



# The Influence of Intellectual Capital on Innovation and Creating Competitive Advantage: The Mediating Role of Knowledge Sharing and Innovation

Safia Alfatis

smalfatis@nu.edu.sa

Prof. Abdelmohsen A. Nassani

nassani@ksu.edu.sa

Department of Management  
College of Business Administration  
King Saud University, KSA

## Abstract

*This paper aims to evaluate the influence of intellectual capital on innovation and creating competitive advantage with mediating role of knowledge sharing and innovation in Saudi companies. Data was collected from employees of the Saudi private sector using an online questionnaire, path analysis was demonstrated using SPSS, and the best fit of the model was tested through AMOS. The findings highlighted a positive relationship among the variables in this study.*

*Human capital and structural capital in Saudi companies have a positive impact on knowledge sharing. Similarly, knowledge sharing positively influenced innovation as well as mediated the effect between intellectual capital and innovation. Results also indicated a mediating effect of innovation between knowledge sharing and competitive advantage, and findings were highly consistent with the predicted hypotheses. Finally, future researchers are recommended to investigate the impact of the other intellectual capital dimensions such as relational and psychological capita on innovation and competitive features in Saudi organizations.*

**Keywords:** Intellectual Capital, Human Capital, Structural Capital, Knowledge Sharing, Innovation, Competitive Advantage.

## Introduction

A competitive business world driven by globalization and evolving technology forces businesses to often develop and launch new products or services (Ardito, Messeni, Dezi, & Castellano, 2020). Businesses, as a result, have shifted the fundamentals of competitiveness from traditional tangible and financial resources to intellectual assets, considering the rapid development of technology, the rise in the value of customers' preferences, and the significance of innovation. Thus, according to Kamukama et al. (2010), considerable agreement exists that a company's intellectual assets, including its variables, are critical to that company's success and expansion. Consequently, organizations have become more dependent on intangible assets such as knowledge, business structure, human creativity, and innovation (Kamasak et al., 2015). According to Obeidat et al. (2018), intellectual capital, represented by human capital and structural capital, has grown to be one of the most crucial components of an organization's success in the knowledge era. In addition, based on the knowledge-based view, knowledge serves as the primary source of power in firms, and an organization's capacity to acquire and apply information is what ultimately determines how influential it will be (Hsu & Sabherwal, 2012; Zhou & Li, 2012). Enterprises in the 21st century, especially in the rapidly changing economy, are under intense pressure to compete in distinctive ways. Therefore, these enterprises need to have the necessary intellectual capital and knowledge to demonstrate innovation (Gogan, Artene, Sarca, & Draghici, 2016). Knowledge sharing is a powerful

\* This article was submitted in May 2023, and accepted for publishing in June 2023.

© Arab Administrative Development Organization- League of Arab States, 2023, pp 417-428. DOI:10.21608/AJA.2023.213440.1454



tool that can help employees advance in their careers and contribute creatively to the company. Similarly, it is crucial for businesses to develop their creative capacities, lower manufacturing costs, enhance their structural situation, and increase revenue (Wang and Noe, 2010; Bogers, 2011). Recognizing the considerable influence of intellectual capital elements on innovation, most intellectual capital studies explored the effects of intellectual capital dimensions on the organization's innovation without much highlighting each component independently (Asiaei et al. 2020; Scafarto et al. 2016; Agostini and Nosella 2017; Chowdhury et al. 2018). For instance, human capital, a component of intellectual capital, is the one that is most frequently examined (Yeoh, 2008). In addition, according to Babkin, Alekseeva, Tashenova, and Karimov (2022), recent years have seen growth in research into both relational capital (rooted in the social sciences) and network capital (tied to the expansion of online communication). However, while organizational capital plays a significant role in today's competitive economy, structural capital, including property, policies, and systems, receives less attention from scholar. Hence, the structural capital in this study is one of the emerging sources of competitive advantage. According to Roos et al. (1997), all of an organization's non-human knowledge base, such as its databases, organizational diagrams, executive directions of operational activities, processes, and the like, are collectively referred to as "structural capital." Moreover, previous research has shown that innovation is crucial to improving business quality, competitiveness, profitability, and productivity (Fraj et al., 2015; Li et al., 2017; Allameh, 2018). Additionally, Wei, Feng, and Zhang (2017) confirmed that the structural culture, policies, and processes that enhance innovation will empower the organization to cope with the changes and strengthen its position in the marketplace. Accordingly, this study aims to investigate the influence of intellectual capital on innovation through knowledge sharing in the Saudi private sector, as well as examine the relationship between structural capital, innovation, and creating competitive advantage.

