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The Role of Intellectual Capital and Knowledge Sharing in Manufacturing SMEs' Innovation and Firm Performance

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Abstract

This research work draws attention to the value of the correlation between intellectual capital, knowledge sharing, innovation performance, and firm performance. The study focused on Jordanian manufacturing sector, where this sector has a substantial role in the Jordanian economy. The study employed a quantitative research approach, through designing a questionnaire survey in purpose of collecting data from manufacturing firms in Jordan. The data were obtained from 216 questionnaires out of 250 distributed. The study findings revealed a positive relation between intellectual capital and innovation performance, knowledge sharing, and firm performance. It can be concluded that intellectual capital components, structural, human, and relational capital, positively impacted knowledge sharing within firms. Additionally, the study findings indicated that knowledge sharing is found to partially mediate the relationship between intellectual capital and both innovation performance and firm performance. The study also highlights the potential for manufacturing firms to boost their innovation and overall performance by paying more attention to their intellectual capital, in addition to promoting a culture of knowledge sharing among employees. This study as well provides valuable insights for decision makers on achieving a sustainable competitive advantage through effective knowledge management and innovation strategies.

Keywords: *Firm performance, Intellectual Capital, Innovation, Knowledge sharing, Firm performance, Manufacturing SMEs.*

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1 Introduction

Nowadays, competition becomes very challenging for firms, and surviving in markets requires agility and flexibility in adapting to new trends and leveraging latent technologies [1]. For instance, the widespread of artificial intelligence (AI) technologies and applications placed a pressure on firms to ensure effective use and integration of all resources [2]. This involves maintaining effective communication to aid in building a culture within firms that motivate employees to share knowledge, collaborate in work assignments, and make best use of their intellectual capital.

On this regard, firms recognized the value of their intellectual capital as intangible assets for businesses, as it driving economic growth and supports the firm's competitiveness [3]. The association among intellectual capital and innovation capabilities is seen as a critical factor of firm success [4]. In essence, intellectual capital acts as main stream of generating novel and new ideas, it severs as foundation resource of innovation [5]. This can be achieved when firms effectively manage their knowledge to foster new knowledge and fresh insights that serves as valuable asset to firms to improve their abilities to thrive and compete [6]. Furthermore, as evident by multiple studies, knowledge is vital asset for firms to survive in dynamic markets where changes occur in rapid-paced and competition is at higher levels [7]–[9].

Furthermore, organizations are demanded to establish guidelines, strategies, and build the required settings and infrastructures to make the best use of their knowledge. Managing knowledge is expected to support organizational performance and contribute to better financial outcomes [10]. Knowledge sharing, a knowledge management practice, is believed to enhance efficiency and performance of the organization [11], [12]. In essence, effective knowledge sharing in any organization is expected to enhance its performance by fostering innovation and developing various organizational capabilities [13]. Knowledge sharing involves the collective beliefs or behavioral patterns related to the dissemination of knowledge among different individuals or units within an organization [14]. Organizations are asked to promote a culture of knowledge sharing for various reasons. As sharing knowledge among employees would improve their skills to innovate, provide efficient solutions, and perform their job tasks in shorter time and higher quality [11]. This implicitly reflecting in building employees capacities, which in turn strengthen the tie between employees and firms, leading to create a positive environment promotes collaboration, teamwork, and job loyalty impacting the firm overall success [15].

This study targeted Jordan manufacturing sector due to its importance for the overall country's economy. The sector provides around 14% of Jordan's GDP and offers wide range of job opportunities, it employs for approximately around 100,000 people. The sector includes variety of sub-sectors, such as textiles, food and beverage processing, pharmaceuticals, chemicals, and construction materials [16]. The business nature of this sector is very competitive, firms within this sector are knowledge-intensive and innovative [17]. This creates the motive of this study, whereby the expected outcomes are deemed to help decision makers within this sector to plan their strategies in light of their innovative capabilities, as well better understand the relation between intellectual capital and knowledge sharing and their influence on innovation and performance abilities.

2 Study Background and Hypotheses Development

The advancements in information and communication technologies have influenced how firms manage and perform their activities. For example, knowledge sharing practice is affected by the availability of different technologies, such as, Enterprise social networks, collaborative platforms, and mobile applications. Such technologies facilitate the flow of sharing knowledge within firm, allow for real time interaction, and helps in creating a culture of knowledge sharing [18], [19].

2.1 Intellectual Capital

The perception of intellectual capital (IC) has changed over time. In fact, firms running their business in new economy that characterized by knowledge and the advent of digital technologies, so the term knowledge economy and digital economy come to surface. This implies the need for firms to be able to adapt and change, which stimulated the attention towards the intangible assets of the firm and the how are managed [20]. In this new economic, IC is regarded as a firm's greatest asset [21]. However, IC basically includes three components, structural capital, human capital, and relational capital [22]. In essence, structural capital refers to the capabilities of firms comprising the firm's database, information systems. While, human capital improves the efficiency of the workload and reflected into improved innovation performance [4]. Relational capital in addition to focuses on relationships with employees and external stakeholders. The interaction among the three elements can enhance the innovation and overall firm performance [22]. The following sections emphasize on the relation between IC components with Knowledge Sharing, and suggesting the hypothesis of this study.

2.2.1 Structural Capital and Knowledge Sharing

Structural capital refers to the explicit knowledge of a firm. This includes the firm charts, standard processes, procedures, programs, and other valuable intangible assets [23]. Patents, trademarks, standardized processes, information repositories, organizational structure, and brand reputation are all examples of structural capital in organizations. However, it is a need for organizations to effectively manage their structural capital for long term success and development. Managing the structural capital include dealing with both types of knowledge. For instance, the explicit knowledge which is stored in databases and information systems that serve as a reference for employees [24]. As well, the tacit knowledge that resides in forms of experience and skills in employees that cannot be taken from employees when leaving the organization [24]. In this context, structural capital also functions as the "organizational memory" or "knowledge infrastructure" of a firm and enables it to adapt to changes within and outside the organization. By promoting knowledge sharing and exchange among employees, the chances of creating new knowledge and gaining new experiences will be maximized. This forms a significant part of leveraging structural capital within organization. Such practice is expected to support organizations to make better decisions through better planning. As well, utilize the collective intelligence and capabilities of their workforce, leading to innovation and enhanced organizational performance [25]. Therefore, we can suggest the following hypothesis:

H1. Structural capital has a positive and significant impact on knowledge sharing.

2.2.2 Human Capital and Knowledge Sharing

Human capital embodies talents, skills, and know-hows, the knowledge and expertise of the firm's working staff that were gained over time and through different training and career development plans [26]–[28]. Human Capital as intangible assets of the organization deemed to have a major influence on improving the overall performance. However, organization seeks different ways to enhance their human capital to avoid missing any opportunities for growth and development. Knowledge sharing, which is essential due to staff movement and turnaround, allows employees to exchange expertise and learn from one another. This can lead to improve the collective human capital within the firms [4], [8]. Additionally, sharing of special skills, methods, and experiences among employees can also boost their job performance. For instance, when employees connect efficiently with their colleagues, share insights, and exchange experience, will not only support employees but also enhances the overall employees' experience [29].

