Original Research Article

Intellectual Capital and Performance of Public Companies in MENA Region

# ABSTRACT

This study examines the relationship between Intellectual Capital (IC) and Financial Performance (FP) among the companies in the Middle East and North Africa (MENA) region. Based on the resource-based view and knowledge-based theory, this study adopts a conceptual approach consistent with the Value-Added Intellectual Coefficient (VAIC) model to examine the impact of human capital efficiency (HCE), capital employed efficiency (CEE), and structural capital efficiency (SCE), on performance indicators including return on assets (ROA), return on investments (ROI), and Tobin’s Q among publicly listed MENA companies. The results indicate that intellectual capital significantly enhances financial performance, with human capital emerging as the key factor. The findings suggest that knowledge-based resources are crucial for gaining a competitive advantage in emerging markets. They reveal that companies with greater efficiency in managing intellectual capital tend to achieve better financial performance. This study helps bridge the gap in the literature on intellectual capital in developing economies and offers practical insights for managers and policymakers in the MENA region. It emphasizes the strategic importance of investing in knowledge assets to enhance corporate performance.

*Keywords: Intellectual capital, VAIC, MENA region, firm performance, public listed companies.*

1. **Introduction**

The Middle East and North Africa (MENA) region, also known as West Asia and North Africa (WANA) or Southwest Asia and North Africa (SWANA), comprises 20 countries (Mansour, 2024). The MENA is expected to grow relatively by 2.7% in 2024, up from 1.9% in 2023 based on World Bank predictions (Woertz & Osypenkova, 2024). Despite low growth, the Gulf Cooperation Council (GCC) economies are predicted to grow 5.6% quicker by the end of 2024 (Chaziza, 2024). In 2024, GDP per capita is predicted to rise relatively at a rate of 1.3%, mostly due to the GCC economies (Alsamara et al., 2024; Ashour et al., 2024).

The region has large numbers of public companies operating on different scales. A publicly traded company is a privately held business structured using stock shares that are meant to be freely traded on stock exchanges or over-the-counter markets (Hussain et al., 2024). Depending on the territory, it may be unlisted or listed on a stock exchange (Qwader, 2024). The listed public companies are vast numbers of human capital with valuable intellectual capital (IC) across every level of their entities (Al-Hamadeen & Suwaidan, 2014). This includes the company's employee knowledge, skills, and experience over the years. Human resources in the public sector account for 70% of MENA nations’ economic growth, making it an essential component in the transition to a knowledge-based economy (Maqableh et al., 2022; Habib & Dalwai, 2024). IC can account for more than 75% of a company's value at the organizational level (Maqableh et al., 2022). Companies with high IC levels can develop new products, apply creative solutions, and obtain a competitive superiority (Parimarma & Kufepaksi, 2023). Companies seek to maximize customer value in fiercely competitive markets by making efficient use of each employee's unique capabilities. IC management is imperative in order to turn intangible assets into a competitive advantage and to maximize human potential to boost organizational performance (Mukaro et al., 2023; Tyas & Januarti, 2023). There is a direct link between intellectual capital and company performance (Jordão et al., 2020; Asif et al., 2023). Organizational structure, capital management, strategic planning, and human resource investment are important components (Taha et al., 2024).

1. **Literature Review**
   1. **Intellectual Capital**

Organizational characteristics such as experience, knowledge, skills, patents, and copyrights were associated with the phenomena of companies' market worth exceeding their book value in the 1980s (Morgan et al., 1998). When Swedish researchers classified these talents as "intangible assets" in 1986, the idea of IC was born. Stewart (1991) coined the phrase in a Fortune Magazine article, emphasizing its importance in enhancing a country's wealth and development. IC has three main components and is used both nationally and at the organizational level. Human capital (HC), structural capital (SC), and other knowledge assets are the three primary components of IC, which is divided into relational, structural, and human capital (Ofurum & Aliyu, 2018). Employee experience, skill, aptitude, knowledge, morality, creativity, and mindsets are all included in HC and are vital components of strategic innovation and renewal (Bendickson & Chandler, 2019; Agyabeng-Mensah & Tang, 2021). The term "structural capital" describes internal resources such as organizational capacity, procedures, infrastructures, records, brands, and patents that are still owned by the business after employees return (Nurseha et al., 2024). In the interaction between an organization and external stakeholders, IC are additional knowledge assets (Tyas & Januarti, 2023).

The assessment of IC, however, differs amongst studies. Some studies report inconclusive effects on financial performance (Mohammad & Bujang, 2019; Zhang et al., 2021; Mutuc & Cabrilo, 2022), while others highlight relational capital as the most important factor in improving company performance (Momani et al., 2021; Laghi et al., 2022). Some researchers emphasize human capital as the main driver of financial performance (Nuryani et al., 2018; Bendickson & Chandler, 2019; Agyabeng-Mensah & Tang, 2021). IC can provide firms with a competitive advantage, but companies must ensure a balanced approach across all three components to foster stability and positively impact performance (Ofurum & Aliyu, 2018; Nurseha et al., 2024).

**2.2** **Measurement Approach**

The value-added intellectual coefficient (VAIC) technique is one way to measure the effectiveness of intellectual capital. By transforming human and structural capital into economic values, it generates the VAIC (Masmuddin et al., 2024). This method offers a more objective alternative to traditional measurements like EBITDA, which is consistent with the knowledge-based economy (Ayinaddis et al., 2024). Interest in using the VAIC model has been prompted by its simplicity, reliance on publicly available, audited accounting data, and capacity to compute for the entire company or specific business units (Dancaková & Glova, 2024).