## **Theoretical background and hypothesis development.**

### ***Human capital and knowledge sharing***

The term "human capital" (HC) refers to the total of an employee's ability, knowledge, skills, innovativeness, mindset, ambition, and experience (Wang, Wang & Liang, 2014: 234). It's also described as a company's store of information that can be used in developing financial and operational decisions. In the current era of globalization, human capital increasingly develops its own perspectives and skills, which is then utilized to create value for the organization. (Natalicchio et al., 2019; Papa et al., 2020). Knowledge sharing, meanwhile, is the process of conveying that knowledge to those within an organization who can put it to effective use; this is a vital function of knowledge management in business culture. Further, it is the act of making information accessible to others, according to Suppiah and Singh Sandhu (2011). However, the sharing of knowledge is determined mainly by the motivation and aim of people (Dougherty, 1999; Scarbrough & Carter, 2001). According to Bloodgood and Chilton (2012), human capital is an organization's stock of knowledge that an individual possesses, which involves skills, expertise, mental strength, and leadership competencies. Therefore, workers can benefit from the knowledge exchange by learning from and teaching one another about specialized knowledge, experience, and particular techniques for more efficient performance in their jobs. Similarly, Wang (2011) highlighted that talent training initiatives that include knowledge-sharing interactions have a positive and supportive influence on development and growth. (Egbu, 2004) also reported that development executives must involve professionals in delivering knowledge management practices, as knowledge sharing within an organization is greatly aided by the qualifications and training of its employees. (Hayton, 2005; Batjargal, 2007) indicated that the mindfulness of qualified employees and their ability to forecast future risks and opportunities contribute to provide innovative knowledge for expanding view of strategic planning with identifying future needs. Chowdhury (2005), in the same direction, suggested that human resources have the power to boost employee engagement and optimism about the benefits of knowledge sharing. Based on the above findings, a hypothesis is proposed as follows:

### ***H1. Human capital is positively related to knowledge sharing.***

### ***Structural capital and knowledge sharing.***

Another component of intellectual capital is structural capital, which includes critical parts of executive functions of the company (Yoon et al., 2011). Furthermore, all assets within a company that aid employees in doing their jobs, such as buildings, machinery, computer programs, operating procedures, and intellectual property, are considered structural capital according to (Chatzkel, 2002). Since structural capital represents information tools that enhance business competitiveness as (Ordonez de Pablos, 2004) mentioned, businesses can improve the availability of databases that encompass valuable expertise and experiences by enhancing their internal structures. Moreover, Improved policies, procedures, and processes are applied to increase the dissemination of knowledge throughout the whole organization (Shih, Chang, & Lin, 2010). In addition, (Benevene et al., 2017) confirmed that the creation of new knowledge and investment in human resources are both enabled by structural capital, which can be defined as an organizational framework. Structural capital also embodies the knowledge created by human capital and establish properties of the framework that, in turn, mirror the significance of the organization according to (Beltramino et al., 2020). In addition, Li et al. (2019) stated that fostering knowledge sharing requires an adaptive organizational structure, persuasive motivational strategies, knowledge administration division, and a knowledge-driven environment. Therefore, knowledge is most effectively generated in a structural culture that encourages workers' sense of belonging, trust, and competence according to (Sveiby & Simons, 2002). Based on the above findings, a hypothesis is proposed as follows:

#### ***H2. Structural capital positively related to knowledge sharing.***

### ***Knowledge sharing and innovation.***

According to (Oslo Manual, 2005), Innovation is the introduction of a novel product, process, brand image, business model, initiative, or improvement in the way an organization operates to address a specific problem. (Duodu & Rowlinson, 2016) considered that the innovation takes place in business during the process of reusing previous or current knowledge. Moreover, the strong linkage between knowledge sharing and innovation is one of the reasons leading scholars to evaluate the relationship between them. Thus, organization's capabilities and innovation are affected through the act of receiving and producing knowledge as noted in study of (Zhi-hong et al 2008). Also, according to (Teixeira et al., 2019) When employees actively participate in gathering and sharing knowledge, a stronger sense of team spirit emerges, which boosts innovation, reduces duplication, and maximizes invention. On the other aspect, Organizational innovation can be measured by how firms would effectively analyze existing knowledge to discover new ways that contribute greatly in solving problems, creating products, and meet consumer demands (Goh, 2002; Tidd et al., 2005). Knowledge sharing according to (Kamasak and Bulutlar, 2009) has been found to have an impact on all forms of innovation as several studies published between 1997 and 2018 investigated the positive influence of knowledge sharing on innovation (Singh and Verma, 2019). Based on the above findings, a hypothesis is proposed as follows:

#### ***H3. Knowledge sharing is positively related to innovation.***

### ***Innovation and competitive advantage.***

The combination of many factors that help set businesses apart from their rivals and provide them with a distinct and superior value in the economy is known as a "competitive advantage" (Afshar-Ghasemi et al., 2013). Maintaining a competitive advantage is crucial for a company's long-term success in the market (Kotabe & Kothari, 2016). Morgan, Kaleka & Katsikeas (2004) suggested that innovation practices aim to help businesses expand, survive, and reinforce the business's ability to outperform its competitors in terms of value that influences customers' purchasing decisions and behavior. Moreover, Genc,

Dayan, and Genc (2019; Afuah, 2009) stressed that besides the role of innovation in creating new technologies and applying them to new services or goods, the improvements in new knowledge-based business models have helped companies adapt to shifting market conditions and remain competitive in today's fast-paced global economy. Also, the research findings of Whrl et al. (2009), who studied more than 80 German technological industries, showed that the involvement of innovation has a supportive effect on business development. Therefore, the relationships between a company's macroenvironment and its competitors are heavily influenced by the ability to innovate and adopt new technologies according to Li, Song, Wang, & Li (2019). Udriyah, Tham & Azam (2019) also conducted an empirical study on textile SMEs in Selangor, Malaysia, and stated the positive effect of innovation toward competitive advantage. Most previous studies on innovation, according to Hinterhuber and Liozu (2014), have assumed that an innovative culture is being considered as a fundamental competitive advantage. Based on the above findings, a hypothesis is proposed as follows:

***H4. Innovation is positively related to competitive advantage.***

***The influence of structural capital on innovation and competitive advantage***

Structural capital, as mentioned previously in this paper, is the non-human assets and all benefits represented through organization structure, including culture, policy setting, information management processes, and decision-making stages. Further, in the recent global economy, it can refer to the increasingly emerging use of advanced technological tools that enhance the application of knowledge in a competitive manner (Cenamor et al., 2017). How well an organization adapts to changing circumstances depends on how well its structure has evolved (Asiaei et al., 2020). Fundamentally, strong structural capital promotes innovation via process, which in turn helps workers perform at their peak efficiency enhancing the quality of performance according to Ardito, Besson, Messeni Petruzzelli, & Gregori (2018). Structural capacity that fosters adapting to changes is considered an ideal environment for obtaining innovation. Previous studies also claimed that creating a special procedure or practice to manage operations and tasks might significantly improve innovation performance (Buenechea-Elberdin et al., 2018; Zhou et al., 2019; Ali et al., 2021). (Buenechea-Elberdin et al., 2017) also reported that human and relational capital ensure achieving innovation in the presence of support from structural capital. Based on the above findings, a hypothesis is proposed as follows:

***H5. Structural capital is positively related to innovation.***

Organizational competitive advantage would be created by responding to the rapidly evolving external environment, which is also reliant on the technology, knowledge, and property that aim to facilitate processes and aid in securing organization strategies. (Nilssen et al., 2015). Yaseen et al. (2016) sought to investigate how intellectual capital affected the attainment of competitive advantage. Thus, to get valuable information, they used a questionnaire and specifically targeted Jordan's communications industry. Variables were examined and it was discovered that the accomplishment of competitive advantage is not significantly influenced by human capital, but rather relational and structural capital have a significant impact on creating competitive advantage. (Plessis, 2007) stressed that a company's structural capital acts mainly as a knowledge guide accessible to all its staff, allowing them to fully develop their potential and boost competitiveness. Therefore, Xiao et al. (2020) confirmed that an organization's ability to differentiate itself from its rivals in terms of production and business model can be attributed to structural capital. Based on the above findings, a hypothesis is proposed as follows:

***H6. Structural capital is positively related to competitive advantage.***

***Knowledge sharing as a mediator between intellectual capital and innovation.***

According to Huang and Chen's (2018) research on Chinese high-tech companies, the sharing of knowledge has a beneficial effect on the connection between intellectual capital and new product devel-

opment. Knowledge sharing, according to the authors, is essential for transforming intellectual capital into innovative performance. Also, Jashapara and Ozbilgin (2009) explored a similar conclusion, arguing that knowledge sharing is valuable for the transfer of implicit information within departments, which thus aims to build an innovative culture. The authors contend that removing barriers to innovation, such as functional processes and poor flow of information, can be accomplished through the effective sharing of knowledge. In addition, knowledge gained through consistent communication within R&D teams is strongly correlated with creative initiatives, according to Matusik and Hill (1998). Based on the above findings, a hypothesis is proposed as follows:

***H7. Intellectual capital could affect innovation through knowledge sharing.***

***Innovation as a mediator between knowledge sharing and competitive advantage.***

Knowledge sharing, innovation, and competitive advantage were all investigated in a (2009) study of Taiwanese high- tech firms by Chen and Huang. Knowledge sharing benefits both innovation and competitive advantage. The authors also discovered that knowledge sharing was positively linked to a higher likelihood of success in business, and innovation was indicated to mediate this connection. Farooq et al. (2021) in recent study conducted in Pakistani manufacturing firms used questionnaire to gather data from 300 manufacturing firms. Findings discovered that both innovation and competitive advantage were found to benefit in greater depth from knowledge sharing practices within firms. Thus, the positive impact of knowledge sharing on competitive advantage can be fully attributed to the boost in innovation. Based on the above findings, a hypothesis is proposed as follows:

***H8. Knowledge sharing could affect competitive advantage through innovation.***

## Methodology

### *Sample and data collection*

To conduct this study and collect data, employees working in the Saudi private and profit sectors were targeted by using an online questionnaire. 27 items are included to investigate study variables. 4 items measured human capital (HC), 4 items measured structural capital (SC), and 4 items measured knowledge sharing (KS). Innovation (In) was measured by nine items, and finally, six items were used to measure competitive advantage (CA). Regarding the demographic characteristics of Saudi privet sector employees, two questions were used (gender and years of experience). The size of the sample was 209; 140 represented males, while 69 represented females. In terms of years of experience, most workers have less than three years of experience (38.28%), followed by employees with more than 10 years of experience (25.36%). Employees who have between 3 and 5 years of experience displayed 17.70% of the sample size, while employees with experience between 5 and 10 years showed 18.66% of the sample. Table 1 provides additional information.

