effect of each predictor variable on dependent variable followed by mediation and moderation analysis.

4.1 Demographic Statistics

Demographic Frequencies refer to recurrence tally, a measure of frequency that an occasion happens (Hair, Ringle & Sarstedt, 2012). Demographic variables in the study involved gender, age, qualification, nature of employment and worker's experience. 69% of the respondents were males with a frequency of 188. Only 31% respondents were women having frequency of 85. 2.2% of employees reported to be fall in age of 25 years. 2% respondent ranged in age of 26-30 years and 18.3% had ages between 31--35 years presenting frequency of 50, 53.5% workers lied in ages between 36-40 years, however 35

members lied in the age group above 40 years displaying a percentage of 12.8%. More than half of the employees displayed their English-speaking competence with frequency of 142 and percentage of 51.9%, while remaining 131 respondents making up 48.1% of total could speak Urdu language only. In addition, 65.1% i.e. 178 employees had completed their Bachelor Degrees, 34.9% i.e. 95 held Master Degree, whereas, none of the respondents reported to have PhD or any higher qualification. These statistics showed that the qualified human resources are contributing to this sector. The result revealed that 62.4% i.e. 170 workers had been working permanently, whereas, 37.6% employees i.e. 103 members had been employed on part time basis. 16.5% employees having frequency of 45 had 2-5 years of working experience, 28.1%, i.e. 77 have worked from 6-10 years, 14.3% i.e. 39 had been being since past 11-15 years, 10.4% making up 28 of total employees had served from 16-20 years, 17.5% i.e. 48 employees are in the sector for 20-25 years and finally, 13.2% including 36 had a tenure of above 25 years. The demographics are displayed in Table 1.

Table 1: Demographics (N = 273)

Demographics	Percentage	Frequency
Gender		
Male	69%	188
Female	31%	85
Age		
< 25 Y	2.2%	6
26-30 Y	13.2%	36
31-35 Y	15.8%	43
36-40 Y	33.5%	92
41-45 Y	18.3%	50
46-50 Y	17%	46
Language		
English	51.9%	142
Urdu	48.1%	131
Education		
Bachelor's	65.1%	178
Master's	34.9%	95
PhD or any higher	0%	0
Length of Service		
2-5 Y	16.1%	45
6-10 Y	28.1%	77
11-15 Y	14.3%	39
16-20 Y	10.4%	28
20-25 Y	17.5%	48
25 >	13.2%	36

4.2 Descriptive Statistics

Table 2 illustrates the descriptive output of continuous variables. The variable of inter-organizational relationships showed 3 as minimum and 7 as maximum value. The mean and standard deviation of employees' perceptions were 5.4791 and 0.81561 respectively. Less value of standard deviation as compared to mean reflected that distribution of responses was somewhat skewed. The skewness value for was found to be -1.285 that depicted smaller value of mean that median, whereas, the kurtosis was determined to be positive having value of 2.653, revealed higher peak than normal curve. The variable of knowledge sharing had 2 as minimum and 7 as the highest value. The mean for the underlying variable was 5.1782 and standard deviation was found to be 0.82337. The less value of standard deviation than mean predicted skewed distribution to some extent. The value of skewness was -1.158 that reflected small value of mean that median, whereas, the kurtosis had positive value of 2.192, displayed great peak of the normality curve. The variable of social capital exhibited lowest value of 2 and a highest of 7. The mean was 5.2111 and standard deviation was 0.7963. The extent of skewness of the curve can be predicted by very lesser value of standard deviation than mean. Skewness of organizational culture was -1.376 showing less mean than median and that of kurtosis was 2.159, reported higher peak of distribution curve. Finally, for innovation performance, the minimum value of response was 3 and maximum was 7. The mean value was 5.717 and standard deviation was 0.7991. A negative value of skewness was displayed i.e., -1.345. Mean was found to be lesser than median, however, the kurtosis was 2.455, which demonstrated shorter tail and higher peak of distribution curve. The assumption of normality of scale variables was investigated through skewness and kurtosis outputs. An ideal normal distribution is indicated by score 0. However, in this study, the assumption was tested through values of standard errors, i.e. the values lying with range of ±1.96 demonstrate the normality of data (Pallant, 2020). The outputs fulfilled the assumption as shown in Table 2.

Table 2: Descriptive Statistics

Variables	***Min.***	***Max.***	***Mean***	***Std. Devi.***	***Skewness***		***Kurtosis***	
					Statistics	**SE**	**Statistics**	**SE**
IR	3	7	5.479	.81	-1.285	.069	2.65	.574
KS	2	7	5.178	.82	-1.158	.069	2.19	.574
SC	2	7	5.211	.80	-1.376	.069	2.16	.574
IP	3	7	5.717	.80	-1.345	.069	2.46	.574

IR= Inter-organizational relationships, KS= Knowledge sharing, SC= Social capital, IP= Innovation performance

4.3 Reliability and Validity

The scale of inter-organizational relationships showed higher levels of inter-item consistency as the value of Cronbach's Alpha came out to be .901. The KMO measure of sampling adequacy was found to be .924. This value lied in the range of adequate sampling

and above cutoff value of 0.5. Significant value of Bartlett's test with Chi-Square value of 332.67 ensure reliability. The outcomes of factor analysis proved the validity of this variable. The variable of knowledge sharing showed high level of internal consistency among item and the value is above the acceptance benchmark of .864. The variable had KMO value of .832. This value fell in the adequate range of 0.8 to 1. The validity was further proved by Bartlett's Test for Sphericity significant at .000 having Chi-Square value of 361.87. The moderating variable of social capital displayed a Cronbach's Alpha value of .817 for the items used to measure this variable. The value revealed that there is a relatively high level of consistency between the items. For the underlying variable, the KMO was .815 that revealed appropriate measure of sampling adequacy. The output showed higher value of Chi-Square i.e. 284.16 and apposite correlation among the items, with significance level at p-value less than 0.05. The dependent variable of innovation performance had Cronbach's Alpha value of .834, demonstrated higher consistency among the items while establishing the reliability of the variable. For the same variable, the KMO value was determined to be .867 which revealed acceptable degree of sufficiency of the sample. Chi-Square value was found to be 245.65 with significance level at 0.000. This also established the satisfied correlation levels among the items. The statistical outputs are illustrated in Table 3.

