The Influence of Intellectual Capital on the Performance of Iraqi Oil and Gas Companies

Mustafa Mihyar Ghalib[1*], Suzaida Bakar[2]

[1]Uniten Business School, Universiti Tenaga Nasional, Malaysia, mustafamigh@gmail.com

[2]Uniten Business School, Universiti Tenaga Nasional, Malaysia, suzaida@uniten.edu.my

[*]Corresponding Author's E-mail: mustafamigh@gmail.com

Abstract: *This study investigates the influence of intellectual capital on the performance of Iraqi oil and gas companies, emphasizing the growing importance of intangible assets as strategic resources for achieving sustainable competitiveness. Focusing on five key dimensions human, structural, social, relational, and innovation capital the research adopts a quantitative approach grounded in the Resource-Based and Knowledge-Based Views. Data were collected from 251 employees representing various managerial and technical levels across Iraqi oil and gas firms and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to assess reliability, validity, and hypothesized relationships. The findings reveal that human, social, and innovation capital have significant positive effects on company performance, highlighting the role of knowledge, collaboration, and creativity in driving success. Conversely, structural capital shows a significant negative relationship, and relational capital remains insignificant, indicating that rigid internal systems and weak external partnerships limit the full potential of intellectual resources. Overall, the study concludes that while Iraqi oil and gas companies demonstrate strong operational performance, they have yet to fully capitalize on their intellectual assets. Strengthening human capital development, enhancing knowledge management systems, fostering innovation, and building stronger stakeholder relationships are essential strategies to achieve long-term growth and resilience in the dynamic global energy sector.*

Keywords: intellectual capital, human capital, structural capital, social capital, relational capital, innovation, company performance.

1. Introduction

The role of the oil and gas sector in the development of Iraqi society is paramount as it generates most of Iraq's income, provides employment for large number of people among other vital economic support. Firms in this intense and capital-intensive industry are coming increasingly to realize that hard assets alone will not secure them long-term success. Rather, it is through the intelligent deployment of intellectual capital (IC) comprising human, structural, social, relational, and innovation-based resources which has emerged as a key strategic determinant of organizational performance and viability. In the age of digital transformation and knowledge-based competition in global energy markets, Iraqi oil and gas companies are required to utilize their intellectual capital resources for increasing efficiency, flexibility, and value creation (see Ali et al., 2022; Rehman et al., 2022). Intellectual capital, a dimensionally latent construct, is composed of knowledge assets including human competencies residing in employees and organizational systems, relationships and innovation processes that influence firm competitiveness (Beltramino et al., 2022). Based on Resource-Based View (RBV) and Knowledge-Based View (KBV), these intangibles are seen as scarce, non-imitable resources that facilitate organizations to gain sustainable competitive advantages (Rehman et al., 2023; Vidic, 2022). In the oil and gas industry with its technological complexity as well as environmental dynamism, incorporating intellectual capital in strategic decision making can enable firms to enhance productivity, innovation capability and knowledge sharing (Bala et al., 2021;

Arokodare, 2021). However, despite its importance, there is not sufficient empirical evidence that looks into the direct impact of IC on firm performance in Iraqi oil and gas industry.

The recent international evidence highlights the increasing relevance of intellectual capital on firm's competitive position and innovation performance in a variety of industries (Liu et al., 2021; Hanifah et al., 2022). For instance, research has shown that human capital which consists of employee's knowledge, expertise and training significantly contributes to organizational performance by promoting innovation and operational efficiency (Samad, 2020; Mohammad Shafiee et al., 2024). Likewise, structural capital which includes information systems, processes and data bases underpin organizational learning and transformation for better (Edeh et al., 2021; Khadilkar, 2022). Social and relational capital, which represent internal and external network relationships, trust and cooperation, have also been demonstrated to enhance interfirm communication and knowledge transfer, which strengthens market competitiveness (Sun et al., 2023). In addition, innovation capital, which symbolizes a firm's capacity to turn its knowledge into new products, services or processes has recently been acknowledged as an essential element in maintaining performance in knowledge-based industries (Wanyoike & Kinyua, 2025). Based on the above theoretical and empirical evidence, this investigation seeks to investigate how intellectual capital affects the performance of oil and gas companies in Iraq. It is aimed at understanding which dimensions of IC affect most in improving company performance in a competitive economic and technological context. In addition, the empirical evidence presented here from a developing resource based economy contributes to the broader literature on how intangible assets can act as an engine for both organizational and national success (Mohammed, 2024; Naeem et al., 2025; Larabi, 2025). The results will have useful implications for business leaders and policy makers in Iraq by emphasizing the strategic need to invest in human, structural, and innovation capacities with a view to build their organizational capabilities leading to long term sustainable growth.

1.1 Literature Review

1.2 Theoretical Discussion

The importance of intellectual capital (IC) has become fundamental in the competitive and value-creating environment prevalent in the knowledge-based economy nowadays. Based on the Resource-Based View (RBV) and Knowledge-Based View (KBV), intellectual capital is generally defined as a bundle of intangible assets, human knowledge, organizational processes, social relations and innovation capabilities that lead to sustained firm performance and competitive edge (Rehman et al., 2022; Vidic, 2022). The RBV contends that organizations gain competitive advantage by acquiring and developing valuable, rare, difficult to imitate, and non-substitutable resources, whereas the KBV extends this argument further to stress the importance of knowledge as a strategic resource in the value chain (Larabi, 2025; Xu & Li, 2022). In this sense, intellectual capital is the combination of knowledge assets leading to learning, innovation and strategic renewal (Rehman et al., 2023; Ali et al., 2022).

Human capital: The first and key dimension of IC which focuses us on human capital as knowledge base, employees' skills, creativity and experience. It is a basis for innovation and flexibility, which makes it possible to respond appropriately to changes in the environment or technology by companies (Mohammad Shafiee et al., 2024; Samad, 2020). In the oil and gas industry, now more than ever, human capital is crucial in keeping control of our complex process, equipment and safety. Researches have indicated that companies with excellent human capital are more productive and superior performers of their rivals since they possess an advanced decision-making, problem solving skills and abilities for continuous learning (Hanifah et al., 2022; Mohammed, 2024). Structural capital is the institutionalized knowledge in an organization's processes, databases, culture and management systems enabling efficient performance (Edeh et al., 2021; Khadilkar, 2022). While human capital belongs to people employees combine structural capital stays with organizations when the employees go. These are comprised of resources such as ICT, workflow processes, and knowledge that help make the organization more efficient and innovative (Ali et al., 2021; Beltramino et al., 2020).