Therefore, when firms encourage knowledge sharing culture can benefit from providing opportunities for their employees to develop problem-solving skills and be able to exploit their knowledge to be more innovative and enhance business profitability [30]. Therefore, we can suggest the following hypothesis:

H2. Human capital has a positive and significant impact on knowledge sharing

2.2.3 Relational Capital and Knowledge Sharing

Relational capital consists of internal and external components. Internal relational capital involves the collaboration and interaction among the firm and its internal stakeholders. This interaction occurs between the different departments in the firm in which employees engaged to establish effective sharing routine [31], [32].

On the other hand, external relational capital refers to the relationship between the firm and any external stakeholders involved in firm's business. For example, distributors or shippers, suppliers, and partners. Such relationship is important to ensure a proper collaborating and cooperating between stakeholders and the firm to run their business smoothly [33], [34].

The base of relational capital is built on the sharing procedure and circulation of knowledge that was collected from firm networking and other resources. This process generates new knowledge and expertise between the firm and its stakeholders. Consequently, firms will develop into learning organization, in which a learning and collaboration culture is formed leading to improved and optimized business model [33]–[35].

Furthermore, it is recommended for firms to practice knowledge sharing among internal and external stakeholders to help exchange thoughts and views, and resolve any issues. Thus, organizations are urged to adopt knowledge sharing activities to sustain their competitive advantages. Therefore, the following hypotheses are proposed:

H3. Internal relational capital has a positive and significant impact on knowledge sharing.

H4. External Relational capital has a positive and significant impact on knowledge sharing.

2.2 Knowledge Sharing and Innovation Performance

Knowledge is vital and valuable asset for an organization to stay innovative and competitive in the marketplace. The value of knowledge can be maximized when organizations are able to make their knowledge accessible and useful through various

sources. One way is by encouraging knowledge sharing practices among employees. Knowledge sharing is convenient and simulate human nature to socialize and communicate. Hence, the free flow of knowledge helps organizations to learn faster and better identify and implement improvements in their processes, products, and services. This demonstrates a strong tie between knowledge sharing and innovation. As when employees' share their knowledge, skill, and experience is seen as valuable inputs for innovation [4], [11], [12].

Thus, the innovation capacity of any firm can be measured by the firms' ability to convert knowledge into usable form in order to create new methods of problem-solving, develop new products or services that act as respond to the market demand [36] which also demonstrated the level of performance of any firm. Whereas firms that are innovative usually perform better than firms that are not innovative [11]. According to that, when a firm is able to promote knowledge sharing practices and culture, innovation appears in teams, units and/or the whole firm [4]. Consequently, the following hypothesis is proposed:

H5. Knowledge sharing has a positive and significant impact on innovation performance.

2.3 Knowledge Sharing and Firm Performance

Firms are seeking continues improvements of their performance, they will be striving all the possible ways to achieve it and measure how well their objectives and needs are met. Knowledge sharing is considered the cornerstone of organizational learning and provides significant benefits to any firm [37], [38]. It was proved that the practice of knowledge sharing reflected positively on the firm's human capital, specifically employee competencies and capacities, which supports the firm's overall performance. This includes improvements in the firm business process and the developed products or services [39]. In our study, three dimensions were considered to measure the performance of the firm, namely: operational efficiency and excellence, financial returns, and customer viewpoint.

Consequently, an investigation carried out to assess knowledge sharing role in accordance to the above firm performance dimensions. Different studies asserted on sharing knowledge practices importance on business success. The culture of knowledge sharing motivates employees to freely exchange information, insights, and expertise, it fosters an environment of creativity, innovation, and problem-solving in firms [12], [40]. Such collaborative culture possibly leads to generate new ideas, processes, and products, enhancing the firm's competitive edge. which in turn boosts operational excellence [41], through more efficient operations, reduced cost, and improved productivity. This positively affects firm's profitability and eventually generating financial returns for the firm [42]. Moreover, knowledge sharing among employees guarantees a deeper understanding of customer needs and preferences. Employees will be more informed and able to address customer issues promptly and deliver a better overall experience[2].

Building the firm's capacity to provide goods and services that up to customer expectations, which in turn increases customer loyalty and satisfaction and thus leading to better firm's profitability. Therefore, the following hypotheses are proposed:

H6a. Knowledge sharing has a positive and significant impact on Financial Returns.

H6b. Knowledge sharing has a positive and significant impact on Customer Perspective

H6c. Knowledge sharing has a positive and significant impact on Operational Excellence

2.4 The Mediating Role of Knowledge Sharing

Knowledge sharing involves the processes by which knowledge becomes accessible and usable from diverse sources. By enabling the exchange of information and ideas among employees, it promotes a collaborative and innovative atmosphere where insights, best practices, and expertise are shared. Such an environment transforms the structural capital of the firm to become more dynamic and adaptable, consequently enhancing innovation performance by providing the necessary resources and support for creative endeavors.

Knowledge significantly influences the capabilities of innovation as well, the capabilities of individuals and organizations [6]. Knowing that, innovation performance is closely tied to overall firm performance. In essence, the ability to locate and share knowledge in the firm has a direct relationship with firm performance [43].

Furthermore, KM capabilities, knowledge sharing in particular, played a major positive role in supporting SMEs performance [26], [37]. As such, firms are required to developing efficient mechanisms for managing knowledge in order to attain high levels of performance.

Therefore, as knowledge sharing plays a mediating role among intellectual capital from one side, and innovation and firm performance from the other side, knowledge sharing deemed to contribute to the firm's business processes and functions. Which will be the building block for the firms' innovative capacity and reflected in improving the firm's competitiveness, market positioning, and financial outcomes. Hence, the following hypothesis is proposed:

H7: Knowledge sharing mediates the relationship between Intellectual capital and both innovation performance and firm performance.

Accordingly, it can be noted that previous studies have examined the role of IC and KS in firm's performance, whereas a little research were found that embarked upon their combined effects in the context of manufacturing SMEs and particularly within developing countries like Jordan. Further, the existing research found to be more focused on large firms with higher reliant on advanced technologies, so different factors and challenges to deal with. Thus, this study proposed a framework integrates IC components to examine their impacts on KS, as well investigate their impacts on innovation and firm performance. This study offers an empirical evidence from manufacturing SMEs that operates in a developing country, in which the utilization of knowledge management practice and other emerging technologies are considered immature.

2.4 The Research Model

Based on the above discussion, this study proposed the following research model as appeared in Fig. 1.