Table 3: Reliability and Validity Statistics

Constructs	Cronbach's Alpha	KMO Value	Chi-Square	P-Values
IR	.90*	.92*	332.67	.000
KS	.86*	.83*	361.87	.000
SC	.82*	.82*	284.16	.000
IP	.83*	.87*	245.65	.000

*$p < .05$ IR= Inter-organizational relationships, KS= Knowledge sharing, SC= Social capital, IP= Innovation performance

4.4 Correlations

For the relationship between inter-organizational relationships and knowledge sharing, the value of correlation statistic came out to be .544 with significance value .000, less than 0.01 which clearly showed that there exists a strong positive correlation between them. The correlation between inter-organizational relationships and social capital demonstrated the correlation value of .409 which clearly revealed that both the variables had a strong positive correlation, significant at .000 at p-value less than 0.05. The direction of relationship between inter-organizational relationships and innovation performance was found to be statistically significant at 0.000, $p < 0.05$, having $r = .598$. Likewise, the correlation statistic representing the relationship between knowledge sharing and social capital was determined to be .429, with significance level of 0.000, less than 0.05. This reported a positive linkage between the two variables. A direct positive association was established between

knowledge sharing and innovation performance, denoted by value of r = .573 having significance level of 0.000. Similarly, a direct positive relationship was found between social capital and innovation performance. The outputs showed Pearson Coefficient r equal to .391 displaying $p < 0.05$.

Table 4: Correlations, CR and AVE

Constructs	Mean	SD	Loadings	CR	AVE	IR	KS	SC	IP
IR	5.48	.81	.64-.75	.69	.52	1			
KS	5.18	.82	.69-.77	.77	.49	.54**	1		
SC	5.21	.80	.71-.76	.66	.58	.41**	.43**	1	
IP	5.72	.80	.73-.79	.81	.45	.60**	.57**	.39**	1

**p < .05, IR= Inter-organizational relationships, KS= Knowledge sharing, SC= Social capital, IP= Innovation performance

4.5 Regression Analysis

The value of R-Square explained the magnitude of variability of the response data around its mean. The higher the value of coefficient of determination, the greater variation in outcome variable is explained by change in independent variable.

4.5.1. Assumptions for Regression Analysis

1. Normality: The normality for the dependent variable was demonstrated through the insignificant values obtained through Kolmogorov-Smirnov test i.e. 0.112 and Shapiro-Wilk test i.e. 0.551, showing that the data follow normal distribution.

2. Multi-collinearity: The outcome values of correlations were found to be less than 0.7 that predicted no multi-collinearity existed between the IVs. Linear relationships between independent and dependent variables having correlation values greater than 0.3 also revealed no multi-collinearity between the variables and thus fulfilled the assumption for regression analysis. The results of multi-collinearity test are displayed in Table 4.

3. Auto-Correlation: The value of Durbin Watson statistics was found to be 1.477, thus lying with the prescribed level and showed that the values fall below 2.0, thus, indicates the presence of a positive autocorrelation in the residual variable from the regression analysis. Results are summated in Table 5.

Table 5: Auto-Correlation and R^2

Model	R^2	Adj. R^2	SE	ΔR^2	F	ΔF	P	Durbin-Watson
1	0.656	0.653	0.611	0.656	188.955	188.948	0.000	1.477

The significance value for ANOVA test was 0.000 which is less than 0.05. In this case, p-value less than 0.05 showed that the model was good. The F value (188.955) although was

large but the significance value is lower, so we can conclude that the model is good. R-square value displays the variation in the dependent variable i.e. innovation performance explained by the predictor variable i.e. inter-organizational relationships. The R- squared value for the model was reported as 65.6% ($\beta = 0.656$, p-value = 0.000) that sufficiently defined the relationship among the variables. This value shows that 66% of the variability in innovation performance around its means was explained by the variation in predictor variables of inter-organizational relationships, knowledge sharing and social capital. This revealed that the model was fit, and the variability is being explained by the model. Adjusted R-square value of 0.653 i.e. 65.3% unveiled the generalization of results that is the variation in the results of sample data derived from population from multiple regression. Consequently, there existed a minimal difference between the R2 and Adjusted R^2 values.

4.5.2 Inter-organizational Relationships and Innovation Performance

As a result of applying multiple regression, output indicating the degree to which inter-organizational relationships explain variance in innovation performance confirmed rejection of null hypothesis. Results in Table 6 showed that 48% i.e. $\beta = .48$, p-value = 0.000 of the variation in innovation performance is explained by inter-organizational relationships in ICT firms, keeping other factors constant. This enunciates that inter-organizational relationships have a significantly positive association with innovation performance.

4.5.3 Inter-organizational Relationships and Innovation Performance with Mediation of Knowledge Sharing

Using Model 4, the mediation of knowledge sharing on association between inter-organizational relationships and innovation performance was determined. A significant positive impact of Inter-organizational relationships on knowledge sharing by multivariate regression indicated that for an increase in relationships between firms by one unit there is 36% ($\beta = 0.36$, p-value = 0.000). This articulates that knowledge sharing subsequently plays an active intervention role in establishing the effect of inter-organizational relationships on the innovation performance of ICT enterprises.

4.5.3.1 Mediation Test using Model 1

The mediation effect was observed through Multiple Regression Analysis using Model 1. It was found that, having significant direct impact of inter-organizational relationships on innovation performance, the indirect influence in the presence of mediating variable of knowledge sharing was also found to be significant, thus, confirmed significant mediation effect. The value of Un-standardized Beta for indirect effect the found to be ($\beta = 0.43$, p-value = 0.000).

4.5.4 Inter-organizational Relationships and Knowledge Sharing, Moderation of Social Capital

The moderating effect of social capital on association between inter-organizational relationships and knowledge sharing had been evaluated using Model 1 of Process Hayes. The results revealed significant positive effect of inter-organizational relationships on knowledge sharing i.e. for an increase in inter-organizational relationships by one unit, there is 49% ($\beta = 0.49$, p-value = 0.020) variation in knowledge sharing, assuring the other factors are constant. The outcome was found to be significant at p-value < 0.05. This confirmed the existence of a direct significant effect on knowledge sharing explained by inter-organizational relationships in the ICT industry.