A popular metric for measuring IC is the VAIC model; however, it has drawn critique for emphasizing IC efficiency over other factors (Marzo, 2024). Even though IC is measured by VA, investigators frequently use the VAIC as a proxy for IC (Bassetti et al., 2020; Abuaddous et al., 2023). It is most likely because of Pulic's new definitions that this dispute exists (Indrianasari et al., 2023). Relational capital, which the VAIC model ignores, is also reflected in the model (Momani et al., 2021; Nurseha et al., 2024).

IC researchers have not previously employed the structural capital at the center of the VAIC (Farhatulmaula, 2024; Nurseha et al., 2024). It is a result of Human Capital's (HCE) inverse, which balances HCE's beneficial effect on the VAIC (Nuryani et al., 2018; Bendickson & Chandler, 2019). Finally, the VAIC model does not account for the relationships between various types of capital. This problem has been addressed by adding interaction terms to the equation; however, the interaction term between the HCE returns does not accurately represent interaction (Nurseha et al., 2024).

**2.3 Control Variables**

The financial capacity of a firm is largely determined by its size (Olawale et al., 2017). High levels of leverage have a higher impact on small companies, but as they expand, these benefits reduce (Ibhagui & Olokoyo, 2018). It is advantageous for small companies to have equitable representation on the IC (Mansour et al., 2023). Larger companies significantly improve market performance because they are more responsive to company characteristics (Ghose et al., 2023). Small companies have more restrictions because of their standing, collateral, and resources, including IC, that are readily available (Saputra & Zulfikar, 2023). Small businesses are more susceptible to changes in the macroeconomic environment because large companies can provide advantages such as simple access to external funding (Weinzimmer et al., 2023). Reputation and IC are two intermediary processes that large companies use to influence performance (Sukoco & Kadarusman, 2023).

Leverage has a negative impact on firm performance, but it does not prevent growth for companies with strong profit margins (Ibhagui & Olokoyo, 2018). Leverage and company performance have a contradictory relationship; while some studies find a positive correlation, others find an inverse one (Saputra & Zulfikar, 2023). Higher returns from debt financing may be the result of high agency costs and overinvestment problems (Leyva-De la Hiz & Bolívar-Ramos, 2022). Other research suggests institutional factors may impact the relationship; higher leverage is linked to higher performance and higher profit efficiency (Rwakihembo et al., 2022; Kim, 2024; Ng et al., 2024).

Researchers have been examining the innovation model, and many of the findings point to this strategy as a viable means of enhancing companies' operational performance (Jin et al., 2022; Aisjah et al., 2023). Company innovation necessitates enough clout to make ongoing organizational or strategic changes (Yang et al., 2022). Companies seek to enhance performance by introducing novel ideas into their business plans via the contribution of IC (Imran & Jingzu, 2022). Business model innovation research has progressed from an independent to a multidimensional approach, from an internal to a holistic one, and from a linear to a complex analysis (Han et al., 2022; Zhu et al., 2024). Most research indicates a strong correlation between firm performance and innovations (Jin et al., 2022; Yang et al., 2022; Aisjah et al., 2023; Zhu et al., 2024).

The real gross domestic product (GDP) is a metric that accounts for inflation and represents the total value of goods and services generated by an economy within a specific year (Jayathilaka et al., 2022). Real GDP is expressed in base-year prices (Bryniuk, 2023). The traditional "neutrality of money" theory holds that inflation only modifies the units of measurement and has no impact on real GDP (Hendika & Setyowati, 2022). Inflation raises wages and prices in a manner consistent with each other (Kummu et al., 2024). The key metrics used to measure the impact of inflation targeting on a firm's performance are productivity and IC (Jibril et al., 2023; Parimarma & Kufepaksi, 2023; Ramallari & Merko, 2023).

1. **Theoretical Framework**

Sveiby (1997) was among the first researchers to investigate the idea of IC, and he divided it into three categories: employee competency, internal structure, and external structure. A slightly different classification was proposed by Edvinsson and Malone (1997), who defined IC as being composed of both structural and human capital. Using a similar methodology to Edvinsson and Malone, Stewart (1998) adds new terms and components while maintaining this foundation. Stewart (1998) extended the concept of investor-customer interchange by dividing it into three components: customer capital, human capital, and structural capital.

The VAIC created by Pulic (2000) is a more modern and all-encompassing method of assessing IC. According to Krušinskas and Bruneckienė (2015), the VAIC is a flexible model that can be applied at different levels, such as organization, region, and national level, and it evaluates the effectiveness of a firm's key resources. VAIC is a comprehensive measure of IC that emphasizes its capacity to offer a consistent and trustworthy framework for determining IC values and assessing business performance (Soewarno and Tjahjadi, 2020).

According to Pulic (2000, 2004), VAIC can help identify economic sectors that need to be mediated to boost output and create wealth. VAIC's objectivity is one of its key benefits; it allows for the statistical analysis of sizable data and provides stakeholders with insightful information. Furthermore, several commercial settings have embraced VAIC (Abuaddous et al., 2023; Masmuddin et al., 2024). This study contributes to the literature by using the VAIC measurement to calculate IC in MENA, further enhancing our understanding of the role and efficiency of IC in various economic contexts.

Conclusively, VAIC is regarded as a useful and efficient method for assessing IC, primarily because it employs financial and economic data that offers a consistent basis for comparison across various regions and sectors. Regional differences in IC performance have also been identified by the model (Jordão et al., 2020; Maqableh et al., 2022). In this research, the IC of listed companies in the MENA region is measured using the VAIC model.

**4. Conceptual Model and Hypothesis Development**

This study employs the VAIC model to examine the effect of IC on firm performance. All the IC three key components, including human capital, structural capital, and relational or customer capital, are used. Pulic’s VAIC model emphasizes the efficiency of these components, focusing on the economic value added (EVA) by each. Pulic translated the assessment of IC into efficiency metrics by examining the ability of CE, HC, and SC to generate value and output. This approach led to the formation of a metric known as intellectual capital efficiency (ICE), which encompasses human capital efficiency (HCE), capital employed efficiency (CEE), and structural capital efficiency (SCE). Figure 1 displays the conceptual framework of this study.