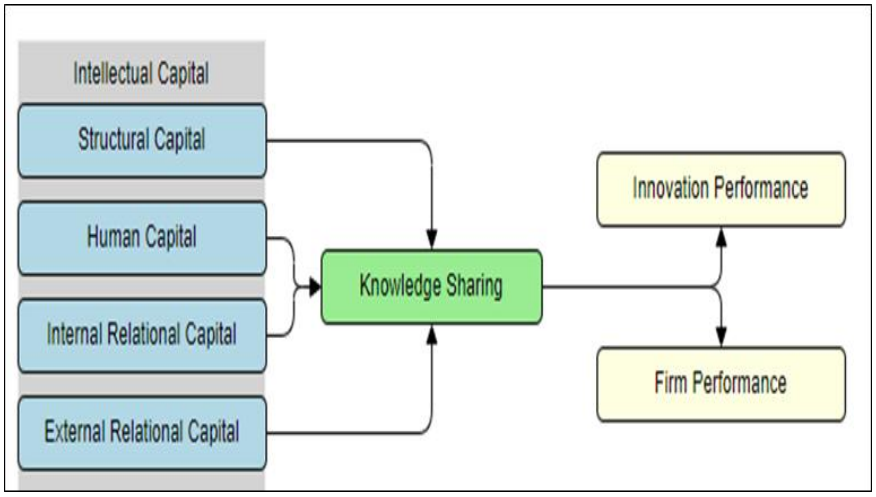

Fig. 1. The research model

3 Research Methodology

3.1 Data Collection

For the sake of this research work, the data were collected during the period 2023–2024, using electronic questionnaire survey. The study targeted manufacturing SMEs in Jordan, whereby decision makers, such as owners and top managers were targeted as respondents. The details of manufacturing SMEs' in Jordan was retrieved from the records of Jordan Chamber of Industry and directory. The questionnaire was developed based on literature review and in accordance to the Jordanian context. However, to ensure validity of questionnaire instrument and before starting the data collection process, the questionnaire survey was reviewed and validated by a panel of experts. The panel consist of two academic professors with a solid expertise in research methods, two CEOs from the industry, and two senior business managers to figure out any issues or problems related to content or measurement items of the questionnaire. However, after undergoing several revisions, the questionnaire for data collection was finalized. The questionnaire uses a five-point Likert scale, with 1 refers to strong disagreement, 5 refers to strong agreement.

3.2 Measurement

This study reused and adapted measurement items from scales found in the literature to make sure reliability and content validity. Therefore, the structural capital measurement was derived from previous studies [44]–[46]. The human capital measurement was adopted from [44]–[48]. The relational capital measurement, both internal and external, was developed according to [44], [45], [49]. While knowledge sharing measurement was based on [50], [51]. The innovation performance measurement was based on study by [52], [53]. The firm performance measurement by the means of operational excellence and performance was adapted from [54]. However, the firm performance measurement by the means of financial performance was selected according to [54]–[56].

4 Results

4.1 Profile of Respondents

The electronically administered questionnaire survey has been sent to 250 manufacturing SMEs in Jordan, out of which 216 usable survey instruments were considered for further analysis. Most of the respondents are male rating 85.2%, and the rest are female, rating 14.8%. The respondents' age ranged from less than 25 years at 1.9% to between 36-55 rating of 40.7% and 46-55 at 22.2. The majority of the respondents are from private sector rating 94.4% and only 5.6% from government sector, with experience range from less than 2 years at 5.6% to between 16-20 years rating at 29.5%. Table 1 shows the respondents' demographic profile.

Table 1. Respondents' Summary

Variables	Group	f	%
Gender	Male	184	85.2
	Female	32	14.8
Age	Less than 25	4	1.9
	25-35	72	33.3
	36-45	88	40.7
	46-55	48	22.2
	More than 55	4	1.9
Years of Experience	Less than 2 years	12	5.6
	2-6	28	13.0
	7-10	20	9.3
	11-15	40	18.5
	16-20	64	29.5
	More than 20 years	52	24.1
Business Sector	Government	12	5.6
	Private	240	94.4
Σ		216	100

4.2 Goodness of Measure

The first and most critical test that must be conducted to measure the goodness of the instrument is the reliability tests which usually used on the collected data to assess the quality of measures. Before conducting any statistical test on the gathered data, the statistical analysis must start with the reliability test.

4.3 Reliability Analysis

The reliability test was conducted to assess the internal consistency of the 31 survey items designed to measure seven key variables: Structural Capital, Human Capital, Internal Relational Capital, External Relational Capital, Knowledge Sharing, Innovation Performance, and Firm Performance. The analysis employed Cronbach's alpha (α) to evaluate reliability, yielding a coefficient of 0.94. This value significantly exceeds the commonly accepted threshold of 0.60, indicating a high level of reliability. Table 2 presents the detailed results of the reliability analysis for the study's scales and constructs.

Table 2. Scales and Constructs Reliability Analysis

Item	Result
(α)	.94
Items Number	31
Variance	291.88
Test Mean	120
Stand. Devi. for Test	17
Construct	(α)
Structural Capital	.89
Human Capital	.89
Internal Relational Capital	.87
External Relational Capital	.88
Knowledge Sharing	.88
Innovation Performance	.89
Firm Performance	.88

4.4 The Value of the Intellectual Capital and Knowledge Sharing on Innovation and Firm Performance

The results of the descriptive statistics show that the 5 Intellectual Capital and Knowledge Sharing which are the independent and mediating variables that affect the 2 dependent variable which are the Innovation and Firm Performance, and that also shows a significant impact on them. However, the participants' perceptions of the most important five variables in Innovation and Firm Performance are: Structural Capital, Human Capital, Internal Relational Capital, External Relational Capital, and Knowledge Sharing, with mean values of 4.0, 3.9, 3.9, 3.9, and 3.9, respectively, and standard deviations ranging from 0.27 to 0.66. The results of the descriptive statistics in the following table demonstrate the importance of the identified Intellectual Capital and Knowledge Sharing components in improving Innovation and Firm Performance.

The descriptive statistics reveal that the five dimensions of Intellectual Capital and Knowledge Sharing, serving as independent and mediating variables, exert a significant impact on the two dependent variables: Innovation and Firm Performance. Participants identified Structural Capital, Human Capital, Internal Relational Capital, External Relational Capital, and Knowledge Sharing as the most critical variables influencing Innovation and Firm Performance. These variables achieved mean values of 4.0, 3.9, 3.9, 3.9, and 3.9, respectively, with standard deviations ranging from 0.27 to 0.66. The detailed descriptive statistics, as presented in the accompanying table, underscore the pivotal role of Intellectual Capital and Knowledge Sharing in enhancing Innovation and Firm Performance. Table 3 describes the above discussion.