4.5.4.1 Interaction Effect using Model 1

The output of model 1, obtained through adding interaction term between inter-organizational relationships and knowledge sharing to regression model, comprising of causal relationship between IV and mediator, this had been considered as significant fraction of variance in knowledge sharing. The Unstandardized Beta for moderation effect was found to be $\beta = 0.29$, p-value = 0.000. The moderation effect of social capital and knowledge sharing was proved to significant with p-value less than 0.05. Examination of the outputs showed an increasing effect of social capital, the effect of inter-organizational relationships becomes pronounced on knowledge sharing among ICT firms. Contrastingly, weak social capital, characterized by poor coordination, weak trust and lack of shared vision, the companies do not exchange knowledge even in presence of formal networking.

4.5.5 Inter-organizational Relationships and Innovation Performance with Moderated Mediation of Social Capital and Knowledge Sharing

The moderation mediation effect was investigated using Model 8 of Process Hayes. The conditional indirect impact was tested for moderated mediation as elaborated by Hayes (2013) using the PROCESS Model 8 using SPSS22. The phenomena occurred when the two initial instrumental variables of inter-organizational relationships and social capital had an interaction, and the impacts of moderation through social capital also incorporated mediating effect of knowledge sharing. The phenomena involving IV, moderator and interaction effect were reckoned as preliminary causal variables. However, the mediation test was steered to evaluate the extent of mediating variable of knowledge sharing explaining the effect of interaction on innovation performance. Social capital moderates the relationship between inter-organizational relationships and knowledge sharing having $\beta = 0.29$ with significant p-value at 0.000. Analyzing the moderation effect, the relationship between inter-organizational relationships and social capital was found to be significant. A key for moderated mediation, the conditional indirect impact for moderator was not significant p-value = 0.12 greater than 0.000, this indicated that the moderated mediation was occurred. Chi-Square Value was found to be 21.714, this confirms the authenticity of the proposed conceptual framework. This verifies that the intervention effect of knowledge

sharing in between inter-organizational relationships and innovation performance is contingent upon the significant role of social capital. Presence of a strong social capital reflected in strong coordination, trust and shared vision among all ICT enterprises leads to effective exchange and sharing of knowledge. Resultantly, ICT firms' durable inter-organizational relationships incur a significantly positive effect on their innovation performance. Table 6 exhibits the regression outputs. The results are also shown in the Figure 2 given below:

Table 6: Results of Multivariate Regression Using Model 1, 4 and 8

DV	IV	Un-std. B	SE	Std. β	CR	P	H_0 Rejected
IP	IR	0.48*	0.09	0.59	6.462	.000	Rejected
KS	IR	0.36*	0.13	0.61	4.263	.000	Rejected
IP	KS	0.49*	0.11	0.32	2.732	.020	Rejected
Mediation/ Indirect Effect IR-KS-IP		0.43*				.000	Rejected
KS	IR	0.49*	0.10	0.69	8.349	.000	Rejected
SC	IR	0.51*	0.09	0.46	3.04	.030	Rejected
KS	SC	0.52*	0.12	0.30	2.327	.020	Rejected
Interaction effect/Moderation IR*SC-KS-IP		0.29*	0.53			.000	Rejected

$X^2 = 21.714$; *p-value < .05

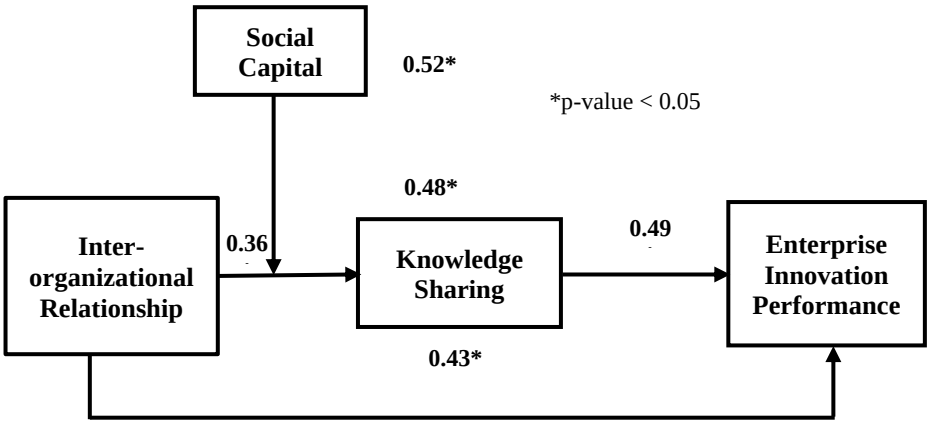

Figure 2: Path Analysis with Unstandardized β Coefficients

5. Discussion

In rapidly changing regional economies, less innovative countries must diminish the development gap between them and knowledge-intensive states. Latest researches stress that the lack of efficient institutional arrangements reduces the prospects of local knowledge spillover. This creates the need for indigenous firms to make effective use of collaborative networks to uplift their innovation performances. Inter-organizational relationships emphasize the movement of information among institutions, enterprises and people. These underlying interfaces among different actors, enable them to transform an innovative idea into new process, product or service (Beck & Schenker-Wicki, 2014; Boughzala & Szostak, 2023). Organizations interacting within relationship networks provide higher connectivity with knowledge sharing and networking competencies (Ferraris, Santoro & Bresciani, 2017), thus, generating and transferring knowledge to application sites and ultimately positively affect firms' innovation performance (Camisón & Forés, 2011). Inter-organizational associations comprised of collections of output-oriented firms, in which yield is primarily focused on knowledge generation and using knowledge as input in the transformation process (Tortoriello, 2015). Opportunely, knowledge systems, comprised of agglomeration of organizations, are extraordinarily proficient in establishing new industries, thus serve as pivotal point for creation and dissemination of knowledge (Del Giudice & Maggioni, 2014; Delgado, Porter & Stern, 2014). These inter-related organizations among ICT firms effectively administer knowledge flows and establish a specialized institutional frame, a form of an enthusiastic "knowledge architecture" that promotes usage of explicit knowledge and proximity in gaining competitive advantage for higher innovation performance (Ellison, Glaeser & Kerr, 2010). The collective assortments of organizational form of knowledge management practices, oriented specifically for each cluster, swiftly propagate knowledge all over the partners to improve learning capacity of regionally located firms, capitalizing upon innovation and sustaining cluster competitive advantages for each cluster (Fang, 2018). Since one firm cannot take hold of all the resources essential for developing innovative outputs, interdependencies exist between organizations, facilitating firms to seek resources for revolution (Hansen & Birkinshaw, 2007).