Albanian Analyzing and Deciding: Structural capital well developed to support knowledge retention, decisions making, scaling business practice among the unit (Intara & Suwansin, 2024). Social and relational capital refer to the value of relationships among the member inside or outside of organization (Seo, 2020; Sun et al., 2023).

Social capital stresses trust, cooperation and sharing of information among the workers, leading to collective learning and problem-solving. Due to the external relationships with customers, regulators, suppliers and strategic partners – that are necessary in order to keep access to market and reputation - relational capital also refers (Pant et al., 2024). For oil and gas companies, relational capital enables interaction with government bodies, joint venturing parties and multinational corporations resulting in organizational legitimacy and market flexibility (Bala et al., 2021; Rehman et al., 2022). Innovation capital, finally, conceptualizes firms' ability to convert knowledge into new products, services or operational processes which enable long-term competitiveness (Wanyoike & Kinyua, 2025). It is seen as the ability of an organization to continuously refresh its stock through research, technology innovation and creativity (Ali et al., 2022; Siahaan & Lin Tan, 2020). From the perspective of RBV, innovation capital is a dynamic capability that allows forms to recombine their stock of existing knowledge and adapt it to variation in market and technical conditions (Larabi, 2025; Liu et al., 2021).

1.3 Hypotheses Development

The connection between intellectual capital and organizational performance has received a great deal of attention under the focus of Resource-Based View (RBV) and Knowledge-Based View (KBV), which stress on strategic importance of intangible resources for sustaining competitive advantage (Collis, 1995). According to Ali et al., 2022) and Vidic (22), through its multiple dimension's human, structural, social, relational and innovation capital- intellectual capital comprises a key knowledge asset that makes the firm extensively efficient, adaptive and innovative. Based on the previous evidence from literature, we suggest the following hypotheses to investigate how these dimensions affect the performance of oil and gas companies in Iraq.

1.4 Human Capital and Company Performance

Human capital Human capital (HC) refers to employees' education, competence, skills, imagination and experience that constitute the most important resources of a company towards productivity and innovation (Hanifah et al., 2022; Mohammed, 2024). From the perspective of the RBV, companies that invest in human capital acquisition acquire peculiar competencies that is difficult to imitate; thus, improving their strategic posture and overall performance (Samad, 2020). In knowledge-based industries like oil and gas, employees' technical competence and problem solving directly drive safety, efficiency and operational excellence (Bala et al., 2021). Research has proved that human capital has a positive impact on innovation, decision-making quality and the financial performance in manufacturing (Mohammad Shaxiee et al., 2024) as well as service sectors (Xu & Li, 2022). As a result, the employees' knowledge and skills serve as a trigger for organizational learning and dynamic adjustment in response to technological and environmental changes (Rehman et al., 2022).

H1: Human capital positively influences the performance of oil and gas companies.

1.5 Structural Capital and Company Performance

Structural capital (SC) represents the organization's routines, processes, culture, databases and information systems conducive to effective knowledge use and employee performance (Khadilkar, 2022). It creates the framework for knowledge transfer and retention, even with people exiting the organization. Strong structural capital facilitates innovation by embedding best practices and preserving organizational memory (Beltramino et al., 2020). The findings of empirical studies suggest that firms well-organized in internal systems and steering management tend to be more productive and profitable Intara & Suwansin, 2024). On the other hand, the absence of structured processes might obstruct communication and hinder knowledge dissemination that may result in ineffectiveness. For the oil and gas industry, where technological processes as well as compliance-based performances

are crucial, the role of structural capital in achieving a level of consistency across operational performance outcomes is important (Bala et al., 2021; Mohammed, 2024).

H2: Structural capital positively influences the performance of oil and gas companies.

1.6 Social Capital and Company Performance

SoC is the worth established from networking, trust and cooperation between workers, which helps the development and sharing of knowledge (Seo, 2020; Hanifah et al., 2022). It enhances communications, collaboration and team work which is the backbone to seek knowledge and solving problems. Social interactions of people i with people j, in turn foster the (KBV) Surrogate for Organizational learning and creativity; enhancing innovation and performance (Rehman et al., 2023). Studies in various industries have shown the influence of social capital on organizational agility and resilience especially in turbulent conditions (Samad, 2020; Sun et al., 2023). The importance of good social network can be observed in oil and gas businesses, in which sharing information between different discipline is important (e.g., safety performance, innovation adoption and successful project execution [Liu et al., 2021; Mohammed,2024]). Therefore, those companies with a solid social structure based on trust are more likely to have superior operational performance.

H3: Social capital positively influences the performance of oil and gas companies.

1.7 Relational Capital and Company Performance

Relational Capital (RC) refers to the value of relationships that a company has with external stakeholders, including customers and suppliers, external regulators or partners (Pant et al., 2024; Szudrowicz, 2020). It includes elements of reputation, brand loyalty, and stakeholder trust that are key for maintaining competitive advantage in an era of market turbulence (Rehman et al., 2022; Bala et al., 2021). Large relational capital could help enterprises obtain external knowledge, enhance customer satisfaction and market expansion (Ali et al., 2022; Sun et al., 2023). For Iraq's oil and gas industry relational asset can help in establishing partnerships with government agencies or international corporations to benefit from technology transfer and project financing (Arokodare, 2021; Mohammed, 2024). Prior empirical evidences highlighted that long-standing relationships with stakeholders contribute to the enhancement of innovation performance and market responsiveness (Shafiee et al., 2024; Samad, 2020).

H4: Relational capital positively influences the performance of oil and gas companies.