***Table (1) Demographic characteristic***

| characteristic | category           | number | percentage |
|----------------|--------------------|--------|------------|
| Gender         | Male               | 140    | 66.99%     |
|                | Female             | 69     | 33.01%     |
| Experience     | Less than 3 years  | 80     | 38.28%     |
|                | 3-5 years          | 37     | 17.70%     |
|                | 5-10 years         | 39     | 18.66%     |
|                | More than 10 years | 53     | 25.36%     |

### *Measures.*

The 27 items on the questionnaire were all selected from reliable measures validated and applied in previous studies. Human capital and structural capital were measured by the intellectual capital scale adapted from Wang et al. (2014). A four-item scale measuring knowledge sharing was adapted from Khazaei Pool et al. (2014). Further, innovation was measured using the innovation scale developed by Darroch and Jardine (2002). The six-item scale developed by Xinghua Xu et al. (2020) was adapted to measure competitive advantage.

### Data analysis

The obtained data were analyzed using the Statistical Package for Social Science (SPSS) as well as Analysis of Moment Structure (AMOS). All the responses were examined in order to avoid any inconsistencies before moving into the analysis process. Further, SPSS was used to exhibit the data’s demographic elements within descriptive statistics. Amos was used to identify the optimum model fit, evaluate model quality, and calculate Cronbach’s alpha to ensure the reliability of each measurement.

### Findings

#### Reliability

As illustrated in Table 2, Cronbach’s alpha was determined to evaluate the measuring scales’ reliability. Cronbach’s alpha, as shown in Table 2, is between 0.77 and 0,92.

**Table (2) The Reliability Test Results**

| Scale                      | Cronbach's Alpha | N.O. of items |
|----------------------------|------------------|---------------|
| Human capital (HC)         | .777             | 4             |
| Structural capita (SC)     | .837             | 4             |
| Knowledge sharing (KS)     | .862             | 4             |
| Innovation (In)            | .921             | 9             |
| Competitive advantage (CA) | .876             | 6             |

#### Means, Standard Deviation and Correlations

The means, standard deviations, and correlations of the variables investigated in this study are illustrated in Table 3. Human capital has a mean of (3.7512) and a standard variation of (.76762). Structural capital represents a mean of (3.6136) and a standard variation of (.86321). Further, knowledge sharing shows a mean of (3.6974) and a standard variation of (.85357). The mean value of innovation is (3.7150) and the standard variation is (.77438). Finally, competitive advantage has a mean of (3.7280) and a standard variation of (.80186). On the other hand, the correlation among variables

**Table (3) Means, Standard Deviation and Correlations**

| Variables | Mean   | Std. D | HC     | SC     | KS     | IN     | CA |
|-----------|--------|--------|--------|--------|--------|--------|----|
| HC        | 3.7512 | .76762 |        |        |        |        |    |
| SC        | 3.6136 | .86321 | .722** |        |        |        |    |
| KS        | 3.6974 | .85357 | .583** | .579** |        |        |    |
| In        | 3.7150 | .77438 | .626** | .762** | .621** |        |    |
| CA        | 3.7280 | .80186 | .575** | .754** | .518** | .746** |    |

Explains that human capital has a significant positive correlation with knowledge sharing ( $r = .583, p 0.01$ ), structural capital ( $r = .722, p 0.01$ ), innovation ( $r = .626, p 0.01$ ) and competitive advantage ( $r = .762, p 0.01$ ). Structural capital illustrates a significant positive correlation with knowledge sharing ( $r = .579, p 0.01$ ). On the other hand, knowledge sharing represents a significant positive correlation with both innovation ( $r = .762, p 0.01$ ) and competitive advantage ( $r = .575, p 0.01$ ). In addition, a significant positive correlation is stated for structural capital with both variables: innovation ( $r = .762, p 0.01$ ) and competitive advantage ( $r = .754, p 0.01$ ). Furthermore, there was a significant positive correlation between innovation and competitive advantage ( $r = .746, p 0.01$ ).