Scholar and practitioners highly recommend firms to operate in knowledge hubs to establish network with inter and intra-related sectors to exploit up to date knowledge and unleash their potential for innovations (Martínez-Pérez, Elche & García-Villaverde, 2019). Building diverse relationships support firms to share knowledge that drives the innovation (Camisón et al., 2017). Functioning with high intensity of bridging and bonding capital, these organizations undertake the opportunity to explore contemporary knowledge while applying several approaches to single strategy (Lefebvre et al., 2016). Susanty, Yuningsih and Anggadwita, (2019) concluded that firms, engaged in ICT processes, working in close cooperation with each other to support ICT needs in diverse sectors exhibit direct positive relationship between inter-organizational relationship and their innovation performance via knowledge sharing. Associations among cluster firms serve as a critical advocate of inter

and intra-organizational learning. The exploratory and exploitative forms of learning determine the way organizations increase their innovation performance (Gao et al., 2019). This strengthens firm to reconsider the role of inter-organizational relationship for exploiting knowledge for bringing novelty to processes and firms' offerings. For startup ventures, the significance of ties between organizations, especially within the domain of ICT, their business values and rationale of their operations are aggressively comprised on notion of innovation. This offers the proposition for resolving the problem by becoming agile in meeting the clients' needs, while playing transformative role for process to occur (Oliva & Kotabe, 2019).

With the rising trend of firms working in close networks, the context of social elements has become significant and has directed the organizations to highlight soft components one of which is social capital. Achieving social capital in inter and intra-organizational relationships is mandated for the firms for efficient knowledge transfer (Macke Vallejos, Faccin & Genari, 2010; Singh et al., 2021; Lyu et al., 2022). The collaborative nature of inter-organizational relationships among firms directs them to develop strong social linkages, based on structural, relational and cognitive dimensions. This makes them share common vision, build sustained partnerships and exchange knowledge for bringing technological advancements (Ganguly, Talukdar & Chatterjee, 2019). Firms operating in shared arrangements, recognize the need to develop networks of resilient social interactions that foster knowledge conception and exchanges not becoming capable of formally sharing resources but also becoming responsive in bringing improvements and innovation for each other (Wegner, Faccin & Dolci, 2018). Relationships with heterogeneous firms lead to build better social connection as they provide access to varied relational resources that add significant contribution to already existing resources (Maurer, Bartsch & Ebers, 2011). This heterogeneity supports dynamicity of social interactions adding to diversity of information flows for innovative decision making (Rossoni, Aranha & Mendes-Da-Silva, 2018). While the social capital acts as moderator, it highly supports the way organizations perform better in ICT network arrangements, develop trust for key information sharing and improving innovation outcomes (Nawinna & Venable, 2019; Singh et al.., 2021; Setini et al., 2020). There is a strong moderated mediating influence of social capital and knowledge sharing on the association between inter-organizational relationships and innovation performance of ICTs.

5.1 Conclusion

Narrowing down the context of developing nations to Pakistan, the significance of institutions, academia and enterprises, their innovation performance and their association with economic success can be understood. Pakistan is one the most emerging nations in Sub-Continent and South Asia, keeping in context its location and contribution in the regional growth, Information and Technology based industrial growth is deemed necessary. Likewise, ICT SMEs, governmental institutions and universities promoting ICT

sector can play critical role in strengthening the entire economic status of the country, hence, their involvement must be highly regarded These entities, working in cooperation and sharing key knowledge among each other can serve to be efficacious in driving ICT based innovation throughout all the sectors. ICT knowledge hubs are said to be critical assets of a nation to pursue innovation and entrepreneurship, making a way forward to endorse techno-preneurship for economic development. They must capitalize on their potential of facilitating access to ICT resources, tying together in strong network to promote innovation and increase each other's innovation performance. Companies struggle to establish their independent innovation Centre and knowledge parks that allow involvement and input from global and local experts to unleash ICT's potential for development at all levels and foster economic uplift Firms must build strong inter-organizational relationships and capitalize upon them, while exploring and sharing real time information, become highly capable of leading major innovations. Social capital is an influential phenomenon in understanding how firms sustain inter-organizational relationships (IORs). It serves as a critical element in developing relationships of trust for deep rooted collaboration among organizations. Fortunately, these ICT knowledge hubs will be prominent in nourishing innovation in local ICT firms, promoting ICT oriented research and development at academic institutions and enabling establishment of policy structures by government to support ICT innovation at maximum. All firms and institutions join a platform to altogether share creative research ideas for innovation to take place, thus create a shared value for all stakeholders.

5.2 Limitations and Future Research Recommendations

Intended study attempts to analyze the inter-organizational relationships improving innovation performance of the information communication technology firms under support of social capital through knowledge sharing. The scope of the research is context specific and thus the results of the study cannot be generalized in other industrial sectors. Future studies can either segregate the study sample within ICT enterprises that vary based on the level of digital transformation and sophisticated procedures, size, and nature of projects; or conduct research in different industrial sectors such as health care, banking, or supply chain etc. This research employed Hayes Process Macro based Regression Analysis using SPSS 22. Future studies can analyze large data sets through structural equation modeling using AMOS in order conduct path analysis with a composite complex model analysis in order to obtain more accurate and refined results. This empirical research studied the effect of inter-organizational relationship on innovative performance through moderated mediation explained by social capital through knowledge sharing, not taking into their dimensions of the variables was thus a limitation of this study. Future researches can determine the effects of individual dimensions of the variables in order to get more specific and comprehensive results.