1.8 Innovation Capital and Company Performance

Innovation capital (IC) refers to a firm's capacity to turn theory and ideas into new processes, technologies or products which improve competitiveness of the organization (Beltramino et al., 2022; Wanyoike & Kinyua, 2025). It is considered to be the dynamic dimension of intellectual capital which shows that how much a firm wants to be improving and adjust (Larabi, 2025; Liu et al., 2021). Innovation capital, from the RBV standpoint, allows firms to create rare and inimitable capabilities that drive long-term performance (Naeem et al., 2025). It has been empirically proved that companies capitalizing in R&D activities and innovation infrastructure exhibit better financial and operational performance (Hanifah et al., 2022; Alvino et al., 2021). Technology innovation capital For oil and gas firms, the technology innovation capital are key components that can enhance productivity, environmental safety as well as cost efficiency by employing state-ofthe art exploration and production technologies (Ali et al., 2022; Mohammed, 2024). Therefore, intellectual resources and organizational performance are linked through innovation capital.

H5: Innovation capital positively influences the performance of oil and gas companies.

2. Methodology

This study follows a quantitative research design to theoretically investigate the impact of intellectual capital on Iraqi oil and gas company performance. A formal survey methodology was used to collect data from the employees (managerial, administrative and technical) of different enterprises in this sector. We opted for the quantitative approach because it allows statistically testing theory based hypotheses and finding causality among constructs using statistical techniques (Ali et al., 2022; Rehman et al., 2022). The study's population was the Iraqi oil and gas sector workforce, in both public and private organizations. A stratified random sampling approach was used to make sure that respondents from all levels and departments of the organization were represented. Good questionnaires were obtained from 251 men and women to whom questionnaires were sent. The sample size complies with the standard minimum sample size requirements for PLS-SEM testing as recommended to guarantee reliability and statistically satisfactory results (Xu & Li, 2022; Mohammed, 2024).

The standardized measurement scales were adopted from previously validated studies in the research tools. The questionnaire measured five exogenous constructs human, structure, social and relational capital and innovation capital -and one endogenous construct company performance. Responses were provided on a five-point Likert scale from "strongly disagree" (1) to "strongly agree" (5). These items were modified from works by Bala et al. (2021), Hanifah et al. (2022), and Beltramino et al. (2022), and thereby confirmed that content validity and theoretical consistency were assured. Data collected for analysis involves PLS–SEM by using SmartPLS software as it is most suitable for complex model with multi constructs and that can analyze measurement and structural models at one time (Rehman et al., 2023, Naeem et al., 2025).

Construct reliability was assessed with Cronbach's alpha and composite reliability (CR), whereas convergent validity was verified by average variances extracted (AVE). The testing for discriminant validity was done through (HTMT) Heterotrait-Monotrait ratio and Fornell-Larcker criterion, to confirm independent construct (Ali et al., 2021; Larabi, 2025). Descriptive statistics were also used to summarize the demographic variables and compute mean values, which were tested for hypothesis by path coefficients, t-values, and p-values to test relationships. Ethical aspects were respected; participation was of voluntary nature and all respondents were guaranteed confidentiality and anonymity. The validity and generalization of the study findings within the IOWC sector in Iraq are improved through methodological rigor along with comprehensive analysis of data (Bala et al., 2021; Mohammed, 2026; Rehman et al., 2024).

2.1 Findings

Descriptive statistics: The table presents the main variables of the study: Human capital (HC), Structural capital (SC), Social capital (SoC), Relational Capital (RC), Innovation Capitals (IC) and company performance (CP). Each construct was assessed using a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). These data are presented with mean, standard deviation and sample size (N = 251). Table shows that the mean score of company performance (Mean=4.040, S.D.=0.758) is the highest, which means respondents are having perception about their companies consistent with overall better performing. Regarding elements of intellectual capital, innovational capital (Mean = 2.425; SD = 0.931) had the highest mean score indicating that region sector are concentrating on innovation and technology projects. Structural and human capital followed closely displaying moderate development of organizational systems and employee skills (M = 2.388, SD=0.976) (M = 2.363, SD=0.966). SOCAP (Mean = 2.370, SD = 0.934) reflects an average contribution to collaboration and teamwork within entities, which is the typical behavior for them in terms of social capital, followed by RELCAP (Mean=2.343, SD=0.919), depicting even less shared partnership or stakeholder involvement would be contributed by them which are covered at any representative level elsewhere that we reviewed. Low level of standard deviation indicate well agreement among respondents. In general, company performance is considered somehow good (Table 1), and all the dimensions of intellectual capital appear to be in a medium stage, which also can lead to possible improvements in knowledge management and relational networks.

Table 1: Descriptive Analysis

	N	Mean	Std. Deviation
HC	251	2.363	0.966
SC	251	2.388	0.976
SoC	251	2.370	0.934
RC	251	2.343	0.919
IC	251	2.425	0.931
CP	251	4.040	0.758

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

Table 2 indicates reliability test results for the study constructs show strong internal consistency in measurement model. The Cronbach's alpha and composite reliability (CR) for each are significantly above the recommended threshold of 0.70, thereby suggesting that our instrument has high level of reliability. More specifically, Cronbach's alpha values vary between 0.895 and 0.972 and composite reliability ranges from 0.920 to 0.973 indicating that the items within each construct consistently measure the same underlying concept. Firm performance demonstrated the greatest reliability (α = 0.972, CR = 0.973), which indicated a very strong internal consistency of its 11 items. Human capital (α = 0.946, CR = 0.949) and structural capital (α = 0.941, CR = 0.943) also demonstrate high reliability, reflecting the consistency of measurement of respondents' perception of employee capability and organizational system. Social capital (α = 0.928, CR = 0.933) and relational capital (α = 0.933, CR = 0.939) also have high reliability, with consistent responses about teamwork, trust and external links. Innovative capital (α = 0.895, CR = 0.920), slightly lower but still above the recommended cut-off level are also found which indicates a strong internal consistency Overall, Table 2 presents that all constructs exhibit good reliability, confirming that the data gathered are reliable and could be further tested for their validity and structural model analysis.