Table 3. Descriptive Statistics Summary

Construct	μ	Σ	Skewness	Kurtosis
Structural Capital	4.0	.70	.47	.13
Human Capital	3.9	.76	.66	.31
Internal Relational Capital	3.9	.77	.61	.22
External Relational Capital	3.9	.72	.27	.26
Knowledge Sharing	3.9	.57	.35	.04
Innovation Performance	3.7	.93	.57	.05
Firm Performance	3.8	.61	.29	.26

4.5 Hypothesis Testing

Table 4 presents the results of the correlation analysis, indicating strong associations among all research variables. A Pearson correlation analysis was conducted to determine the strength and direction of the linear relationships between the variables. The analysis revealed significant and positive correlations between all independent variables and both the mediating and dependent variables. These findings are supported by the medium to large significant correlations observed among the variables, all at the .01 level (two-tailed). Prior to performing the correlation analysis, a preliminary assessment confirmed that the assumptions of normality, linearity, and homoscedasticity were met. The bivariate correlations were analyzed using a two-tailed test of significance at two levels: highly significant ($p < .01$) and significant ($p < .05$). This rigorous approach allowed for a comprehensive examination of the relationships between all variable pairs, including independent, dependent, and mediating variables. The statistical notes accompanying Table 4 provide further insights into these significant relationships.

Table 4. Summary of Correlation Analysis

Measures	SC	HC	IC	EC	KS	IP	FP
Structural Capital (SC)	1.00						
Human Capital (HC)	.533**	1.00					
Internal Relational Capital (IC)	.570**	.656**	1.00				
External Relational Capital (EC)	.517**	.564**	.735**	1.00			
Knowledge Sharing (KS)	.568**	.581**	.682**	.660**	1.00		
Innovation Performance (IP)	.453**	.431**	.587**	.577**	.539**	1.00	
Firm Performance (FP)	.475**	.542**	.571**	.578**	.582**	.651*	1.00

Note: *Correlation is significant at the .05 level (2 tailed). **Correlation is significant at the .01 level (2 tailed).

The findings presented in Table 5 reveal that Intellectual Capital accounts for 56% of the variance in Knowledge Sharing (R2=.653). With an F value of 68, the Knowledge Sharing variable exhibits a significant linear model at α <= .01, signifying the significance of one or more independent variables that substantially contribute to Knowledge Sharing. Notably, Structural Capital (β =.192, p<.01), Human Capital (β =.141, p<.05), Internal Relational Capital (β =.274, p<.01), and External Relational Capital (β =.280 p<.01) demonstrate high and significant beta coefficient values, indicating their substantial positive impact on Knowledge Sharing. These results show that each Intellectual Capital variable makes a distinct and significant contribution to the Knowledge Sharing. The notable contribution was from the External Relational Capital variable because it makes the largest and strongest beta value among other independent variables, followed by Internal Relational Capital variable. The participants perceived that the 4 four types of Intellectual Capital are very important variables that contribute to the Knowledge Sharing at within the organization.

Table 5. Multiple Regressions for IVs x MV: (β).

Intellectual Capital	Knowledge Sharing
Structural Capital	.192***
Human Capital	.141**
Internal Relational Capital	.274***
External Relational Capital	.280***
R	.750
R^2	.563
Adjust R^2	.555
F	68***

Notes: Significant levels: ***p<.01; ** p<.05; * p<.1

Table 6 illustrates the impact of the Knowledge Sharing on Innovation and Firm Performance. According to the results, there is a significant and positive impact of Knowledge Sharing on Innovation and Firm Performance. Knowledge Sharing variable alone makes up to 29% of the variance in Innovation Performance (R2=.291), and 34% in Firm Performance (R2=.339). The F value is 88 in Innovation Performance and 110 in Firm Performance with significant linear model at α <.01 for both dependent variables, these results indicates that Knowledge Sharing variable alone significantly contributes to both Innovation and Firm Performance. In addition, Knowledge Sharing has (β =.539, p<.01) in Innovation Performance and (β =.582, p<.01) in Firm Performance which are high and significant beta coefficient values and that indicate a high contribution and positive impact on both Innovation and Firm Performance.

Table 6. Multiple Regressions for MV x DVs: (β).

Mediating Variable	Innovation Performance	Firm Performance
Knowledge Sharing	.539***	.582***
R	.539	.582
R^2	.291	.339
Adjust R^2	.287	.336
F	87.7***	110***

Notes: Significant levels: ***p<.01; ** p<.05; * p<.1

Tables 6 and 7 present the results of a hierarchical multiple regression analysis conducted to examine the relationships among the independent, mediating, and dependent variables. This two-step regression analysis assessed the mediating role of Knowledge Sharing in the

relationship between Intellectual Capital and the dependent variables, Innovation Performance and Firm Performance. Table 7 demonstrates that Intellectual Capital accounts for 63% of the variance in Innovation Performance in the first step ($R^2 = 0.63$) and 64% in the second step ($R^2 = 0.64$) after including Knowledge Sharing as a mediating variable. This indicates a modest yet statistically significant increase of 1% in the variance explained for Innovation Performance.

The F-values for the two steps, 35.53 and 29.6, respectively, are significant at $\alpha < .01$, confirming the meaningful increase in the variance of Innovation Performance. The change in R^2 (R^2 Change = 0.011, $p < .05$) signifies that Knowledge Sharing explains an additional 1.1% of the total variance in Innovation Performance. This contribution is statistically significant, as indicated by the Sig. F Change value ($p < .05$). Furthermore, in the second step, the beta coefficient for Knowledge Sharing ($\beta = 0.157$, $p < .05$) highlights its unique contribution, explaining 16% of the variance in Innovation Performance. These findings underscore the significant mediating role of Knowledge Sharing in the relationship between Intellectual Capital and Innovation Performance. Detailed results are provided in Table 7.

Table 7. Hierarchical Multiple Regression: The Mediating Effect of the Knowledge Sharing on the Relationship between Intellectual Capital and Innovation Performance.

Dependent Variable	Independent Variables	Std. Beta Step 1	Std. Beta Step 2
Innovation Performance	Structural Capital	.133**	.103*
	Human Capital	.002*	-.02*
	Internal Relational Capital	.299***	.256**
	External Relational Capital	.287***	.243***
	Mediating		.157**
	Knowledge Sharing (KS)		
	R^2	.63	.64
	R^2 Change	.40	.011
	F Change	35.5	3.86
	Sig. F change	.000	.051
	F	35.53***	29.6***

Note: Significant levels: ***p<0.01 **p<0.05 *p<0.1
Step 1: Refers to regression with the independent of 4 dimensions of Intellectual Capital.
Step 2: Refers to regression with the 4 dimensions and the mediating variable.

Table 8 demonstrates how Intellectual Capital explain 65% of the variance in Firm Performance (R2 = 0.65) in the first step, and in the second step explain 67% (R2 = 0.67). These results show an increase by 2% in the variance of Firm Performance after considering Knowledge Sharing as a mediating variable.