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REFERENCES

Abdu, M., & Jibir, A. (2018). Determinants of firms' innovation in Nigeria. *Kasetsart Journal of Social Sciences*, *39*(3), 448-456.

Agyapong, F. O., Agyapong, A., & Poku, K. (2017). Nexus between social capital and performance of micro and small firms in an emerging economy: The mediating role of innovation. *Cogent Business & Management*, *4*(1), 1309784.

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework. *Journal of management*, *40*(5), 1297-1333.

Beck, M., & Schenker-Wicki, A. (2014). Cooperating with external partners: the importance of diversity for innovation performance. *European Journal of International Management*, *8*(5), 548-569.

Bhatti, S.H., Vorobyev, D., Zakariya, R. and Christofi, M. (2021). Social capital, knowledge sharing, work meaningfulness and creativity: evidence from the Pakistani pharmaceutical industry. *Journal of Intellectual Capital*, 22(2), 243-259.

Braun, C. (2015). *A qualitative analysis of the networks of tourism SMEs in Germany: managing business networks for knowledge transfer*. Doctoral dissertation, University of Nottingham, UK.

Birasnav, M. (2014). Knowledge management and organizational performance in the service industry: The role of transformational leadership beyond the effects of transactional leadership. *Journal of Business Research*, *67*(8), 1622-1629.

Boughzala, Y., & Szostak, B. L. (2023). The impact of international interorganizational relationships on creativity: the local partner perspective in an emerging country. *European Journal of Innovation Management*, *26*(1), 157-182.

Broekel, T., & Boschma, R. (2011). Knowledge networks in the Dutch aviation industry: the proximity paradox. *Journal of Economic Geography*, *12*(2), 409-433.

Camisón, C., & Forés, B. (2011). Knowledge creation and absorptive capacity: The effect of intra-district shared competences. *Scandinavian Journal of Management*, *27*(1), 66-86.

Camisón, C., Forés, B., & Boronat-Navarro, M. (2017). Cluster and firm-specific antecedents of organizational innovation. *Current Issues in Tourism*, *20*(6), 617-646.

Carayannis, E. G., Barth, T. D., & Campbell, D. F. (2012). The Quintuple Helix innovation model: global warming as a challenge and driver for innovation. *Journal of Innovation and Entrepreneurship*, *1*, 1-2.

Carnabuci, G., & Operti, E. (2013). Where do firms' recombinant capabilities come from? Intraorganizational networks, knowledge, and firms' ability to innovate through technological recombination. *Strategic Management Journal*, *34*(13), 1591-1613.

Carrasco-Hernández, A., & Jiménez-Jiménez, D. (2013). Can family firms innovate? Sharing internal knowledge from a social capital perspective. *Electronic Journal of Knowledge Management*, *11*(1), 30-37.

Casanueva, C., Castro, I., & Galán, J. L. (2013). Informational networks and innovation in mature industrial clusters. *Journal of Business Research*, *66*(5), 603-613.

Cheng, J. H., & Fu, Y. C. (2013). Inter-organizational relationships and knowledge sharing through the relationship and institutional orientations in supply chains. *International Journal of Information Management*, *33*(3), 473-484.

Chen, H., & Tian, Z. (2022). Environmental uncertainty, resource orchestration and digital transformation: A fuzzy-set QCA approach. *Journal of Business Research*, 139, 184–193.

Chen, M. H., Wang, H. Y., Chang, Y. Y., & Hung, A. (2014, July). Knowledge sharing, social capital and firm performance in technological clusters of Taiwan Science Parks: An innovation strategy perspective. In *Proceedings of PICMET'14 Conference: Portland International Center for Management of Engineering and Technology; Infrastructure and Service Integration* (pp. 1040-1054). IEEE.

Choesni, T. A., & Schulz, N. S. (2013). Knowledge Hubs—Progress in Practice since the Bali Communiqué. *Tackling Global Challenges through Triangular Cooperation*, Achiev. Sustain. Dev. Eradicating Poverty Through Green Econ. 82–100.

Chowdhury, M., Prayag, G., Patwardhan, V., & Kumar, N. (2020). The impact of social capital and knowledge sharing intention on restaurants' new product development. *International Journal of Contemporary Hospitality Management*. 32(10), 3271-3293.

Cricelli, L., & Grimaldi, M. (2010). Knowledge-based inter-organizational collaborations. *Journal of Knowledge Management*, *14*(3), 348-358.

Davis, J. P. (2016). The group dynamics of inter-organizational relationships: Collaborating with multiple partners in innovation ecosystems. *Administrative Science Quarterly*, *61*(4), 621-661.

Delgado, M., Porter, M. E., & Stern, S. (2014). Clusters, convergence, and economic performance. *Research Policy*, *43*(10), 1785-1799.

Del Giudice, M., & Maggioni, V. (2014). Managerial practices and operative directions of knowledge management within inter-firm networks: a global view. *Journal of Knowledge Management, 18*(5), 841-846.

Ellison, G., Glaeser, E. L., & Kerr, W. R. (2010). What causes industry agglomeration? Evidence from co-agglomeration patterns. *American Economic Review*, *100*(3), 1195-1213.

Fan, Y. W., & Wu, C. C. (2011, January). The Role of Social Capital in Knowledge Sharing: A Meta-Analytic Review. In *2011 44th Hawaii International Conference on System Sciences* (pp. 1-10). IEEE.

Fang, L. (2019). Manufacturing clusters and firm innovation. *Economic Development Quarterly*, *33*(1), 6-18.

Fatemi, S. Z., Sadeghian, S., Ganji, S. F. G., & Johnson, L. W. (2021). Do different genders' knowledge sharing behaviors drive different innovative behavior? The moderating effect of social capital. *European Journal of Innovation Management. 5*(2) 592-606.

Ferraris, A., Santoro, G., & Bresciani, S. (2017). Open innovation in multinational companies' subsidiaries: the role of internal and external knowledge. *European Journal of International Management*, *11*(4), 452-468.