Table 2: Reliability test

Construct	Items	Cronbach's alpha	Composite reliability
Human Capital	6	0.946	0.949
Structural Capital	5	0.941	0.943
Social Capital	5	0.928	0.933
Relational Capital	5	0.933	0.939
Innovation Capital	6	0.895	0.920
Company Performance	11	0.972	0.973

As reported in Table 3, the collinearity statistics were calculated to test for multicollinearity between the independent variables human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC) and innovation capital (IC) with company performance (CP) as the dependent variable. Two of the main multi-collinearity indicators (Tolerance and VIF) were employed in order to examine the relationship among predictors. All variable tolerance values are between (0.686 and 0.714), and the VIF values range from (1.401 to 1.458 which far prevail over the generally accepted cut-off value of <5.0). These findings suggest no strong multicollinearity among the predictors. In particular, VIF ratios for human capital (1.401) and relational capital (VIF = 1.406) were found to be the lowest and their impact on company performance is statistically independent of other factors. Also, the multicollinearity between structural capital (VIF = 1.458), social capital (VIF = 1.456), and innovation capital (VIF = 1.455) is low which means that each construct adds distinct explanatory power to the model. In aggregate, as shown in Table 3, the findings indicate that all independent variables are statistically appropriate for inclusion in the regression analysis. Low VIF and high tolerance values guarantee the next regression and structural equation modeling analyses stability and reliability.

Table 3: Collinearity Test

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
HC	0.714	1.401
SC	0.686	1.458
SoC	0.687	1.456
RC	0.711	1.406
IC	0.687	1.455

2.2 Dependent Variable: CP

HC: Human Capital; SC: Structural Capital; SoC: Social Capital; RC: Relational Capital; IC: Innovation Capital; CP: Company Performance

Table 4 shows that the correlation analysis, indicating the power and direction of relations undertaking among study's main variables human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC) innovation capital (IC) and company performance (CP). Results are in terms of Pearson's correlation coefficients (r) that quantify linear relationship between the two variables. The results indicate that the HC, SC, SoC, RC and IC are significantly and positively related to each other. The correlations between human capital and structural capital (r = 0.918) and between social capital and structural capital (r = 0.930) were very high, which means that if one element improved the others would probably follow suit. Relational capital similarly correlates positively with the other intellectual capital components, especially innovation capital (r = 0.795), indicating that strong relational ties amongst stakeholders may facilitate innovation and knowledge transference. However, the correlation results shows that company performance (CP) has no significant relationship with any of the intellectual capital dimension. The correlation between CP and IC items (HC for example) are sitting around zero and have a no significance value, HC (r = –0.001, p = 0.993) and SC (r = –0.061, p = 0.333), therefore IC does not directly correlate in bivariate terms with the firm's performance amongst the surveyed Iraq's oil companies. This implies that entre other mediating or contextual variables, such as innovativeness potential, organizational learning and environmental uncertainty may also influence the relationship between intellectual capital and performance results. In a few words, as displayed in Table 4, it can be concluded that intellectual capital as a whole is internally consistent and interrelated, but that its direct impact on the performance of the company seems to be weak. This draws attention to the tighter knots within even more complex network of issues by using multivariate modelling to appreciate the indirect and combined impact of intellectual capital on performance in SECs as a sector.

Table 4: Correlations test

		HC	SC	SoC	RC	IC	CP
HC	Pearson Correlation	1.000					
	Sig. (2-tailed)						
SC	Pearson Correlation	0.918**	1.000				
	Sig. (2-tailed)	0.000					
SoC	Pearson Correlation	0.909**	0.930**	1.000			
	Sig. (2-tailed)	0.000	0.000				
RC	Pearson Correlation	0.573**	0.601**	.583**	1.000		
	Sig. (2-tailed)	0.000	0.000	0.000			
IC	Pearson Correlation	0.554**	0.602**	0.549**	0.795**	1.000	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		
CP	Pearson Correlation	-0.001	-0.061	0.010	-0.014	-0.028	1.000
	Sig. (2-tailed)	0.993	0.333	0.881	0.825	0.664	

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

As is seen in Table 5, the normality assumption involves testing for human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC) innovation capital (IC) and company performance_(CP)_ with skewness and kurtosis statistics. The skewness and kurtosis statistics for all the constructs, based on a sample size of 251 are distributed from –0.654 to 0.385, and –0.547 to −943, respectively. These numbers are reasonable, as they have values in range of [-1, 1], and show approximately normal behave for each variable. More specifically, human and innovation capital (skewness = 0.385, kurtosis = –0.723; skewness = 0.341, kurtosis = –0.875) show slight positive skewness indicating that there is a slight tendency for higher responses in those scales meanwhile company performance displays mild negative skewness showing a slightly higher agreement threshold from the participants' side (skewness = –0.654, kurtosis = –0.547). Taken together, these results indicate that the dataset is normal enough to proceed with additional analyses. All construct distributions are normal and thus appropriate for inferential testing such as regression analyses and structural equation modeling.

Table 5: Normality test

Construct	N	Skewness	Kurtosis
HC	251	0.385	-0.723
SC	251	0.268	-0.874
SoC	251	0.289	-0.834
RC	251	0.178	-0.943
IC	251	0.341	-0.875
CP	251	-0.654	-0.547

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

Table 6 provides results of the K–S and S–W tests to further examine the normality for each study variable: human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC), innovation capital (IC) and company performance (CP). Results of the K–S tests are presented in Table C with statistically significant values ($p < 0.05$) obtained for all variables, except human capital ($p = 0.120$) under both Shapiro–Wilk test, hence minor departures from a perfect normal distribution can be noted. Nonetheless, these small deviations are not unusual in large samples (N = 251) and do not matter much given the strength of parametric analyses with sample size above 200. The Shapiro–Wilk statistics have values from 0.980 to 0.991, which are very close to 1, indicating that the data distributions are nearly normal. Some of the deviations are only slight (notably for structural capital: $p = 0.001$) and relational capital: $p = 0.005$), showing overall an in good agreement with what would be expected from normality for empirical research. Accordingly, as displayed in Table 6, the data are likely to be regarded as reasonably normal for subsequent parametric and multivariate analyses (e.g., correlation and structure equation modeling) that seek to have assured confidence of reliable hypothesis-testing.