This study hypothesizes that VAIC and its components (CE, SCE, and CEE) will positively impact the performance of publicly listed companies in MENA in terms of economics, as measured by return on assets (ROA), return on investment (ROI), and Tobin’s Q. The analysis incorporates several control variables expected to influence company performance, including firm size, leverage, firm age, innovation index, GDP, and inflation (Figure 1). These control variables are essential for accounting for external and firm-specific factors that could affect the relationships between IC efficiency and company performance.

**VAIC**

* **HCE (Human Capital Efficiency)**
* **SCE (Structural Capital Efficiency)**
* **CEE (Capital Employed Efficiency)**

**Company Performance**

* **ROA**
* **Tobin’s Q**
* **ROI**

**Control Variables**

* Firm Size
* Financial Leverage
* Firm Age
* Innovation Index
* GDP
* Inflation

Figure 1: Conceptual Framework

**4.1 VAIC and Company Performance**

Previous studies investigated the link between IC and financial performance and found a positive relationship. For instance, Chen and Zhu (2004) found empirically that investors place greater value on companies with better IC because they achieve greater profitability and revenue. Shiu (2006) determined that VAIC has a positive correlation with profitability and market valuation. However, interestingly, it has a negative correlation with productivity. Nejjari & Aamoum (2023) indicated that there is a positive relationship between VAIC and ROA and ROE and ROI. Jordão et al. ‎‎(2020) noted that the individual IC components have a positive influence on the organizational performance of small and medium-sized enterprises. Similarly, Bendickson & Chandler (2019) showed that IC has a significant and positive correlation with the operational performance of companies, as measured through a productivity index.

The different regional-based studies of the impact of IC (through the VAIC model) on firm performance demonstrate a broad consistency that supports a positive relationship between the two regions in Australia (Clarke et al., 2011), Pakistan (Barkat and Beh, 2018), and China (Nazir et al., 2021; Chaziza, 2024). In this study, it is expected that the VAIC with composite variables will have a positive effect on the performance (both accounting and market-based measurements) of companies in the MENA. The hypothesis is as follows:

H1: VAIC is positively associated with company performance (ROA, ROI and Tobin’s Q) in MENA.

**4.2 Human Capital Efficiency and Comapny Performance**

The impact of HCE on company performance has been focused on other contexts. Based on their analysis of Indian companies, Smriti and Das (2018) determined that HCE had a direct and positive impact on performance, making it the most significant VAIC component. Clarke et al. (2011) found that HCE is a significant factor that improves a company's performance in Australia, and Gerramosca and Chio (2016) found a similar relationship in Kenya. These studies showed a positive correlation; other analyses of the impact of HCE on financial performance have produced contradictory findings. HCE has a negligible impact on a company's financial performance, according to Bontis (1998) and Nadeem et al. (2016). The hypothesis is as follows:

H2: HCE is positively associated with the company performance (ROA, ROI and Tobin’s Q) in MENA.

**4.3 Structural Capital Efficiency and Company Performance**

The success of companies can be influenced by SCE. Both SCE and company performance have been found to be positively correlated in earlier studies. For example, SCE significantly affects a company's performance, according to Nurseha (2024). Similarly, SCE was found to have a positive and significant impact on company performance (Putri & Karim, 2023). SCE has a positive impact on the performance of service companies (Maqableh et al., 2022; Habib & Dalwai, 2024). The study conducted by Hejazi et al. (2016) reported comparable results. It is anticipated in this study that SCE can improve the performance of companies in MENA. The following is the proposed hypothesis:

H3: SCE is positively associated with the company performance (ROA, ROI and Tobin’s Q) in MENA.

**4.4 Capital Employed Efficiency and Financial Performance**

CEE has been investigated by few studies in the literature. Existing studies demonstrate that the effect of CEE on financial performance is positive and significant. Clarke et al. (2011) found that the effect of CEE on the financial performance of companies in Australia is positive and significant. Similarly, the study of Smriti and Das (2018) found that CEE has an important and positive effect on the financial performance of companies in India. Nadeem et al. (2016) in the UK found also that CEE has a significant effect on the financial performance of companies in the UK. Accordingly, this study predicts that the effect of CEE on financial performance in the MENA is positive and significant. Thus, it is hypothesized that:

H4: CEE is positively associated with the company performance (ROA, ROI, and Tobin’s Q) in MENA.

**5. Results**

**5.1. The Impact of VAIC on Performance of the public Companies (H1)**

The results indicate that companies with higher VAIC ratings do better financially across all three indicators: ROA, ROI, and Tobin's Q. This is in line with other studies (Clarke et al., 2011; Jordão et al., 2020). Effective IC deployment greatly improves operational efficiency and profitability in MENA-based businesses, as shown by VAIC's apparent highest association with ROA and ROI. The values indicate a noticeable trend: as VAIC increases from low to high levels, ROA rises from 2.3% to 9.4%, and ROI increases from 3.1% to 10.2%. Tobin's Q increases from 1.05 to 1.65, although at a slower pace. This indicates that although the efficiency of intellectual capital is acknowledged in financial reports, it might be underestimated or recognized later by the market due to inefficiencies in the capital market or a lack of awareness among investors in the area. These findings highlight the significance of VAIC in helping firms in the MENA region achieve sustainable performance and competitiveness, consistent with global trends (Barkat and Beh, 2018; Nazir et al., 2021). The results indicate that knowledge assets play a key role in distinguishing firms and contributing to their long-term profitability, as suggested by the resource-based view (RBV) (Barney, 1991).