Franco, M., Haase, H., & Barbeira, M. (2015). Measuring knowledge sharing in inter-organisational networks: Evidence from the healthcare sector. *International Journal of Knowledge Management Studies*, *6*(2), 101-122.

Ganguly, A., Talukdar, A., & Chatterjee, D. (2019). Evaluating the role of social capital, tacit knowledge sharing, knowledge quality and reciprocity in determining innovation capability of an organization. *Journal of Knowledge Management, 23*(6), 1105-1135.

Gao, S., Yin, F., Chen, J., & Guo, Y. (2019). The Mechanism of Inter-Organizational Collaboration Network on Innovation Performance: Evidences from East Coastal Enterprises in China. *Journal of Coastal Research*, *94*(sp1), 945-949.

García-Villaverde, P. M., Elche, D., Martínez-Pérez, Á., & Ruiz-Ortega, M. J. (2017). Determinants of radical innovation in clustered firms of the hospitality and tourism industry. *International Journal of Hospitality Management*, *61*, 45-58.

Ghaedi, M., & Madhoushi, M. (2018). Social capital, knowledge management and innovation performance. *International Journal of Entrepreneurship and Small Business*, *35*(4), 579-597.

Ghoneim, S., & Brown, C. (2011). Capacity building of knowledge management among research institutes: Reflections from the GDNET experience. *World Journal of Science, Technology and Sustainable Development*, *8*(2/3), 227-240.

Giniuniene, J., & Jurksiene, L. (2015). Dynamic capabilities, innovation and organizational learning: Interrelations and impact on firm performance. *Procedia-Social and Behavioral Sciences*, *213*, 985-991.

Gnyawali, D. R., & Srivastava, M. K. (2013). Complementary effects of clusters and networks on firm innovation: A conceptual model. *Journal of Engineering and Technology Management*, *30*(1), 1-20.

Golicic, S. L., Foggin, J. H., & Mentzer, J. T. (2003). Relationship magnitude and its role in interorganizational relationship structure. *Journal of Business Logistics*, *24*(1), 57-75.

Gunawan, T., Jacob, J., & Duysters, G. (2016). Entrepreneurial orientation and network ties: Innovative performance of SMEs in an emerging-economy manufacturing cluster. *International Entrepreneurship Management Journal,* 12, 575-599.

Hajek, P., Henriques, R., & Hajkova, V. (2014). Visualising components of regional innovation systems using self-organizing maps—Evidence from European regions. *Technological Forecasting and Social Change*, *84*, 197-214.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2012). Partial least squares: the better approach to structural equation modeling? *Long Range Planning*, *45*(5-6), 312-319.

Hansen, M. T., & Birkinshaw, J. (2007). The innovation value chain. *Harvard Business Review*, *85*(6), 1-13.

Hayes, A. F. (2013). Mediation, moderation, and conditional process analysis. *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* New York: Guilford Publications.

Huggins, R., Johnston, A., & Thompson, P. (2012). Network capital, social capital and knowledge flow: how the nature of inter-organizational networks impacts on innovation. *Industry and Innovation*, *19*(3), 203-232.

Inkpen, A. C., & Tsang, E. W. (2005). Social capital, networks, and knowledge transfer. *Academy of Management Review*, *30*(1), 146-165.

Janssen, O., & Van Yperen, N. W. (2004). Employees' goal orientations, the quality of leader-member exchange, and the outcomes of job performance and job satisfaction. *Academy of Management Journal*, *47*(3), 368-384.

Jiménez-Jiménez, D., Martínez-Costa, M., & Sanz-Valle, R. (2014). Knowledge management practices for innovation: a multinational corporation's perspective. *Journal of Knowledge Management*, *18*(5), 905-918.

Kim, N., & Shim, C. (2018). Social capital, knowledge sharing and innovation of small- and medium-sized enterprises in a tourism cluster. *International Journal of Contemporary Hospitality Management*, *30*(6), 2417-2437.

Kremer, H., Villamor, I., & Aguinis, H. (2019). Innovation leadership: Best-practice recommendations for promoting employee creativity, voice and knowledge sharing. *Business Horizons*, 62(1), 65– 74.

Lai, Y. L., Hsu, M. S., Lin, F. J., Chen, Y. M., & Lin, Y. H. (2014). The effects of industry cluster knowledge management on innovation performance. *Journal of Business Research*, *67*(5), 734-739.

Leana, C. R., & Pil, K. P. (2006). Social capital and organizational performance: Evidence from urban public schools. *Organization Science*, *17*, 353-366.

Lefebvre, V. M., Sorenson, D., Henchion, M., & Gellynck, X. (2016). Social capital and knowledge sharing performance of learning networks. *International Journal of Information Management*, *36*(4), 570-579.

Liu, J., & Chaminade, C. (2010). Dynamics of a technological innovator network and its impact on technological performance. *Innovation: Management, Policy & Practice*, 12, 53–74.

Lyu, C., Peng, C., Yang, H., Li, H., & Gu, X. (2022). Social capital and innovation performance of digital firms: Serial mediation effect of cross-border knowledge search and absorptive capacity. *Journal of Innovation & Knowledge*, *7*(2), 100187.

Macke, J., Vallejos, R. V., Faccin, K., & Genari, D. (2010, October). The Impact of Inter-organizational Social Capital in Collaborative Networks Competitiveness: An Empirical Analysis. In *Working Conference on Virtual Enterprises* (pp. 517-526). Springer, Berlin, Heidelberg.

Maietta, O. W. (2015). Determinants of university–firm R&D collaboration and its impact on innovation: A perspective from a low-tech industry. *Research Policy*, *44*(7), 1341-1359.

Mandry, F., & Koubaa, S. (2021). Exploring inter-organizational Knowledge Transfer and implications for innovation within the framework of Renewable Energy Projects' co-development: Case study of an institutional organization. *Revue Management Innovation*, *20*(3), 103-117.

Marchiori, D., & Franco, M. (2020). Knowledge transfer in the context of inter-organizational networks: Foundations and intellectual structures. *Journal of Innovation & Knowledge*, *5*(2), 130-139.

Mas-Tur, A., & Soriano, D. R. (2014). The level of innovation among young innovative companies: The impacts of knowledge-intensive services use, firm characteristics and the entrepreneur attributes. *Service Business*, *8*(1), 51-63.