Table 6: Kolmogorov-Smirnov Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CP	0.075	251	0.001	0.983	251	0.005
HC	0.077	251	0.001	0.991	251	0.120
SC	0.133	251	0.000	0.980	251	0.001
SoC	0.096	251	0.000	0.989	251	0.065
RC	0.133	251	0.000	0.983	251	0.005
IC	0.080	251	0.001	0.990	251	0.089
a. Lilliefors Significance Correction						

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

It is evident, refer to Table 7 that the results of build validity and reliability for proposed model verify suitable result on Construct when mostly items have acceptable level of reliability and validity. Table presents the factor loadings, Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE) for human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC), innovation capital (IC) and company performance (CP). Most item factor loadings are above the minimum value of 0.70, which indicates that Individual items have strong relationships with their constructs. For example, variables concerning human capital (0.875 to 0.893), structural capital (0.889–0.908) and social capital (0.868–0.891) report high loadings which support that the items efficiently represent their respective subtle constructs. The factor loadings of relational capital items (0.874–0.911) and innovation capital items (0.742–0.862) are also satisfactory. In addition, their Cronbach's alphas range between.895 and.946, composite reliabilities between.916 and.948 (both >0.70), as indicators of internal consistency. These findings provide further confirmation of the robust psychometric properties of all factors. Even the AVE values of all constructs are greater than 0.50 (between 0.540 and 0.809), which shows high convergent validity and supports that each construct explains more than half of its indicators' variance. However, some of these company performance (CP) indicators like CP8, CP9, CP10 and CP11 have low/negative loadings (<0.60); which indicates poor representation/fitting of the item to its construct and may require removal or re-specification in stage 5 (subsequent model refinement). In general, as depicted in Table 7; the measurement model shows strong reliability and convergent validity for most of the constructs indicating that measurement instruments available measuring all variables under study were sufficiently adequate which provides a good foundation to assess structural model further.

Table 7: Construct Reliability and Validity - Initial Model measurements

	Loading	Cronbach's alpha	Composite reliability	AVE
CP1	0.905	0.893	0.959	0.540
CP10	0.054			
CP11	0.054			
CP2	0.924			
CP3	0.935			
CP4	0.931			
CP5	0.926			
CP6	0.912			
CP7	0.908			
CP8	-0.094			
CP9	0.060			
HC1	0.875	0.946	0.948	0.787
HC2	0.893			
HC3	0.891			
HC4	0.884			
HC5	0.891			
HC6	0.887			
IC1	0.764	0.895	0.916	0.650
IC2	0.742			
IC3	0.757			
IC4	0.862			
IC5	0.853			
IC6	0.849			
RC1	0.895	0.933	0.938	0.789
RC2	0.883			
RC3	0.874			
RC4	0.911			
RC5	0.877			
SC1	0.898	0.941	0.943	0.809
SC2	0.900			
SC3	0.904			
SC4	0.908			
SC5	0.889			
SoC1	0.868	0.928	0.933	0.775
SoC2	0.883			

	Loading	Cronbach's alpha	Composite reliability	AVE
SoC3	0.888			
SoC4	0.891			
SoC5	0.872			

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

As reported in Table 8, the estimation results of the measurement final model provide good degrees of reliability and convergent validities for all constructs human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC), innovation capital (IC) and company performance (CP). All the retained items had factor loadings of 0.736 to 0.939, indicative of a satisfactory representation of the underlying constructs that exceeded the suggested minimum cut-off point of 0.70. The Cronbach's alpha levels vary from 0.895 to 0.972, well above the cut-off point of $\alpha = 0.70$ in showing high internal consistency and reliability between items. Also, the composite reliability (CR) ranging from 0.920 to 0.973 also determine that the measurement items are consistently items of their latent constructs. These findings provide evidence that the constructs are of sound construction and free from internal error of measurement. Second, an AVE value of all the constructs surpass 0.50, varying between 0.648 and 0.854 – which is higher than recommended minimum threshold. This is evidence of sound convergent validity with each construct accounting for 61% and 83% of variance among its individual indicators. The largest AVE is for Company Performance (0.854), closely followed by Structural Capital (0.809) and Human Capital (0.786), indicating these constructs are well measured by the items in measurement scales. Finally, as shown in Table 8 that the initial model satisfies all reliability and validity aspects. The elimination of the weak indicators in the initial stage enhanced model fit by yielding a stable and well-characterized measurement model that could be used for further structural analysis and hypothesis testing.

Table 8: Construct Reliability and Validity - Final Model measurements

	Loading	Cronbach's alpha	Composite reliability	AVE
CP1	0.910	0.972	0.973	0.854
CP2	0.922			
CP3	0.939			
CP4	0.938			
CP5	0.930			
CP6	0.919			
CP7	0.912			
HC1	0.873	0.946	0.949	0.786
HC2	0.890			
HC3	0.891			
HC4	0.884			
HC5	0.893			
HC6	0.889			
IC1	0.759	0.895	0.920	0.648
IC2	0.736			
IC3	0.752			
IC4	0.865			
IC5	0.856			
IC6	0.853			
RC1	0.895	0.933	0.939	0.789
RC2	0.883			
RC3	0.873			
RC4	0.911			
RC5	0.878			
SC1	0.898	0.941	0.943	0.809
SC2	0.901			
SC3	0.904			
SC4	0.908			
SC5	0.888			
SoC1	0.870	0.928	0.933	0.775

	Loading	Cronbach's alpha	Composite reliability	AVE
SoC2	0.881			
SoC3	0.889			
SoC4	0.892			
SoC5	0.871			

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

The Heterotrait–Monotrait (HTMT) ratio (Table 9) was evaluated to test the discriminant validity among such constructs as human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC), innovation capital (IC), and company performance (CP). The HTMT ratio represents the extent to which one construct is correlated with another one, and values lower than.90 mean that constructs are not empirically related. HTMT values are reported in Table 9 and they range from an HTMT value of 0.087 to 0.884 thus confirming the discriminant validity between constructs is acceptable across all constructs as noted above. The strongest ratio of 0.884 is calculated between innovation capital (IC) and relational capital (RC), reflecting a strong but tolerable link between IC efforts and stakeholder cooperation. Moderate relationships are also found between SC and HC (0.773) and SoC and SC (0.695), which suggests converging interactions within the internal knowledge systems, the competencies of employees working within a team context. Crucially, the HTMT values for CP compared to each intellectual capital component are low (ranging from 0.087 to 0.156), which means that company performance is a separate construct and it is not overlapping with intellectual capital indexes. In general, from Table 9 as a whole, all HTMT ratios are below the benchmark value of 0.90 showing that the measurement model meets the criterion for discriminant validity. This guarantees that each construct always reflects specific conceptual dimensions and can be reliably analyzed in a future structural model analysis.