**Table4: Results of Model Fit**

| Statistics | Results of model fit |
|------------|----------------------|
| $\chi^2$   | 1.358                |
| Df         | 3                    |
| RMSEA      | .000                 |
| CFI        | 1.000                |
| TLI        | 1.008                |
| NFI        | .998                 |
| GFI        | .997                 |
| AGFI       | .987                 |

#### Path analysis for testing Research Model Fit:

Path analysis was used to examine the study’s hypotheses. Table 4 displays the default model’s fit indices according to chi-square, degrees of freedom ratio, comparative fit, incremental fit, and root mean square error. Based on fit indices illustrated above, the model fits when the values of chi-square = 1.358, degree of freedom = 3, RMSEA= .000, CFI= 1.000, TLI= 1.008, NFI= .998, GFI= .997 and AGFI= .987.

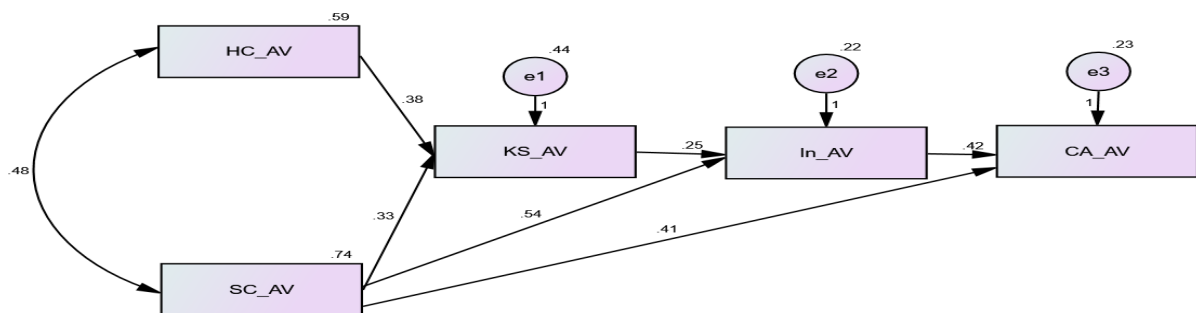
Figure1 demonstrate the ideal model describing the relationship between studies variables.

Table 5 provides an overview of the nature and direction of each relationship among variables. As illustrated above, intellectual capital, which was represented in this study specifically by human capital (HC) and structural capital (SC), has a positive impact on knowledge sharing (.382) and (.327) which supported H1 and H2. The relationship between knowledge sharing (KS) and innovation (In) also showed a posi-

tive impact of KS on innovation (.245) as proposed in H3. The results also clearly show that structural capital (SC) positively influenced both variables: innovation (In) H4(.543) and competitive advantage (.410) H5. Further, there was a positive effect of innovation (In) on competitive advantage (.425), as displayed in the final finding which supported H6. These findings also confirmed H8 and H8 that knowledge sharing mediate the effect of intellectual capital (HC, SC) on innovation, while innovation mediated the effect of knowledge sharing on competitive advantage.

**Table 5: Bath analysis.**

|               | Estimate | S.E.  | C.R.   | P.  | Label |
|---------------|----------|-------|--------|-----|-------|
| KS_AV ← HC_AV | 0.382    | 0.087 | 4.393  | *** |       |
| KS_AV ← SC_AV | 0.327    | 0.077 | 4.235  | *** |       |
| In_AV ← KS_AV | 0.245    | 0.047 | 5.221  | *** |       |
| In_AV ← SC_AV | 0.543    | 0.046 | 11.677 | *** |       |
| CA_AV ← In_AV | 0.425    | 0.067 | 6.375  | *** |       |
| CA_AV ← SC_AV | 0.410    | 0.060 | 6.868  | *** |       |