Matricano, D., Candelo, E., Sorrentino, M., & Martínez-Martínez, A. (2019). Absorbing in-bound knowledge within open innovation processes. The case of Fiat Chrysler Automobiles. *Journal of Knowledge Management*, *23*(4), 786-807.

Martínez-Pérez, Á., Elche, D., & García-Villaverde, P. M. (2019). From diversity of interorganizational relationships to radical innovation in tourism destination: The role of knowledge exploration. *Journal of Destination Marketing & Management*, *11*, 80-88.

Martínez-Pérez, Á., García-Villaverde, P. M., & Elche, D. (2016). The mediating effect of ambidextrous knowledge strategy between social capital and innovation of cultural tourism clusters firms. *International Journal of Contemporary Hospitality Management*, *28*(7), 1484-1507.

Maurer, I., Bartsch, V., & Ebers, M. (2011). The value of intra-organizational social capital: How it fosters knowledge transfer, innovation performance, and growth. *Organization Studies*, *32*(2), 157-185.

Monavvarian, A., Asgari, N., Akhavan, P., & Ashena, M. (2013). Developing social capital for facilitating knowledge management practices. *International Journal of Social Economics*, *40*(9), 826-844.

Moraa, H., & Gathege, D. (2013, December). How ICT hubs models have impacted on the technology entrepreneurship development. In *Proceedings of the Sixth International Conference on Information and Communications Technologies and Development. 2*, 100-103.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital and the organizational advantage. *Academy of Management Review*, *23*, 242-266.

Nam, T. H., Tuan, N. P., & Van Minh, N. (2017). Critical successful factors for innovation in Vietnamese firms. *Journal of Industrial Engineering and Management*, *10*(3), 522-544.

Navarro, F. M. (2016). From Government Innovation to Public Innovation. The ICT as Key Tools. *International Journal of New Technology and Research*, *2*(6), 263496.

Nawinna, D., & Venable, J. R. (2019). Effects of ICT-enabled social capital on inter-organizational relationships and performance: empirical evidence from an emerging economy. *Information Technology for Development*, *25*(1), 49-68.

Nieto, M. J., & Santamaría, L. (2010). Technological collaboration: Bridging the innovation gap between small and large firms. *Journal of Small Business Management*, *48*(1), 44-69.

Noruzy, A., Dalfard, V. M., Azhdari, B., Nazari-Shirkouhi, S., & Rezazadeh, A. (2013). Relations between transformational leadership, organizational learning, knowledge management, organizational innovation, and organizational performance: an empirical investigation of manufacturing firms. *The International Journal of Advanced Manufacturing Technology*, *64*(5-8), 1073-1085.

Oliva, F. L., & Kotabe, M. (2019). Barriers, practices, methods and knowledge management tools in startups. *Journal of Knowledge Management*, *23*(9), 1838-1856.

Oliva, F. L., Couto, M. H. G., Santos, R. F., & Bresciani, S. (2018). The integration between knowledge management and dynamic capabilities in agile organizations. *Management Decision. 57*(8), 1960-1979.

Ortiz, B., Donate, M. J., & Guadamillas, F. (2018). Inter-organizational social capital as an antecedent of a firm's knowledge identification capability and external knowledge acquisition. *Journal of Knowledge Management*. 22(6). 1332-1357.

Ou, Y. C., Hsu, L. C., & Ou, S. L. (2015). Social capital and dynamic driving competitive advantage: the moderating role of corporate governance. *International Business Research*, *8*(5), 1-18.

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. Routledge.

Panir, M. J. H., Xiaolin, X., & Zijun, M. (2019). Integration of ICT With Knowledge Management to Foster Digital Innovation: The Case of Bangladesh Public Sector. *International Journal of Managing Public Sector Information and Communication Technologies*, *9*(4), 1-16.

Parida, V., & Örtqvist, D. (2015). Interactive effects of network capability, ICT capability, and financial slack on technology-based small firm innovation performance. *Journal of Small Business Management*, *53*, 278-298.

Park, C. (2020). Inter-organizational relationships management as a knowledge strategy: A simulation approach. *Dynamic Relationships Management Journal*, *9*(2), 5-18.

Peng, M. Y. P., Zhang, Z., Yen, H. Y., & Yang, S. M. (2019). Dynamic Capabilities and Firm Performance in the High-Tech Industry: Quadratic and Moderating Effects under Differing Ambidexterity Levels. *Sustainability*, *11*(18), 5004.

Pérez-Luño, A., Medina, C. C., Lavado, A. C., & Rodríguez, G. C. (2011). How social capital and knowledge affect innovation. *Journal of Business Research*, *64*(12), 1369-1376.

Petricevic, O., & Verbeke, A. (2019). Unbundling dynamic capabilities for inter-organizational collaboration. *Cross Cultural & Strategic Management. 26*(3), 422-448.

Pikkemaat, B., & Weiermair, K. (2007). Innovation through cooperation in destinations: first results of an empirical study in Austria. *Anatolia*, *18*(1), 67-83.

Pouwels, I., & Koster, F. (2017). Inter-organizational cooperation and organizational innovativeness. A comparative study. *International Journal of Innovation Science*, *9*(2), 184-204.

Qamariah, I., & Muchtar, Y. C. (2019). Analyzing business performance of small and medium enterprises (SMEs) based on human capital, social capital and competitive advantage. *Ecoforum Journal*, *8*(2). 1-8.

Qian, Y., Wang, M., Zou, Y., Jin, R., Yuan, R., & Wang, Q. (2019). Understanding the Double-Level Influence of Guanxi on Construction Innovation in China: The Mediating

Role of Interpersonal Knowledge Sharing and the Cross-Level Moderating Role of Inter-Organizational Relationships. *Sustainability*, *11*(6), 1657.

Robertson, J., Caruana, A., & Ferreira, C. (2021). Innovation performance: The effect of knowledge-based dynamic capabilities in cross-country innovation ecosystems. *International Business Review*, *32*(2), 1-14.