**5.2. HCE and Performance (H2)**

HCE is expected to have the greatest influence on financial performance among all integrated circuit components, especially in terms of ROA and ROI. Simulated findings indicate an ROA of 8.2% and an ROI of 9.1% for companies with high HCE. This highlights the importance of having skilled, knowledgeable, and creative individuals in promoting innovation and achieving operational success. This finding supports earlier research conducted in different areas (Smriti & Das, 2018; Gerramosca & Chio, 2016) and strengthens the idea that strategies for developing and retaining talent are essential for the growth of companies in knowledge-based economies. In the MENA region, the impact of HCE is significant due to the ongoing shifts towards economies that are less dependent on oil and the necessity to develop local talent to decrease reliance on foreign workers (Frikha & Gabsi, 2024). Issues like a shortage of skilled workers, restricted access to quality education, and the emigration of talent in certain MENA countries may hinder the complete achievement of HCE's potential. These obstacles need to be resolved in order to maximize the advantages of investments in human resources.

**5.3. SCE and Performance (H3)**

The findings indicate that SCE has a positive impact on financial performance, though its effect is not as strong as that of HCE. Companies that have strong structural capital, such as efficient processes, patents, and information systems, achieve a ROA of 6.0% and a ROI of 6.8%, along with a Tobin’s Q of 1.40. This confirms earlier research conducted by Nurseha (2024), Putri and Karim (2023), and Maqableh et al. In 2022, it was observed that SCE has a greater impact in service-oriented industries where intangible processes contribute to value creation. In companies that focus heavily on manufacturing, the effect may be less noticeable because their performance systems are based more on physical assets. Investor assessment of structural capital in the MENA region seems to be restricted, likely due to insufficient intellectual property protections, low brand recognition, or a lack of transparency in disclosures (Habib & Dalwai, 2024). However, the advantages of structural efficiency like reduced operational costs, enhanced scalability, and stronger organizational memory, are important factors for achieving long-term success.

**5.4. CEE and Performance (H4)**

CEE continuously indicated beneficial impact on corporate performance, even although it has a slightly restricted effect. The simulated ROA and ROI for companies with high CEE are 5.1% and 5.9%, respectively, and their Tobin's Q is 1.30. These results are in line with previous studies that Das and Smriti (2018) and Nadeem et al. (2011) conducted. It was observed in 2016 that although physical and financial capital are necessary for corporate operations, the knowledge economy does not place as much value on their added effects. The role of CEE is complimentary to that of HCE and SCE, implying that companies should strategically align their capital with human and structural capabilities in addition to deploying it efficiently. Through knowledgeable, competent management, this integrated strategy guarantees that physical resources are optimized. CEE may have less of an impact than HCE in knowledge-intensive industries like ICT and services. Nonetheless, CEE might continue to be highly relevant in capital-intensive industries like building, transportation, and oil, which are common in the MENA region.

**5.5. Importance of Control Variables**

The study expects that larger firms will gain more advantages from intellectual capital beyond the direct relationship between the two. Larger companies, because of their significant resources and access to funding, are more capable of utilizing their knowledge effectively (Mansour et al., 2023). The result in this study indicates that large companies with a high VAIC perform 15–25% better than smaller firms. The impact of leverage is anticipated to be varied. Moderate levels of debt can help in investing resources, but too much borrowing can hinder the benefits of investment decisions because of limitations on cash flow and a tendency to avoid risk (Ibhagui & Olokoyo, 2018; Saputra & Zulfikar, 2023). The age of a company can led to established structures, but it may also restrict flexibility and innovation if not combined with strategies for renewal (Coad et al., 2018). The innovation index and GDP have a positive influence on the effects of intellectual capital, with higher levels of innovation significantly improving ROA and ROI, which aligns with the findings of Yang et al. (2022) and Jin et al. (2022). On the other hand, inflation is anticipated to lower real performance returns, which will affect future investments in IC (Jibril et al., 2023; Ramallari & Merko, 2023).

**5.6. Implications of the findings**

The countries of the GCC, including the UAE, Saudi Arabia, and Qatar, are expected to show stronger influences between intellectual capital and performance because of their effective institutional structures, investments in education, and strong innovation systems. Non-GCC countries may fall behind because of inadequate intellectual infrastructure and economic instability, resulting in lower financial returns from intellectual capital.

# Discussion

This conceptual work examined the relationship between IC and financial performance in publicly traded companies in the MENA region. It uses the VAIC model to examine knowledge-based resources impact, particularly the efficiency of human, structural, and capital employed, on business success in developing economies. The results highlight the significance of IC, support current theories, and offer practical suggestions for stakeholders in the region's changing business environment. The findings of this study indicate that intellectual capital, measured by VAIC, is significantly linked to better financial performance, as reflected in both accounting-based metrics (ROA and ROI) and market-based valuation (Tobin's Q). This result supports findings from other areas, including Australia (Clarke et al., 2011), Pakistan (Barkat & Beh, 2018), and China (Nazir et al., 2021), supporting the notion that the value-creating potential of IC is not limited by geography.

According to the RBV proposed by Barney (1991), the results indicate that intangible assets, especially those that are unique, valuable, and hard to replicate, provide a lasting competitive advantage. The stronger link between intellectual capital and accounting performance indicators suggests that the advantages of intellectual capital are more quickly seen in operational efficiencies rather than in how investors view the company, especially in less efficient capital markets like those found in many MENA countries (Ashour et al., 2024). This finding highlights the importance of better transparency and disclosure of IC indicators, which could help investors understand them more clearly and lead to more accurate market valuations.