**Figure 1: The Path Analysis**

**Managerial applications and limitations**

This study provides information related to workers in Saudi companies and confirmed that organizations must go beyond pursuing only financial success; instead, they should consider other essential factors such as human capital, structural capital, knowledge that aim businesses fundamentally to develop and survive in such challenging economic world. The results of this study could be used to heighten awareness about the significance of knowledge and intellectual resources that Saudi organizations have in building innovative cultures and competing in uncertain situation. These assets can be represented in organizational skills, capabilities, knowledge, technology, databases, and policies. In addition, managers and executives can strengthen systems that facilitate the administration, receive, and application of employee knowledge toward innovation. This study will assist decision-makers in defining procedures and practices that support innovation initiatives, as well as nurturing organizational culture that encourages employees to share knowledge embodied in their experience and abilities to enhance the quality of operations as well as producing new products and services.

The time and effort would identify the limitations of this study. If additional time were available, it may be beneficial in expanding research sample to include other fields in Saudi market, increasing respondents, and acquiring additional data in terms of demographics such as (age, employment failed). This study investigated only two dimensions of intellectual capital: human and structural capital. Future researchers interested in this subject could additionally examine the influence of the relational and psychological capital on knowledge sharing, innovativeness, and competitive advantage in Saudi business environment.

**Discussion and Conclusion**

In this study, a model and hypotheses were developed to explore the impact of critical factors that may be overlooked by business owners, especially in comparison with physical and financial assets. These ele-

ments consist of human and structural capital in addition to knowledge and its influence on the existence of innovation in organizations, thereby generating competitive strength. Concentrate is implanted on the human and structural capital dimensions of intellectual capital as well as employees from the Saudi organizations identified to conduct this study, considering the remarkable evolution of the economy witnessed by Saudi organizations in all aspects, according to (Sweidan, O. & Elbargathi, K, 2022). The findings of this study show a significant positive influence of human capital H1 and structural capital H2, as Grant (1996) stated, on how the process of knowledge exchange across the organization would be more influential in developing products and services with excellent competitive features. Knowledge is viewed (Suppiah and Singh Sandhu, 2011) as a most powerful resource for success in business. Therefore, organizations may expand the efficiency of knowledge by motivating and supporting employees (Scarborough and Carter, 2001). The deployment of knowledge can be more facilitated and flexible with the aim of structural culture, processes, databases, and policies (Ordonez de Pablos, 2004). Moreover, there is a positive influence of knowledge sharing indicated in these findings on innovation, as proposed in H3. Thus, this result, compise with Duodu & Rowlinson (2016), highlights that innovation occurs when people produce and reuse knowledge within organizations. On the other aspect, innovation significantly impacts competitive advantage as stated in H4 and according to Morgan, Kaleka, and Katsikeas (2004), the development of organizations depends on efforts to produce new products and services as well as building new systems that create a competitive value for enterprises. Innovation can be enhanced through policies and processes that encourage new ideas and create a suitable environment for innovative initiatives as (Ardito, Besson, Messeni Petruzzelli, & Gregori, 2018) mentioned which confirmed H5 that exhibited a significant positive effect of structural capital on innovation in the private Saudi sector. H6 proposed a positive effect of structural capital on competitive advantage, as Nielsen et al. (2015) discovered that structural capital provides the property capital that protects business strategies from competitors and thus maintains firms' competitive advantage. According to Jashapara and Ozbilgin (2009), when organizations allocate valuable resources to manage the rotation of knowledge, there will be an increased probability of gaining more innovative performance from intellectual capital as H7 proposed. In H8, there is also a mediating effect of innovation between knowledge sharing and creating competitive advantage, which, along with the study of Farooq et al. (2021) that found the competitive advantage in Pakistani manufacturing was influenced by knowledge sharing used for the purpose of innovation, confirmed innovation as a mediator.

In conclusion, as several previous studies investigated the influential relationship between intellectual capital, knowledge sharing, innovation, and competitive advantage, this study confirmed the significant impact of intangible assets in the Saudi private sector, such as human capital, structural capital, and knowledge, on innovation and creating competitive advantage.



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