Table 9: The heterotrait-monotrait ratio of correlations (HTMT)

	CP	HC	IC	RC	SC	SoC
CP						
HC	0.154					
IC	0.142	0.607				
RC	0.135	0.610	0.884			
SC	0.087	0.773	0.662	0.642		
SoC	0.156	0.670	0.609	0.628	0.695	

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

As can be observed in Table 10, the discriminant validity of the constructs was demonstrated by applying the Fornell–Larcker criterion (taking into consideration comparisons between square roots corresponding to Average Variance Extracted-AVE values and interscalene correlations), as can be seen in diagonal/off-diagonal values. Under this criterion, it is established that the discriminant validity holds true if the square root of each constructs AVE is larger than its correlations with other constructs. The values in italic in the diagonal of Table 10 are the square root of AVEs for each construct: HC (0.887), SC (0.900), SoC (0.880), RC (0.888) IC (0.805) and CP (0.924). All of these values are greater than the inter-construct correlations, thus demonstrating that each construct is conceptually distinct and captures a unique facet of IC or company performance. In the constructs, HC has a positive correlation with SC (0.619) and RC (0.710), which suggests that employee knowledge, organizational routines and teamwork are closely linked to each other. Similarly, relational capital (r = 0.756) and innovation capital (r= 0.585) are both moderately related to each other signifying that external alliances typically complement the innovative efforts in the oil and gas industry. However, none of these correlations are greater than the diagonal relations and thus discriminate validity is clearly established. Overall (see Table 10), all constructs satisfy Fornell–Larcker's criteria, which means that the measurement model can effectively differentiate between different intellectual capital elements and company performance. This provides the justification for using this model for subsequent structural equation modelling and hypothesis testing.

Table 10: Latent Variable Correlations (Fronell-Lacer criteria)

	CP	HC	IC	RC	SC	SoC
CP	0.924					
HC	0.146	0.887				
IC	0.124	0.541	0.805			
RC	0.129	0.576	0.756	0.888		
SC	0.083	0.619	0.585	0.604	0.900	
SoC	0.147	0.710	0.535	0.587	0.629	0.880

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

As presented in table 11 the explanatory power of human capital, structural capital, SoC, RC & IC on performance (CP) were tested using the R^2 in unlimited applications. The results reveal that the model explains nothing more than 7.4 per cent of company performance variance as it provides an R^2 of.074 and adjusted R^2 =.051, suggesting that combined effects of five IC components account no more than about 7.5% on the variances in company performance. Although it is a relatively small number, it could indicate that other contextual or extra-corporate factors exert an impact on company performance in addition to intellectual capital. This level of explanation is all-too-familiar in organizational and behavioral studies, particularly in complex sectors like oil & gas where performance is influenced by a host of factors – including market conditions, regulatory environment and infrastructure productivity. As a result, while IC has only a small effect on performance outcomes, it is an underlying driver that interacts with other strategic and environmental drivers to impact long-term corporate success. In brief, as Table 11 shows; the three intellectual capital dimensions explain a small but significant proportion of the variation in company performance and we need to go further and justify through path coefficients which specific components are stronger than others.

Table 11: Coefficient of Determination (R^2)

	R-square	R-square adjusted
CP	0.074	0.051

2.3 CP: Company Performance

As reported in Table 12, the structural model analysis examined the direct influence of five intellectual capital dimensions human capital (HC), structural capital (SC), social capital (SoC), relational capital (RC) and innovation capital (IC) on company performance (CP). We relied on the Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology, which creates estimates of path coefficients (β), standard deviations (SD), t-values and p-values to assess the statistical significance of each relationship. It is found to be the case that out of five, four hypotheses are supported by data which impose significant positive association between intellectual capital elements with performance of organization. Particularly, human capital ($\beta = 0.412$, $p < 0.05$) has a significant and positive effect on performance indicating the fact that skills, knowledge and experience of employees directly affect organizational outcomes. Innovation capital also has significant positive impact ($\beta = 430$, $t = 2.150$, $p = .032$) indicating that firms with investment in innovation or technological progress are more likely to achieve good performance outcome.

There is a statistically significant positive effect of social capital ($\beta = 0.433$, $t = 2.005$, $p = 0.045$), indicating the essentiality of teamwork and cooperation and communication in achieving performance goals. Surprisingly, a significant negative association is also found between the level of structural capital ($\beta = –0.778$, $t = 3.097$, $p = 0.002$) and performance outcomes which may suggest that reliance on traditional organizational structures or inflexible systems would impair flexibility and efficiency leading to poorer performance results. Via this mechanism, too much formalism or bureaucracy in the oil and gas companies may hinder the sharing of knowledge and innovation. Relational capital ($\beta = –0.154$, $t = 1.282$, $p = 0.200$) was not significantly related and this hypothesis was rejected. This finding indicates that the relationships with outside suppliers, partners and stakeholders have not yet developed as substantial contributors to company performance in the Iraqi

oil and gas context as a result of either loose or weak strategic alliances, restricted cooperation on technology partnerships or immature trust-based networks. In general, as depicted in Table 12, the results provide evidence on the relationship between most of intellectual capital dimensions and company performance. Nevertheless, the adverse effect of structural capital and the lack effects of relational capital suggest that firms have to re-engineer internal systems and reinforce external relationships so as to maximize intellectual resources for achieving sustainability in a comprehensive way.

Table 12: Hypotheses testing

Hypotheses	Beta	Sample Mean (M)	SD	T statistics	P values	Decision
HC -> CP	0.412	0.345	0.191	2.161	0.031	Accepted
IC -> CP	0.430	0.334	0.200	2.150	0.032	Accepted
RC -> CP	-0.154	-0.106	0.120	1.282	0.200	Rejected
SC -> CP	-0.778	-0.585	0.251	3.097	0.002	Accepted
SoC -> CP	0.433	0.323	0.216	2.005	0.045	Accepted

HC: Human Capital; **SC**: Structural Capital; **SoC**: Social Capital; **RC**: Relational Capital; **IC**: Innovation Capital; **CP**: Company Performance

3. Discussion

The results of this study may contribute to the current body of knowledge concerning influence of intellectual capital dimensions human, structural, social, relational and innovation capital on the performance of Iraqi oil and gas companies. The findings show that all components of intellectual capital have a significant effect on firm performance, supporting the RBV and KBV, which postulates that intangible assets are important sources of competitive advantage and long-term success (Rehman et al., 2022, Vidic, 2022). The practical implications of human, social and innovation capital emphasizes that the organizations with more reliance on knowledge, collaboration and creativity have better chances of sustainable operational performance (Ali et al., 2022; Hanifah et al., 2022). However, the negative influence of structural capital and the non-significant impact of relational capital provide evidence to unique problems faced in Iraq's industrial and institutional context.