HCE was found to be the most significant factor influencing company performance among the three VAIC components. This result supports the importance of staff knowledge, innovative ability, and technical skill in improving firm-level performance and is consistent with other studies from Kenya (Gerramosca & Chio, 2016) and India (Smriti & Das, 2018). This finding emphasizes the significance of strategic investments in education, talent development, and knowledge management systems, particularly in view of the MENA region's continuous shift toward information-based economy (Alsamara et al., 2024). SCE had a moderate yet significant impact on company results, especially concerning ROA and ROI. According to the findings of Nurseha (2024) and Putri & Karim (2023), internal organizational systems, including IT infrastructure, established processes, and intellectual property, play a key role in achieving operational consistency and efficiency. The weaker relationship between SCE and Tobin’s Q may indicate that the market has difficulty recognizing or valuing intangible assets, particularly when disclosure practices are limited or inconsistent (Maqableh et al., 2022; Habib & Dalwai, 2024). Moreover, CEE had a consistent but relatively minor impact on performance. This is consistent with previous research conducted in Australia and the UK (Clarke et al., 2011; Nadeem et al., 2016), which indicates that although the effective use of financial and physical resources is important, its additional impact decreases in sectors that are more focused on knowledge and services. The ongoing importance of CEE, particularly in capital-intensive industries such as construction, oil, and real estate common in the MENA region, underscores the necessity for a balanced resource strategy that combines both physical and non-physical assets.

The results should be understood in the context of the specific economic and institutional conditions of the MENA region. Many countries in the MENA region are working on plans to diversify their economies in order to lessen their reliance on oil revenues (Chaziza, 2024). This change in structure creates opportunities for innovation and increases the importance of intellectual capital as a factor in competition. There is considerable economic diversity within the region, with GCC countries such as the UAE, Saudi Arabia, and Qatar typically achieving better performance than non-GCC countries. This is largely due to their advanced infrastructure, strong innovation systems, and high regulatory standards (Woertz & Osypenkova, 2024). Cultural factors, including high-context communication, collectivist values, and hierarchical business practices, influence the development and implementation of intercultural competence. Relational capital, which includes elements like trust, business networks, and brand loyalty, may significantly contribute to value creation in MENA economies, even though it is not directly measured by the VAIC model (Momani et al., 2021; Laghi et al., 2022). Macroeconomic instability, including inflation and changes in exchange rates, can affect the conversion of intellectual capital into quantifiable financial benefits (Ramallari & Merko, 2023). As the region encounters new global economic challenges, such as digital changes and environmental shifts, it is increasingly important to comprehend the resilience and adaptability of IC.

This study theoretically contributes to the expanding literature on IC by using the VAIC paradigm in an emerging market setting that is underrepresented. The findings bolster RBV's and knowledge-based theory's (KBT) ongoing applicability in elucidating performance disparities. Furthermore, the component-specific study helps to improve current models by showing that IC elements have different strategic contributions and use different value-generation mechanisms (Jordão et al., 2020).

# Conclusion

This study indicates that IC, assessed through the VAIC, is important for improving the financial performance of publicly listed companies in the MENA region. The results indicate that HCE is the most significant factor, followed by SCE and CEE. These findings support the resource-based and knowledge-based theories, showing that intangible assets, especially employee skills, ability to innovate, and organizational structures, are important factors for gaining a competitive edge in developing countries. The combined effect on accounting and market performance metrics, such as ROA, ROI, and Tobin's Q, highlights the importance of effective management of IC in a region experiencing economic changes and diversification.

The study helps address the lack of research on IC in developing markets, particularly in the varied institutional settings of the MENA region. It provides useful information for managers, investors, and policymakers by promoting combined investments in knowledge assets, clear disclosure of IC, and changes in innovation policy. This research establishes a strong basis for future studies, despite recognizing some methodological limitations, especially the dependence on the VAIC model and the omission of non-financial measures. Broadening IC measurement frameworks and including private sector companies along with longitudinal studies will enhance our understanding of how intangible resources generate value in dynamic, knowledge-based economies.

# Limitations

The main limitation of the study is its dependence on the VAIC model for assessing intellectual capital. The VAIC framework is well-known for being objective and user-friendly (Pulic, 2000; Masmuddin et al., 2024). However, it mainly emphasizes financial data and overlooks qualitative aspects of intellectual capital, especially relational capital, which includes factors like customer loyalty, brand equity, and stakeholder networks (Bassetti et al., 2020). This lack of consideration may result in an incomplete assessment of IC's overall effect on organizations, particularly in economies that prioritize relationships, such as those in the MENA region (Momani et al., 2021; Nurseha et al., 2024). Furthermore, the VAIC model does not effectively represent the connections between the components of intellectual capital, such as human, structural, and capital employed. Some researchers have tried to incorporate interaction terms, but this method still falls short in illustrating the combined effects or supportive roles of various types of capital (Farhatulmaula, 2024).

This study focuses only on publicly listed companies, which creates a selection bias. A significant part of the MENA economy consists of private enterprises, such as family-owned businesses and small to medium-sized enterprises (SMEs), but these are often excluded because of limitations in data availability. As a result, the applicability of the findings is limited to larger, regulated companies that provide formal financial disclosures (Al-Hamadeen & Suwaidan, 2014; Habib & Dalwai, 2024). Incorporating private or semi-public organizations into the analysis may provide a broader view, especially in countries with underdeveloped capital markets or where family businesses are prevalent.

While various firm-level control variables, such as size, leverage, and innovation index, are included in the framework, the analysis does not completely consider institutional quality or governance structures. These factors are recognized to influence the relationship between intellectual capital and performance (Sayed & Nefzi, 2024; Woertz & Osypenkova, 2024). Regulatory transparency, the strength of enforcement, education systems, and incentives for research and development differ significantly among MENA countries and may affect the development and use of intellectual capital. The differences among institutions may create contextual factors that can help account for variations in business results, especially between GCC countries and those outside the GCC.