The F-values for the two steps, 39.1 and 33.9, respectively, are both significant at $\alpha < .01$, indicating that the increase in the variance of Firm Performance is statistically significant. These results confirm the significant mediating role of Knowledge Sharing in the relationship between Intellectual Capital and Firm Performance. The change in R^2 from step 1 to step 2 is 2.1% (R^2 Change = 0.021, $p < .01$), demonstrating that Knowledge Sharing explains an additional 2.1% of the overall variance in Firm Performance. This increase is statistically significant, as evidenced by the Sig. F Change value ($p < .01$). Moreover, in the second step, the beta coefficient for Knowledge Sharing ($\beta = 0.221$, $p <$

.01) indicates a unique contribution of 22%, highlighting its substantial role in explaining the variance in Firm Performance. These findings provide strong statistical evidence of the critical influence of Knowledge Sharing in enhancing Firm Performance. The details of the above discussion presented in the following Table 8.

Table 8. Hierarchical Multiple Regression: The Mediating Effect of the Knowledge Sharing on the Relationship between Intellectual Capital and Firm Performance.

Dependent Variable	Independent Variables	Std. Beta Step 1	Std. Beta Step 2
Firm Performance	Structural Capital	.131**	.088
	Human Capital	.217***	.186*
	Internal Relational Capital	.151*	.09
	External Relational Capital	.277***	.215*
	Mediating Knowledge Sharing (KS)		.221***
	R^2	.65	.67
	R^2 Change	.43	.021
	F Change	39.1	8.1
	Sig. F change	.000	.005
	F	39.1***	33.9***

Note: Significant levels: ***p<0.01 **p<0.05 *p<0.1
Step 1: Refers to regression with the independent of 4 dimensions of Intellectual Capital.
Step 2: Refers to regression with the 4 dimensions and the mediating variable.

5 Discussion

As shown in Table 9, the findings of this study approve all proposed hypotheses, highlighting a positive and significant correlation among the variables in the research framework: Intellectual Capital, Knowledge Sharing, Innovation, and Firm Performance. Notably, the substantial impact of Intellectual Capital on both Innovation and firm Performance, facilitated by Knowledge Sharing, underscores the positive and significant correlation between all variables under consideration. These outcomes not only affirm the hypotheses put forth in this research but also align with findings from prior studies, as evidenced by [4], [23], [38], [57].

Furthermore, the study has uncovered a compelling finding: intellectual capital serves as a pivotal driver of both innovation and firm performance through the mechanism of knowledge sharing, this is aligned with the findings of studies from the literature [57], [58]. Notably, the exploration of this relationship in depth remains scarce in existing literature, and this study fills that gap by presenting a comprehensive theoretical model. As per the study model, intellectual capital establishes a direct link with knowledge sharing, which in turn, directly influences performance while also bolstering innovation and firm performance as well as facilitates the continuous learning and adaptation of AI technologies. This underscores the critical role of knowledge sharing in stimulating innovation and enhancing firm performance, particularly within manufacturing SMEs.

Our study's findings offer fresh insights into knowledge-based view processes by elucidating the business value of knowledge sharing alongside the three components of intellectual capital. Undoubtedly, knowledge-related resources emerge as fundamental determinants of a firm's success and sustained superior performance. In comparison to

tangible resources, intellectual capital confers a significantly more enduring and valuable competitive advantage, propelling growth and prosperity. To maintain a competitive edge and thrive in today's fiercely competitive marketplace, businesses must prioritize investments in knowledge-related resources [59], [60]. Besides, the exploration of a positive relationship between IC and KS marks a significant advancement in knowledge management and IC research. Our study indicates that knowledge sharing offers organizational benefits by providing avenues for enhancing various components of IC. Specifically, Knowledge Sharing contributes to the enrichment of human and structural capital through exchanges of resources in different formats, such as the formal reports, training courses, IT systems, and similar initiatives. These findings align partially with prior research [4], [57], [61]. While previous studies have explored the empirical relationships between IC, KS, and firm performance, scant attention has been given to the specific impacts of IC and KS on different types of firm performance within a unified model, consistent with earlier research [10], [39], [62], [63]. Past investigations have predominantly focused on the relationship between knowledge sharing and performance at individual and team levels. However, recent scholarly interest has shifted towards examining the influence of knowledge sharing on organizational performance [8], [11], [12].

As our study findings confirmed that knowledge sharing and intellectual capital are essential to foster innovation. This draws attention to additional positive consequences including reduction of work redundancy, accelerating employee development, and supports continuous improvement, making organizations more agile and responsive to market changes. This in turn, helps in optimizing the use of AI and other intelligent technologies, leading to maximizing the operational excellence and ultimately driving sustainable growth and success.

Table 9. Summary of research hypothesis and key findings

Hypothesis Statement	Key Finding
H1:Structural capital has a positive and significant impact on knowledge sharing.	Supported – Structural capital improves knowledge sharing practices by offering systems, processes, and organizational memory.
H2: Human capital has a positive and significant impact on knowledge sharing.	Supported – Employees' expertise, skills, and training enhances knowledge sharing behaviors.
H3:Internal relational capital has a positive and significant impact on knowledge sharing.	Supported – Effective internal collaboration strengthens knowledge sharing culture.
H4: External relational capital has a positive and significant impact on knowledge sharing.	Supported – Strong relationships with external stakeholders facilitate knowledge exchange and innovation.
H5: Knowledge sharing has a positive and significant impact on innovation performance.	Supported – Firms with active knowledge-sharing practices experience better innovation outcomes.

H6a: Knowledge sharing has a positive and significant impact on financial returns.	Supported – Knowledge sharing leads to improved financial performance through efficiency and innovation.
H6b: Knowledge sharing has a positive and significant impact on customer perspective.	Supported – Firms with strong knowledge sharing cultures provide better customer service and satisfaction.
H6c: Knowledge sharing has a positive and significant impact on operational excellence.	Supported – Knowledge sharing improves productivity, process efficiency, and overall firm performance.
H7: Knowledge sharing mediates the relationship between intellectual capital and both innovation performance and firm performance.	Supported – Knowledge sharing serves as a critical link, amplifying the impact of intellectual capital on innovation and firm success.

6 Conclusion

The main motive of this study was to examine the factors that support firms to improve their innovation capabilities and reach better outcomes. Accordingly, a theoretical framework was proposed to investigate the correlation between intellectual capital and knowledge sharing and their impacts on innovation and firm performance. Based on proposed hypotheses and after analysing data collected from manufacturing SMEs firms in Jordan, findings showed that intellectual capital components are positively impacting the practice of knowledge sharing. This eventually highlighted the importance of structural capital, human capital, and relational capital in improving the culture of knowledge sharing in firms. This will be reflected in a positive way on the innovation and performance of the firm. In essence, the environment of manufacturing firms is dynamic and challenging, it requires an equipped working staff with the right skills and knowledge to help firms to survive and compete. So, understanding the findings of this study promise firms with many benefits and would provide valuable inputs for decision and policy makers in preparing and developing the strategic plans of the firm.