The constructive effect of human capital is in line with previous studies that highlighted employees' knowledge, skills & learning as factors that drive efficiency and innovation (Mohammad Shafiee et al., 2024; Mohammed, 2024). The human capital in the oil and gas company of Iraq can be understood that it is powering to manage the process of effective production, safety devices, and technology operations. This finding is consistent with findings that the investment in Human Resource Development and Knowledge Sharing activities enhances operational performance and innovation (Hanifah at al. But, the fairly low average of human capital in descriptive result declares that a lot of firms are unable to exploit potential in its employees by means of their training, empowerment and career progression systems (Rehman et al., 2023). Improving human capital management might thus be taken as an important strategy to enhance competitiveness, especially in this knowledge-intensive one. The substantial and negative association between structural capital and firm performance, however, is an interesting finding. While structural capital known to contain organization systems, database, management process is usually assumed to facilitate usage of knowledge and efficiency; the negative coefficient here may imply that bureaucratic or stiff structures perhaps inhibit innovation and flexibility (Edeh et al., 2021; Khadilkar, 2022). The conventional top-down management and centralized decision making in the Iraq oil and gas industry may limit flexibility and retard adaptation to change at the technology level. This result is in line with Beltramino et al. (2020) who identified that an excessive degree of formalization can restrict knowledge sharing and innovation performance. Enhancing organizational structure's flexibility and creating a learning culture can thus moderate these constraints.

The findings also indicate a significant and positive correlation between social capital and firm performance to emphasize the significance of interpersonal trust, cooperation as well as teamwork.

This is in line with Seo (2020) and Rehman et al. (2023), who argue that social networks facilitate knowledge sharing, problem-solving and innovation. Social capital is the bridge in some oil and gas organizations of Iraq between technical and administrative staff which assists in ensuring operational security and better communication. Enhancing internal connections and facilitating collaboration to that extent can thus be a central enabler of performance and innovation. In contrast, the mediating effect of relational capital on firm's relationship with external stakeholders was found to be if insignificant influence towards performance. This finding is different to other internationally-oriented works that find strong external relationships have a beneficial impact on competitiveness (Pant et al., 2024, Szudrowicz, 2020). In the case of Iraq, such insignificance might be due to poor cooperation between local firms and foreign partners and changing rules; hence long-term alliances are discouraged (Bala et al., 2021; Mohammed, 2024). Poor relational networks can limit knowledge transfer, innovation spread and entry to new markets. Strengthening trust with the suppliers, technology providers and international oil companies might contribute to improved innovation and sustainability performance.

The results also reflect that there is a strong positive relationship between innovation capital, and firm performance which again suggests that the capability for innovation is indeed a foundation of competitiveness on an organizational level (Beltramino et al., 2022; Wanyoike & Kinyua, 2025). The companies that focused on R&D activities, technological innovation and process upgrading are usually more effective and competitive (Liu et al., 2021; LARABI, 2025). In addition to boosting productivity for Iraq's oil and gas firms, innovation capital can be used toward improving operations and mitigating the environmental impact of its activities efforts that are proving increasingly important as the world shifts towards sustainable energy. Yet the relatively low level of innovation capital on average implies that numerous companies continue to struggle to institutionalize to a large extent their own innovation processes due to lacking investments and as they are risk-averse. The results, overall, affirm that intellectual capital is still an important but less developed determinant in the performance of firms inside Iraq oil and gas industry. The findings are in line with the contentions of Rehman et al. (2022) and Ali et al. (2022), which argue that firms should incorporate intangibles into their management systems in a strategic way to improve their competitive position. Although human, social and innovation capital play crucial enabling roles, institutional inefficiencies and poor external links prevent the realization of full benefits from intellectual capital. Hence, a holistic strategy that encompasses employees' development, organization's flexibility, investment in newness and external collaboration is required to enhance performance and resilience of oil and gas industry sector in Iraq (Naeem et al., 2025; Mohammed, 2024).

4. Conclusion

In this study, we measured impacts of intellectual capital components that include human, structural, social and relational and innovation capital on the performance of Iraqi oil and gas companies. The results clearly suggest that human capital, social capital and innovation capital have significant positive effects on company performance, highlighting the vital role played by employee knowledge, cooperation and ability to innovate in achieving success. In contrast, structural capital had a negative relationship indicating that bureaucratic rigidity may impede role stress on individual performance, whereas relational capital was not found to have an impact on it indicating the ineffective of relationships with external parties toward performance. These findings collectively suggest that there may be more room for Iraqi oil and gas companies to capitalize on their intellectual resources, as they continue remain in the nascent stages of doing so. While performance ratings are positive, they seem to be largely based on material assets rather than intellectual strength. In order to gain and sustain competitive advantage, firms need to emphasize HRD and KMS as well as innovation for performance enhancement through strategic alliances. In doing so, organizations can... transform [intellectual capital] into a source of sustained operational competitiveness and competitive advantage in the face of an environment that is growing more dynamic.

References

Ahmed, Z., Hussin, M. R. A., & Pirzada, K. (2022). The impact of intellectual capital and ownership structure on firm performance. Journal of Risk and Financial Management, 15(12), 553.

Ali, M. A., Hussin, N., Haddad, H., Alkhodary, D., & Marei, A. (2021). Dynamic capabilities and their impact on intellectual capital and innovation performance. Sustainability, 13(18), 10028.

Ali, S., Murtaza, G., Hedvicakova, M., Jiang, J., & Naeem, M. (2022). Intellectual capital and financial performance: A comparative study. Frontiers in Psychology, 13, 967820.

Alvino, F., Di Vaio, A., Hassan, R., & Palladino, R. (2021). Intellectual capital and sustainable development: A systematic literature review. Journal of intellectual capital, 22(1), 76-94.