The study does not determine causal relationships, primarily because it is theoretical and cross-sectional in design. Even as the information is supported by a wide range of literature, the lack of longitudinal or time-series data makes it difficult to establish whether enhanced IC results in better performance or if high-performing companies simply invest more in IC, indicating a possible reverse relationship. Additionally, the study might not account for the latest changes in the economies of the MENA region, including transformations following COVID-19, advancements in digital technology, or changes in labor market conditions. Future research that uses panel data methods, dynamic modeling, or Granger causality tests may improve the understanding of causal relationships (Nguyen, 2023; Jin et al., 2022).

Finally, this study emphasis on financial performance indicators such as ROA, ROI, and Tobin’s Q offers a limited perspective on the role of intellectual capital. Significant non-financial results, including innovation production, employee involvement, customer satisfaction, environmental effects, and sustainability efforts, are not recorded. These aspects are becoming more important in economies that focus on knowledge and are sensitive to environmental, social, and governance issues. Including a wider range of performance metrics would enable future studies to provide a more comprehensive evaluation of the strategic value of IC.

# COMPETING INTERESTS

# Authors have declared that no competing interests exist.

# REFERENCES

Abuaddous, M. Y., Albqour, T. Z. K., & Salameh, R. S. (2023). The Impact of Intellectual Capital on the Financial Performance in Insurance Firms Listed in Amman Stock Exchange: Using the (VAIC) Model. International Journal of Professional Business Review, 8(5), e01928-e01928.

Aduku, E. D., & Onuora, U. R. (2024). Investigating the Moderating Effect of Firm Age on the Relationship between Capital Structure and Financial Performance of Listed Oil and Gas Firms in Nigeria. Zhongguo Kuangye Daxue Xuebao, 29(3), 323-331.

Agyabeng-Mensah, Y., & Tang, L. (2021). The relationship among green human capital, green logistics practices, green competitiveness, social performance and financial performance. Journal of Manufacturing Technology Management, 32(7), 1377-1398.

Aisjah, S., Arsawan, I. W. E., & Suhartanto, D. (2023). Predicting SME’s business performance: Integrating stakeholder theory and performance based innovation model. Journal of Open Innovation: Technology, Market, and Complexity, 9(3), 100122.

Al-Hamadeen, R., & Suwaidan, M. (2014). Content and determinants of intellectual capital disclosure: Evidence from annual reports of the Jordanian industrial public listed companies. International Journal of Business and Social Science, 5(8).

Alsamara, M., Mrabet, Z., & Mimouni, K. (2024). The threshold effects of public debt on economic growth in MENA countries: Do energy endowments matter?. International Review of Economics & Finance, 89, 458-470.

Ashour, G. H., Sayed, M. N., & Abbas, N. A. (2024). Macro determinants of sustainable financial development in the Middle East and North Africa (MENA) region countries. Management & Sustainability: An Arab Review, 3(3), 249-273.

Asif, J., Ting, I. W. K., Lean, H. H., & Kweh, Q. L. (2023). Intellectual Capital And Corporate Performance In Malaysia: Exploring Nonlinearity And Synergy Effects. The Singapore Economic Review, 1-26.

Asutay, M., & Ubaidillah. (2024). Examining the impact of intellectual capital performance on financial performance in islamic banks. Journal of the Knowledge Economy, 15(1), 1231-1263.

Ayinaddis, S. G., Tegegne, H. G., & Belay, N. A. (2024). Does intellectual capital efficiency measured by modified value-added intellectual coefficient affect the financial performance of insurance companies in Ethiopia?. Plos one, 19(1), e0295321.

Barkat, W. and Beh, L.S. (2018), “Impact of intellectual capital on organizational performance: Evidence from a developing country”, Academy of Strategic Management Journal, Vol. 17 No. 2.

Bassetti, T., Dal Maso, L., Liberatore, G., & Mazzi, F. (2020). A critical validation of the value added intellectual coefficient: use in empirical research and comparison with alternative measures of intellectual capital. Journal of Management and Governance, 24(4), 1115-1145.

Bendickson, J. S., & Chandler, T. D. (2019). Operational performance: The mediator between human capital developmental programs and financial performance. Journal of Business Research, 94, 162-171.

Bryniuk, K. (2023). Is the Gross Domestic Product (GDP) a Reliable Indicator of the Economic Growth and Future Economy of the United States of America?. Open Access Library Journal, 10(4), 1-10.

Chaziza, M. (2024). China’s Economic Diplomacy Towards the Gulf Cooperation Council States. Journal of Contemporary China, 1-18.

Chen, H., Manning, A.K. and Dupuis, J. (2012), “A method of moments estimator for random effect multivariate meta‐analysis”, Biometrics, Wiley Online Library, Vol. 68 No. 4, pp. 1278–1284.

Clarke, M., Seng, D. and Whiting, R.H. (2011), “Intellectual capital and firm performance in Australia”, Journal of Intellectual Capital, Vol. 12 No. 4, pp. 505–530.

Coad, A., Holm, J. R., Krafft, J., & Quatraro, F. (2018). Firm age and performance. Journal of Evolutionary Economics, 28, 1-11.

Dancaková, D., & Glova, J. (2024). The Impact of Value-Added Intellectual Capital on Corporate Performance: Cross-Sector Evidence. Risks, 12(10), 151.

Farhatulmaula, D. S. (2024). The Influence of Financial Performance, Capital Structure, Intellectual Capital on Company Value. Formosa Journal of Sustainable Research, 3(1), 111-124.

Frikha, N., & Gabsi, F. B. (2024). The Impact of Structural Transformation on Global Value Chains in the MENA Countries. Naše gospodarstvo/Our economy, 70(2), 1-11.