Furthermore, digging deeply on the relationships between intellectual capital and knowledge sharing, the findings affirms that a firm's culture and system are vital elements in fostering a knowledge sharing environment and promoting innovation. This is essential, especially in today’s time-sensitive business markets, firms must be agile and innovative to stay ahead of the competition. In fact, working in environment supports knowledge sharing, the expertise and insights will be shared helping firms to enhance collaboration, drive innovation, and ultimately attain better business results.

At practical level, the study findings could support managers in the manufacturing industry to follow a proper strategy that inspire knowledge sharing among employees. As the competition between employees can sometimes impede the exchange of knowledge within a firm. Therefore, it is vital to implement effective incentive mechanisms to encourage employees to share and collaborate and thus building a collaborative work environment. For instance, incentives could be in a form of paid recognition for accomplishments, establishing a fair rewarding system, and offering relevant support, to ensure that

employees feel valued and motivated to share their expertise with others. Additionally, to achieve long-term growth, firms must support their human capital and train employees regularly.

Moreover, managers could invest in technology and implement a knowledge management system that facilitate knowledge sharing and innovation. The system provides a platform to capture, collect, refine, share, and utilize knowledge within the firm. By doing this, the firm will be transformed into a learning organization characterized by its ability to adapt and respond promptly to the dynamic market needs and changes.

7 Limitation and Future Research

This study targets Jordanian manufacturing SMEs, in which the findings and recommendations are relevant to Jordanian culture and context, thus generalizing the findings for different cultures and contexts are deemed to be imprecise. Furthermore, the study followed a quantitative approach for data collection, through which anticipating respondent's views via online questionnaire survey faced difficulties due to email filter applications, incorrect or inoperative email addresses, and respondents' willingness and busy schedule.

Future research could focus on the emerging technologies, such as Artificial Intelligence (AI), and how such technologies could impact the relationship between IC and KS in SMEs, in addition, it is important to investigate how the use of AI tools could influence knowledge sharing practices in firms and how it also affects the innovation capabilities and the overall performance of the firm. As well, targeting different sectors and industries and even different types of organizations could be an interesting area of future research.

References

[1] F. Pinarbasi, F. Sonmez Cakir, D. Güner Gültekin, M. Yazici, and Z. Adiguzel, "Examination of the effects of value creation, intellectual property and organizational creativity on artificial intelligence focused enterprises," *Bus. Process Manag. J.*, vol. 30, no. 1, pp. 317–337, Jan. 2024, doi: 10.1108/BPMJ-07-2023-0551.

[2] M. Doğan and H. Doğan, "Knowledge sharing, innovation and firm performance: Evidence from Turkey," *Financ. Stud.*, vol. 24, no. 1 (87), pp. 36–52, 2020.

[3] Y. Li, Y. Song, J. Wang, and C. Li, "Intellectual capital, knowledge sharing, and innovation performance: Evidence from the Chinese construction industry," *Sustainability*, vol. 11, no. 9, p. 2713, 2019.

[4] B. T. T. Truong, P. V. Nguyen, and D. Vrontis, "Enhancing firm performance through innovation: the roles of intellectual capital, government support, knowledge sharing and knowledge management success," *J. Intellect. Cap.*, vol. 25, no. 1, pp. 188–209, 2024, doi: 10.1108/JIC-08-2023-0181.

[5] M. Buenechea-Elberdin, J. Sáenz, and A. Kianto, "Intellectual capital-driven innovation: the influence of servitization degree," *R D Manag.*, vol. 54, no. 4, pp. 818–832, 2024, doi: 10.1111/radm.12576.

[6] Z. Jiang, M. L. Huo, J. Jones, Z. Cheng, A. Manoharan, and J. Spoehr, "Thriving in

future work: knowledge management and innovation perspectives," *Knowl. Manag. Res. Pract.*, vol. 23, no. 1, pp. 1–12, 2024, doi: 10.1080/14778238.2024.2344347.

[7] Z. Hu, M. Sarfraz, K. F. Khawaja, H. Shaheen, and S. Mariam, "The Influence of Knowledge Management Capacities on Pharmaceutical Firms Competitive Advantage: The Mediating Role of Supply Chain Agility and Moderating Role of Inter Functional Integration," *Front. Public Heal.*, vol. 10, no. July, 2022, doi: 10.3389/fpubh.2022.953478.

[8] K. Asiaei, N. Bontis, M. R. Askari, M. Yaghoubi, and O. Barani, "Knowledge assets, innovation ambidexterity and firm performance in knowledge-intensive companies," *J. Knowl. Manag.*, vol. 27, no. 8, pp. 2136–2161, 2023, doi: 10.1108/JKM-04-2022-0277.

[9] H. K. Singla, A. Shrivas, and A. Sharma, "Identification of knowledge assets in construction projects and their impact on project performance," *J. Intellect. Cap.*, vol. 23, no. 3, pp. 558–587, 2022, doi: 10.1108/JIC-04-2020-0135.

[10] F. Rezaei, M. Khalilzadeh, and P. Soleimani, "Factors Affecting Knowledge Management and Its Effect on Organizational Performance: Mediating the Role of Human Capital," *Adv. Human-Computer Interact.*, vol. 2021, 2021, doi: 10.1155/2021/8857572.

[11] M. Kumar, P. Mamgain, S. S. Pasumarti, and P. K. Singh, "Organizational IT support and knowledge sharing behaviour affecting service innovation performance: empirical evidence from the hospitality industry," *VINE J. Inf. Knowl. Manag. Syst.*, vol. 54, no. 2, pp. 256–279, 2024, doi: 10.1108/VJIKMS-07-2021-0124.

[12] J. R. Meher, L. Nayak, R. K. Mishra, and G. Patel, "Impact of organizational learning culture on organizational effectiveness: a serial mediation analysis with knowledge sharing and employee competencies," *VINE J. Inf. Knowl. Manag. Syst.*, vol. 54, no. 2, pp. 324–338, 2024, doi: 10.1108/VJIKMS-10-2021-0230.

[13] H. Hanifah, N. Abd Halim, A. Vafaei-Zadeh, and K. Nawaser, "Effect of intellectual capital and entrepreneurial orientation on innovation performance of manufacturing SMEs: mediating role of knowledge sharing," *J. Intellect. Cap.*, 2021, doi: 10.1108/JIC-06-2020-0186.

[14] D. Gharakhani and M. Mousakhani, "Knowledge management capabilities and SMEs' organizational performance," *J. Chinese Entrep.*, vol. 4, no. 1, pp. 35–49, 2012, doi: 10.1108/17561391211200920.