Robertson, J., McCarthy, I. P., & Pitt, L. (2019). Leveraging social capital in university-industry knowledge transfer strategies: a comparative positioning framework. *Knowledge Management Research & Practice*, *17*(4), 461-472.

Rossoni, L., Aranha, C. E., & Mendes-Da-Silva, W. (2018). Does the capital of social capital matter? Relational resources of the board and the performance of Brazilian companies. *Journal of Management & Governance*, *22*(1), 153-185.

Ruiz-Ortega, M. J., Parra-Requena, G., García-Villaverde, P. M., & Rodrigo-Alarcon, J. (2017). How does the closure of inter-organizational relationships affect entrepreneurial orientation? *BRQ Business Research Quarterly*, *20*(3), 178-191.

Scuotto, V., Santoro, G., Bresciani, S., & Del Giudice, M. (2017). Shifting intra-and inter-organizational innovation processes towards digital business: an empirical analysis of SMEs. *Creativity and Innovation Management*, *26*(3), 247-255.

Setini, M., Yasa, N. N. K., Supartha, I. W. G., Giantari, I. G. A. K., & Rajiani, I. (2020). The passway of women entrepreneurship: Starting from social capital with open innovation, through to knowledge sharing and innovative performance. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(2), 25.

Singh, S. K., Gupta, S., Busso, D., & Kamboj, S. (2021). Top management knowledge value, knowledge sharing practices, open innovation and organizational performance. *Journal of Business Research*, *128*, 788-798.

Singh, S. K., Mazzucchelli, A., Vessal, S. R., & Solidoro, A. (2021). Knowledge-based HRM practices and innovation performance: Role of social capital and knowledge sharing. *Journal of International Management*, *27*(1), 100830.

Subramony, M., Segers, J., Chadwick, C., & Shyamsunder, A. (2018). Leadership development practice bundles and organizational performance: The mediating role of human capital and social capital. *Journal of Business Research*, *83*, 120-129.

Susanty, A., Yuningsih, Y. & Anggadwita, G. (2019). Knowledge management practices and innovation performance: A study at Indonesian Government apparatus research and training center, *Journal of Science and Technology Policy Management*, 10(2), 301-318.

Svare, H., & Gausdal, A. H. (2017). Dynamic capabilities and network benefits. *Journal of Entrepreneurship, Management and Innovation*, *13*(1), 117-146.

Teece, D. J. (2019). A capability theory of the firm: an economics and (strategic) management perspective. *New Zealand Economic Papers*, *53*(1), 1-43.

Teece, D. J. (2014). A dynamic capabilities-based entrepreneurial theory of the multinational enterprise. *Journal of International Business Studies*, *45*(1), 8-37.

Teece, D. J. (2018). Dynamic capabilities as (workable) management systems theory. *Journal of Management & Organization*, *24*(3), 359-368.

Teixeira, S. J., Veiga, P. M., & Fernandes, C. A. (2019). The knowledge transfer and cooperation between universities and enterprises. *Knowledge Management Research & Practice*, *17*(4), 449-460.

Tortoriello, M. (2015). The social underpinnings of absorptive capacity: The moderating effects of structural holes on innovation generation based on external knowledge. *Strategic Management Journal*, *36*(4), 586-597.

Tsai, A. (2016). The effects of innovation by inter-organizational knowledge management. *Information Development*, *32*(5), 1402-1416.

Tsai, F. S., & Hsu, I. C. (2018). The effects of social capital on knowledge heterogeneity. *Management Decision. 57*(5), 1237-1253.

Uzzi, B., & Gillespie, J. J. (2002). Knowledge spillover in corporate financing networks: Embeddedness and the firm's debt performance. *Strategic Management Journal*, *23*(7), 595-618.

Van Wijk, Jansen, J., & Lyles, M. (2009, August). Social Capital, Knowledge Transfer and Outcomes: Meta-Analysis of a Moderated Mediation Model. In *Academy of Management Proceedings*, 1, 1-6). Briarcliff Manor, NY 10510: Academy of Management.

Vukšić, V. B., Bach, M. P., Inkinen, H. T., Kianto, A., & Vanhala, M. (2015). Knowledge management practices and innovation performance in Finland. *Baltic Journal of Management*, *10*(4), 432-455.

Wang, J. (2018). Innovation and government intervention: A comparison of Singapore and Hong Kong. *Research Policy*, *47*(2), 399-412.

Wang, Y. B., & Ho, C. W. (2017). No Money? No Problem! The Value of Sustainability: Social Capital Drives the Relationship among Customer Identification and Citizenship Behavior in Sharing Economy. *Sustainability*, *9*(8), 1400.

Wang, Z., & Wang, N. (2012). Knowledge sharing, innovation and firm performance. *Expert systems with applications*, *39*(10), 8899-8908.

Wegner, D., Faccin, K., & Dolci, P. C. (2018). Opening the black box of small-firm networks: governance mechanisms and their impact on social capital. *International Journal of Entrepreneurship and Small Business*, *35*(4), 559-578.

Wen, Q., & Qiang, M. (2016). Coordination and knowledge sharing in construction project-based organization: A longitudinal structural equation model analysis. *Automation in Construction*, *72*, 309-320.

Wu, G. D. (2013). Knowledge collaborative incentive based on inter-organizational cooperative innovation of project-based supply chain. *Journal of Industrial Engineering and Management*, *6*(4), 1065-1081.

Yu, A. Y., Hao, J. X., Dong, X. Y., & Khalifa, M. (2010). Revisiting the effect of social capital on knowledge sharing in work teams: A multilevel approach. *International Conference on Information Systems (ICIS) Proceedings*, AISeL, 1-18.

Zafar, A., & Mustafa, S. (2017). SMEs and its role in economic and socio-economic development of Pakistan. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *6*(4), 1-16.

Zhang, X., Liu, S., Chen, X., & Gong, Y. (2017). Social capital, motivations, and knowledge sharing intention in health Q&A communities. *Management Decision*, *55*(7), 1536-1557.

Zheng, J., Wu, G., & Xie, H. (2017). Impacts of leadership on project-based organizational innovation performance: The mediator of knowledge sharing and moderator of social capital. *Sustainability*, *9*(10), 1893.

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