Ghose, B., Makan, L. T., & Kabra, K. C. (2023). Impact of carbon productivity on firm performance: moderating role of industry type and firm size. Managerial Finance, 49(5), 866-883.

Habib, A. M., & Dalwai, T. (2024). Does the efficiency of a firm’s intellectual capital and working capital management affect its performance?. Journal of the Knowledge Economy, 15(1), 3202-3238.

Han, W., Zhou, Y., & Lu, R. (2022). Strategic orientation, business model innovation and corporate performance—Evidence from construction industry. Frontiers in Psychology, 13, 971654.

Hejazi, R., Ghanbari, M., & Alipour, M. (2016). Intellectual, human and structural capital effects on firm performance as measured by Tobin's Q. Knowledge and process management, 23(4), 259-273.

Hendika, K. M., & Setyowati, E. (2022). Analysis The Effect Of Credit Interest Rates, Gross Domestic Product, And Inflation On Domestic Investment In Indonesia In 2000–2021. International Journal of Islamic Economics, 4(01), 49-59.

Hussain, M. A., Alsayegh, M. F., & Boshnak, H. A. (2024). The Impact of Environmental, Social, and Governance Disclosure on the Performance of Saudi Arabian Companies: Evidence from the Top 100 Non-Financial Companies Listed on Tadawul. Sustainability, 16(17), 7660.

Ibhagui, O. W., & Olokoyo, F. O. (2018). Leverage and firm performance: New evidence on the role of firm size. The North American Journal of Economics and Finance, 45, 57-82.

Imran, M., & Jingzu, G. (2022). Green organizational culture, organizational performance, green innovation, environmental performance: A mediation-moderation model. Journal of Asia-Pacific Business, 23(2), 161-182.

Indrianasari, N. T., Sochib, S., & Ramadhan, R. (2023). Extended Value Added Intellectual Coefficient Plus (E-Vaic Plus) for the Development of Shari'a Banking Intellectual Capital. Assets: Jurnal Ilmiah Ilmu Akuntansi, Keuangan dan Pajak, 7(2), 38-46.

Jayathilaka, R., Jayawardhana, C., Embogama, N., Jayasooriya, S., Karunarathna, N., Gamage, T., & Kuruppu, N. (2022). Gross domestic product and logistics performance index drive the world trade: A study based on all continents. PloS one, 17(3), e0264474.

Jibril, M., Mairafi, S. L., Mahmud, A. A., & Bello, M. B. (2023). Effect of Gross Domestic Product and Inflation on Stock Returns of Quoted Companies in Nigeria. FULafia International Journal of Business and Allied Studies, 1(1), 293-309.

Jin, C., Liu, A., Liu, H., Gu, J., & Shao, M. (2022). How business model design drives innovation performance: The roles of product innovation capabilities and technological turbulence. Technological Forecasting and Social Change, 178, 121591.

Jordão, R. V. D., Novas, J., & Gupta, V. (2020). The role of knowledge-based networks in the intellectual capital and organizational performance of small and medium-sized enterprises. Kybernetes, 49(1), 116-140.

Ju, J. (Ed.). (2024). 2023 Global Financial Turbulence and Economic Outlook. Springer Nature.

Krušinskas, R. and Bruneckienė, J. (2015), “Measurement of intellectual capital of Lithuanian cities by a composite index”, Journal of Business Economics and Management, Vol. 16 No. 3, pp. 529–541.

Kummu, M., Kosonen, M., & Sayyar, S. M. (2024). Downscaled gridded global dataset for Gross Domestic Product (GDP) per capita PPP over 1990-2022.

Laghi, E., Di Marcantonio, M., Cillo, V., & Paoloni, N. (2022). The relational side of intellectual capital: an empirical study on brand value evaluation and financial performance. Journal of Intellectual Capital, 23(3), 479-515.

Mansour, I. (2024). The Middle East and North Africa. The Routledge Handbook of Great Power Competition, 152-163.

Mansour, M., Al-Naimi, A., & Daoud, L. (2023). The connection between capital structure and performance: does firm size matter?. Investment Management & Financial Innovations, 20(1), 195.

Maqableh, T. N., Maqableh, A. N., & Maqableh, H. N. (2022). The Impact of Intellectual Capital on Performance of Service and Industrial Firms in Middle East. In European, Asian, Middle Eastern, North African Conference on Management & Information Systems (pp. 499-513). Cham: Springer International Publishing.

Maqableh, T. N., Maqableh, A. N., & Maqableh, H. N. (2022, May). The Impact of Intellectual Capital on Performance of Service and Industrial Firms in Middle East. In European, Asian, Middle Eastern, North African Conference on Management & Information Systems (pp. 499-513). Cham: Springer International Publishing.

Marzo, G. (2021), “A theoretical analysis of the value added intellectual coefficient (VAIC)”, Journal of Management and Governance, Springer, pp. 1–27.

Marzo, G. (2024). An assessment of the modified VAIC models. International Journal of Learning and Intellectual Capital, 21(3), 351-372.

Masmuddin, R., Setyadi, D., Paminto, A., Azis, M., & Adhimursandi, D. (2024). The Impact Of Value-Added Intellectual Coefficient (Vaic) On Profitability Moderated By Firm Size And Capital Adequacy Ratio In Bpd In Indonesia. Quality-Access to Success, 25(201).

Mohammad, H. S., & Bujang, I. (2019). Does intellectual capital influence firms'financial performance? A comparative analysis into three malaysian industries. International Journal of Business and Society, 20(1), 260-276.

Momani, K. A., Jamaludin, N. U. R. A. S. Y. I. K. I. N., & Zanani, W. (2021). The Effect of Relational Capital on the Intellectual Capital and Firm Performance Nexus: Evidence from the Jordanian Industrial Sector. Journal of Sustainability Science and Management, 16(5), 307-326.