[15] M. A. I. Gazi, A. Al Mamun, A. Al Masud, A. R. bin S. Senathirajah, and T. Rahman, "The relationship between CRM, knowledge management, organization commitment, customer profitability and customer loyalty in telecommunication industry: The mediating role of customer satisfaction and the moderating role of brand image," *J. Open Innov. Technol. Mark. Complex.*, vol. 10, no. 1, p. 100227, 2024, doi: 10.1016/j.joitmc.2024.100227.

[16] A. Abu Allan, N. Abu Kasim, M. Mustapha, and S. Shah, "An Overview of Jordanian Manufacturing Sector in Light of Current Regional Political Situation," *Int. J. Econ. Commer. Manag. United Kingdom*, vol. VI, no. 5, pp. 373–377, 2018.

[17] A. W. Al-Khatib and E. M. Al-ghanem, "Radical innovation, incremental innovation, and competitive advantage, the moderating role of technological intensity: evidence from the manufacturing sector in Jordan," *Eur. Bus. Rev.*, vol.

34, no. 3, pp. 344–369, Jan. 2022, doi: 10.1108/EBR-02-2021-0041.

[18] H. Deng, S. X. Duan, and S. Wibowo, "Digital technology driven knowledge sharing for job performance," *J. Knowl. Manag.*, vol. 27, no. 2, pp. 404–425, 2023, doi: 10.1108/JKM-08-2021-0637.

[19] M. Zamiri and A. Esmaeili, "Methods and Technologies for Supporting Knowledge Sharing within Learning Communities: A Systematic Literature Review," *Adm. Sci.*, vol. 14, no. 1, 2024, doi: 10.3390/admsci14010017.

[20] D. Dancaková, J. Sopko, J. Glova, and A. Andrejovská, "The Impact of Intangible Assets on the Market Value of Companies: Cross-Sector Evidence," *Mathematics*, vol. 10, no. 20. 2022. doi: 10.3390/math10203819.

[21] R. Bhattu-Babajee and B. Seetanah, "Value-added intellectual capital and financial performance: evidence from Mauritian companies," *J. Account. Emerg. Econ.*, vol. 12, no. 3, pp. 486–506, 2022, doi: 10.1108/JAEE-11-2020-0300.

[22] P. Paoloni, G. Modaffari, F. Ricci, and G. Della Corte, "Intellectual capital between measurement and reporting: a structured literature review," *J. Intellect. Cap.*, vol. 24, no. 1, pp. 115–176, 2023, doi: 10.1108/JIC-07-2021-0195.

[23] M. Buenechea-Elberdin, "Structured literature review about intellectual capital and innovation," *Journal of Intellectual Capital*, vol. 18, no. 2. Emerald Group Publishing Ltd., pp. 262–285, 2017. doi: 10.1108/JIC-07-2016-0069.

[24] A. Kianto, J. Sáenz, and N. Aramburu, "Knowledge-based human resource management practices, intellectual capital and innovation," *J. Bus. Res.*, vol. 81, pp. 11–20, 2017.

[25] M. A. Ibarra-Cisneros, J. B. V. Reyna, and F. Hernández-Perlines, "Interaction between knowledge management, intellectual capital and innovation in higher education institutions," *Educ. Inf. Technol.*, vol. 28, no. 8, pp. 9685–9708, 2023.

[26] M. Oliveira, C. Curado, A. R. Balle, and A. Kianto, "Knowledge sharing, intellectual capital and organizational results in SMES: are they related?," *J. Intellect. Cap.*, vol. 21, no. 6, pp. 893–911, 2020, doi: 10.1108/JIC-04-2019-0077.

[27] M. Buenechea-Elberdin, J. Sáenz, and A. Kianto, "Exploring the role of human capital, renewal capital and entrepreneurial capital in innovation performance in high-tech and low-tech firms," *Knowl. Manag. Res. Pract.*, vol. 15, no. 3, pp. 369–379, Aug. 2017, doi: 10.1057/s41275-017-0069-3.

[28] X. Islami and E. Mulolli, "Do training and development, internal communication and information sharing, and job design boost the innovation of SMEs?," *Cogent Bus. Manag.*, vol. 11, no. 1, p., 2024, doi: 10.1080/23311975.2024.2413912.

[29] R. M. Al-dwairi, "Web 2 . 0 Tools and Service Quality : The key to effective customer relationships in e-commerce environments," *2023 Int. Conf. Inf. Technol.*, no. October, pp. 827–831, 2023, doi: 10.1109/ICIT58056.2023.10226159.

[30] S.-H. Han, D.-Y. Yoon, B. Suh, B. Li, and C. Chae, "Organizational support on knowledge sharing: a moderated mediation model of job characteristics and organizational citizenship behavior," *J. Knowl. Manag.*, vol. 23, no. 4, pp. 687–704, 2019.

[31] A. Sharma, J. Bhatnagar, M. Jaiswal, and M. Thite, "Enterprise social media and organizational learning capability: mediated moderation effect of social capital and

informal learning," *J. Enterp. Inf. Manag.*, vol. 36, no. 2, pp. 528–552, 2023, doi: 10.1108/JEIM-07-2021-0323.

[32] S. Berraies, R. Lajili, and R. Chtioui, "Social capital, employees' well-being and knowledge sharing: does enterprise social networks use matter? Case of Tunisian knowledge-intensive firms," *J. Intellect. Cap.*, vol. 21, no. 6, pp. 1153–1183, 2020.

[33] S. K. Singh, A. Mazzucchelli, S. R. Vessal, and A. Solidoro, "Knowledge-based HRM practices and innovation performance: Role of social capital and knowledge sharing," *J. Int. Manag.*, vol. 27, no. 1, p. 100830, 2021, doi: 10.1016/j.intman.2021.100830.

[34] R. F. Santos, M. Oliveira, and C. Curado, "The effects of the relational dimension of social capital on tacit and explicit knowledge sharing: a mixed-methods approach," *VINE J. Inf. Knowl. Manag. Syst.*, vol. 53, no. 1, pp. 43–63, 2023, doi: 10.1108/VJIKMS-05-2020-0094.

[35] I. E. Albawwat, "Tacit knowledge sharing in small audit firms and audit quality inputs: the antecedent effect of auditors' social capital," *J. Knowl. Manag.*, vol. 26, no. 9, pp. 2333–2353, 2022, doi: 10.1108/JKM-02-2021-0113.

[36] M. M. Migdadi, "Knowledge management processes, innovation capability and organizational performance," *Int. J. Product. Perform. Manag.*, vol. 71, no. 1, pp. 182–210, 2022, doi: 10.1108/IJPPM-04-2020-0154.

[37] M. T. Ha, "Social capital and firm operational performance: The mediating roles of knowledge sharing," *Cogent Bus. Manag.*, vol. 8, no. 1, 2021, doi: 10.1080/23311975.2021.1973237.

[38] T. M. Ha and P. K. Nguyen, "Social capital, knowledge sharing and firm performance," *Manag. Sci. Lett.*, vol. 10, no. 12, pp. 2923–2930, 2020, doi: 10.5267/j.msl.2020.4.014.