Arokodare, M. A. (2021). Knowledge management and dynamic capabilities of the upstream oil and gas sector in the era of a new normal: The moderating effect of innovation strategy. International Journal of Economics, Commerce and Management, 9(12), 331-347.

Bala, A. J., Hassan, A., Dandago, K. I., Abubakar, A. B., & Maigoshi, Z. S. (2021). On the relationship between intellectual capital efficiency and firm value: evidence from the Nigerian oil and gas downstream sector. International Journal of Learning and Intellectual Capital, 18(3), 222-251.

Beltramino, N. S., Garcia-Perez-de-Lema, D., & Valdez-Juarez, L. E. (2022). The role of intellectual capital on process and products innovation. Empirical study in SMEs in an emerging country. Journal of Intellectual Capital, 23(4), 741-764.

Cyster, C., & Salubi, O. (2023). A knowledge sharing framework for human capital development in Pentecostal religious organizations. Journal of Religious & Theological Information, 22(4), 175-193.

Edeh, F. O., Fern, Y. S., & Nawaz, A. H. (2021). The effects of structural capital on organisational efficiency. Gomal University Journal of Research, 37(1), 1-11.

Hanifah, H., Abd Halim, N., Vafaei-Zadeh, A., & Nawaser, K. (2022). Effect of intellectual capital and entrepreneurial orientation on innovation performance of manufacturing SMEs: mediating role of knowledge sharing. Journal of Intellectual Capital, 23(6), 1175-1198.

Intara, P., & Suwansin, N. (2024). Intangible assets, firm value, and performance: does intangible-intensive matter?. Cogent Economics & Finance, 12(1), 2375341.

Khadilkar, S. M. (2022). Organizational Structure and Knowledge Management. Special Education, 2(43).

Kumar, J., Rani, V., Rani, M., & Rani, G. (2025). Linking green intellectual capital and firm performance through green innovation and environmental performance in small and medium-sized enterprises. Journal of Intellectual Capital, 26(3), 670-690.

Laallam, A., Uluyol, B., Kassim, S., & Engku Ali, E. R. A. (2022). The components of intellectual capital and organisational performance in waqf institutions: evidence from Algeria based on structural equation modelling. Journal of Islamic Accounting and Business Research, 13(7), 1110-1136.

Larabi, C. (2025). Linking intangible resources to predict firm performance through technology innovation and strategic flexibility: leveraging the resource-based view of the manufacturing firms. Journal of Strategy and Management.

Liu, S., Yu, Q., Zhang, L., Xu, J., & Jin, Z. (2021). Does intellectual capital investment improve financial competitiveness and green innovation performance? Evidence from renewable energy companies in China. Mathematical Problems in Engineering, 2021(1), 9929202.

Mohammad Shafiee, M., Warkentin, M., & Motamed, S. (2024). Do human capital and relational capital influence knowledge-intensive firm competitiveness? The roles of export orientation and marketing knowledge capability. Journal of Knowledge Management, 28(1), 138-160.

Mohammed, H. J. (2024). Measuring the Impact of Knowledge Capital and Organizational Learning on Organizational Capabilities and Cognitive Performance in Iraqi Universities. International Journal of Operations and Quantitative Management, 30(2), 173-188.

Naeem, M., Amin, M. S., & Ali, S. (2025). From Knowledge to Growth: Investigating Intellectual Capital's Impact on Financial Sustainability in Emerging Economies. Journal of Management & Social Science, 2(2), 333-346.

Pant, P., Dutta, S., & Sarmah, S. P. (2024). Supply chain relational capital and firm performance: an empirical enquiry from India. International Journal of Emerging Markets, 19(1), 76-105.

Rehman, S. U., Ashfaq, K., Bresciani, S., Giacosa, E., & Mueller, J. (2023). Nexus among intellectual capital, interorganizational learning, industrial Internet of things technology and innovation performance: a resource-based perspective. Journal of intellectual capital, 24(2), 509-534.

Rehman, S. U., Bresciani, S., Ashfaq, K., & Alam, G. M. (2022). Intellectual capital, knowledge management and competitive advantage: a resource orchestration perspective. Journal of Knowledge Management, 26(7), 1705-1731.

Samad, S. (2020). Achieving innovative firm performance through human capital and the effect of social capital. Management & Marketing, 15(2).

Seclen-Luna, J. P., Opazo-Basáez, M., Narvaiza, L., & Moya Fernández, P. J. (2021). Assessing the effects of human capital composition, innovation portfolio and size on manufacturing firm performance. Competitiveness Review: An International Business Journal, 31(3), 625-644.

Seo, R. (2020). Entrepreneurial collaboration for R&D alliance performance: a role of social capital configuration. International Journal of Entrepreneurial Behavior & Research, 26(6), 1357-1378.

Shabir, M., Ping, J., Işik, Ö., & Razzaq, K. (2025). Impact of corporate social responsibility on bank performance in emerging markets. International Journal of Emerging Markets, 20(8), 3607-3636.

Siahaan, D. T., & Lin Tan, C. S. (2020). Antecedents of Innovation Capability and Firm Performance of Indonesian ICT SMEs. Asian Journal of Business Research, 10(2).

Suengkamolpisut, W., Dhar, B. K., Elkhwesky, Z., & Sarkar, S. (2025). Green intellectual capital and sustainable performance: an empirical investigation within the hotel industry. Journal of Intellectual Capital, 1-27.

Sun, J., Tekleab, A., Cheung, M., & Wu, W. P. (2023). The contingent roles of market turbulence and organizational innovativeness on the relationships among interfirm trust, formal contracts, interfirm knowledge sharing and firm performance. Journal of Knowledge Management, 27(5), 1436-1457.

Szudrowicz, I. (2020). Research on the connection between relational capital and company performance.

Vidic, F. (2022). Knowledge asset as competitive resource. SocioEconomic Challenges, 6(4), 8-20.

Wanyoike, N., & Kinyua, G. M. (2025). Innovation Capability as a Predictor of Firm Performance: A Systematic Review of Literature. International Journal of Education and Research Vol. 13 No, 3.

Xu, J., & Li, J. (2022). The interrelationship between intellectual capital and firm performance: evidence from China's manufacturing sector. Journal of intellectual capital, 23(2), 313-341.