[39] C. C. Lee, W. C. Yeh, Z. Yu, and Y. C. Luo, "Knowledge sharing and innovation performance: a case study on the impact of organizational culture, structural capital, human resource management practices, and relational capital of real estate agents," *Humanit. Soc. Sci. Commun.*, vol. 10, no. 1, pp. 1–16, 2023, doi: 10.1057/s41599-023-02185-w.

[40] Y. Harb, A. Zahrawi, I. Shehabat, and Z. J. Zhang, "Managing knowledge workers in healthcare context: role of individual and knowledge characteristics in physicians' knowledge sharing," *Ind. Manag. Data Syst.*, vol. 121, no. 2, pp. 381–408, 2021.

[41] P. Chaithanapat, P. Punnakitikashem, N. C. K. K. Oo, and S. Rakthin, "Relationships among knowledge-oriented leadership, customer knowledge management, innovation quality and firm performance in SMEs," *J. Innov. Knowl.*, vol. 7, no. 1, p. 100162, 2022.

[42] I. W. E. Arsawan, V. Koval, I. Rajiani, N. W. Rustiarini, W. G. Supartha, and N. P. S. Suryantini, "Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage," *Int. J. Product. Perform. Manag.*, vol. 71, no. 2, pp. 405–428, 2020.

[43] H. Tang, Y. Xie, Y. Liu, and F. Boadu, "Distributed innovation, knowledge re-orchestration, and digital product innovation performance: the moderated mediation roles of intellectual property protection and knowledge exchange activities," *J. Knowl. Manag.*, vol. 27, no. 10, pp. 2686–2707, 2023, doi: 10.1108/JKM-07-2022-

0592.

[44] N. Bontis, "Intellectual capital: an exploratory study that develops measures and models," *Manag. Decis.*, vol. 36, no. 2, pp. 63–76, 1998.

[45] Y.-H. Hsu and W. Fang, "Intellectual capital and new product development performance: The mediating role of organizational learning capability," *Technol. Forecast. Soc. Change*, vol. 76, no. 5, pp. 664–677, 2009.

[46] W. Wu, M. Chang, and C. Chen, "Promoting innovation through the accumulation of intellectual capital, social capital, and entrepreneurial orientation," *R&d Manag.*, vol. 38, no. 3, pp. 265–277, 2008.

[47] M. A. Youndt, M. Subramaniam, and S. A. Snell, "Intellectual capital profiles: An examination of investments and returns," *J. Manag. Stud.*, vol. 41, no. 2, pp. 335–361, 2004.

[48] C.-J. Chen, H.-A. Shih, and S.-Y. Yang, "The role of intellectual capital in knowledge transfer," *IEEE Trans. Eng. Manag.*, vol. 56, no. 3, pp. 402–411, 2009.

[49] M. Longo and M. Mura, "The effect of intellectual capital on employees' satisfaction and retention," *Inf. Manag.*, vol. 48, no. 7, pp. 278–287, 2011.

[50] J. Liebowitz and Y. Chen, "Developing knowledge-sharing proficiencies," *Knowl. Manag. Rev.*, vol. 3, pp. 12–15, 2001.

[51] Z. Wang and N. Wang, "Knowledge sharing, innovation and firm performance," *Expert Syst. Appl.*, vol. 39, no. 10, pp. 8899–8908, 2012, doi: 10.1016/j.eswa.2012.02.017.

[52] T. Ritter and H. G. Gemünden, "The impact of a company's business strategy on its technological competence, network competence and innovation success," *J. Bus. Res.*, vol. 57, no. 5, pp. 548–556, 2004.

[53] G. G. Bell, "Clusters, networks, and firm innovativeness," *Strateg. Manag. J.*, vol. 26, no. 3, pp. 287–295, 2005.

[54] D. J. Bowersox, D. J. Closs, T. P. Stank, and S. B. Keller, "How supply chain competency leads to business success," *Supply Chain Manag. Rev.*, vol. 4, no. 4, pp. 70–78, 2000.

[55] R. A. Inman, R. S. Sale, K. W. Green Jr, and D. Whitten, "Agile manufacturing: relation to JIT, operational performance and firm performance," *J. Oper. Manag.*, vol. 29, no. 4, pp. 343–355, 2011.

[56] A. Vaccaro, R. Parente, and F. M. Veloso, "Knowledge management tools, inter-organizational relationships, innovation and firm performance," *Technol. Forecast. Soc. Change*, vol. 77, no. 7, pp. 1076–1089, 2010.

[57] J. Kumar, V. Rani, M. Rani, and G. Rani, "Nexus between intellectual capital and innovation performance: the mediating role of firm's attractiveness and knowledge sharing," *VINE J. Inf. Knowl. Manag. Syst.*, 2024, doi: 10.1108/VJIKMS-06-2023-0145.

[58] T. Thi Nhat Minh and P. Dinh Nguyen, "The impact of intellectual capital and market capitalization on corporate investment decisions: exploring the mediating and moderating effect of knowledge sharing and the COVID-19 pandemic," *J. Intellect. Cap.*, vol. 25, no. 5, pp. 1237–1258, 2024, doi: 10.1108/JIC-04-2024-0111.

[59] M. M. M. Bagram, H. Ali, and N. Ali, "Impact of Knowledge Management Information System on Organizational Productivity Through Employee Engagement: An Empirical Evidence from I.T. Industry," *Tech. Journal, Univ. Eng. Technol.*, vol. 27, no. 2022, pp. 2313–7770, 2022.

[60] F. Idris, "Service Innovations, Knowledge Management, Advance Technology and Organizational Performances," *Int. J. Acad. Res. Econ. Manag. Sci.*, vol. 12, no. 2, pp. 77–98, 2022, doi: 10.6007/ijarems/v12-i2/15330.

[61] A. A. Al-Tit, S. Al-Ayed, A. Alhammadi, M. Hunitie, A. Alsarayreh, and W. Albassam, "The Impact of Employee Development Practices on Human Capital and Social Capital: The Mediating Contribution of Knowledge Management," *J. Open Innov. Technol. Mark. Complex.*, vol. 8, no. 4, 2022, doi: 10.3390/joitmc8040218.

[62] I. W. E. Arsawan, V. Koval, I. Rajiani, N. W. Rustiarini, W. G. Supartha, and N. P. S. Suryantini, "Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage," *Int. J. Product. Perform. Manag.*, vol. 71, no. 2, pp. 405–428, 2022, doi: 10.1108/IJPPM-04-2020-0192.

[63] N. Sudibjo and R. K. Prameswari, "The effects of knowledge sharing and person–organization fit on the relationship between transformational leadership on innovative work behavior," *Heliyon*, vol. 7, no. 6, Jun. 2021, doi: 10.1016/j.heliyon.2021.e07334.

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