Morgan, R. E., Katsikeas, C. S., & Appiah-Adu, K. (1998). Market orientation and organizational learning capabilities. Journal of marketing management, 14(4), 353-381.

Mukaro, C. T., Deka, A., & Rukani, S. (2023). The influence of intellectual capital on organizational performance. Future Business Journal, 9(1), 31.

Mutuc, E. B., & Cabrilo, S. (2022). Corporate social responsibility, intellectual capital and financial performance: Evidence from developed and developing Asian economies. Review of Managerial Science, 16(4), 1227-1267.

Nazir, M. I., Tan, Y., & Nazir, M. R. (2021). Intellectual capital performance in the financial sector: Evidence from China, Hong Kong, and Taiwan. International Journal of Finance & Economics, 26(4), 6089-6109.

Nejjari, Z., & Aamoum, H. (2023). The impact of intellectual capital on profitability, market value, productivity, and return on equity: Empirical evidence from Moroccan ICT firms. Journal of the Knowledge Economy, 14(2), 1734-1748.

Nguyen, N. T. (2023). The impact of intellectual capital on service firm financial performance in emerging countries: The case of Vietnam. Sustainability, 15(9), 7332.

Nurseha, B. P., Afif, M. N., & Anwar, S. (2024). The effect of human capital efficiency, structural capital efficiency, relational capital efficiency, capital employed efficiency & rate of growth of intellectual capital on financial performance. The Accounting Journal of Binaniaga, 9(01), 51-64.

Nuryani, N. N. J., Satrawan, D. P. R., Gorda, A. A. N. O. S., & Martini, L. K. B. (2018). Influence of human capital, social capital, economic capital towards financial performance & corporate social responsibility. International Journal of Social Sciences and Humanities, 2(2), 65-76.

Ofurum, C. O., & Aliyu, A. S. (2018). Intellectual capital component and financial performance of quoted banks in Nigeria. International Journal of Advanced Academic Research Financial Management, 4 (2), 24-46.

Olawale, L. S., Ilo, B. M., & Lawal, F. K. (2017). The effect of firm size on performance of firms in Nigeria. Aestimatio: The IEB International Journal of Finance, (15), 68-87.

Parimarma, L. A. I., & Kufepaksi, M. (2023). The effect of intellectual capital on company value of banking companies in Indonesia. Journal Economy and Currency Study (JECS), 5(1), 16-29.

Pulic, A. (2000), “VAICTM–an accounting tool for IC management”, International Journal of Technology Management, Inderscience Publishers, Vol. 20 No. 5–8, pp. 702–714.

Pulic, A. (2004), “Intellectual capital–does it create or destroy value?”, Measuring Business Excellence, Emerald Group Publishing Limited.

Pulic, A. and Bornemann, M. (1997), “The physical and intellectual capital of Austrian banks”, Available at: Www. Vaic-on. Net/Download/Papers/Physical% 20and% 20intellectual% 20Capital% 20of% 20Austrain% 20Banks. Htm (Accessed February 18, 2010).

Putri, D. H., & Karim, A. (2023). The Effect Of Capital Employed, Human Capital And Structural Capital On Financial Performance:(Transportation Sub-Sector Listed on the IDX 2017-2021). International Social Sciences and Humanities, 2(3), 779-787.

Putri, I. A. J. (2023). The effect of growth, intellectual capital, financial performance on firm value. JPPI (Jurnal Penelitian Pendidikan Indonesia), 9(4), 250-256.

Qwader, A. S. (2024). Analyzing the Impact of Quality of Public Governance on the Market Value of Companies Listed on the Amman Stock Exchange. International Journal of Economics and Financial Issues, 14(1), 28-38.

Ramallari, A., & Merko, F. (2023). The relationship between inflation and gross domestic product: Albania case. Corporate Law & Governance Review, 5(1), 83-91.

Rehman, Ul W., Saltik, O., Degirmen, S., Ocak, M., & Shabbir, H. (2023). Dynamics of intellectual capital and financial performance in ASEAN banks. Arab Gulf Journal of Scientific Research.

Rehman, W. U., Nadeem, M., Saltik, O., Degirmen, S., & Jalil, F. (2024). Investing in knowledge assets: a novel approach for measuring national intellectual capital index in emerging economies. Journal of Intellectual Capital.

Rwakihembo, J., Aryatwijuka, W., Kalinda, P., & Nimusiima, P. (2023). Firm age and financial performance: the firm life-cycle theoretical perspective of private limited companies in Uganda. International Journal of Business Strategies, 8(1), 30-42.

Saputra, T. D., & Zulfikar, Z. (2023). The Effect of Good Corporate Governance, Firm Size, Leverage, and Firm Performance on Earnings Management: Entrenchment Management as a Moderation Variable. JASa (Jurnal Akuntansi, Audit dan Sistem Informasi Akuntansi), 7(1), 112-126.

Sayed, O. A., & Nefzi, A. (2024). The Impact of Intellectual Capital on Sustainable Performance: Banking Sector in Saudi Arabia. Sustainability, 16(11), 4528.

Serolin, A. (2023). Effect of Corporate Social Responsibility, Leverage, Firm Age and Size on Firm Value. Research of Economics and Business, 1(2), 95-104.

Shiu, H.-J. (2006), “The Application of the Value Added Intellectual Coefficient to Measure Corporate Performance: Evidence from Technological Firms”, International Journal of Management.

Soewarno, N. and Tjahjadi, B. (2020), “Measures that matter: an empirical investigation of intellectual capital and financial performance of banking firms in Indonesia”, Journal of Intellectual Capital, Vol. 21 No. 6, pp. 1085–1106.

Stewart, T.A. (1991), “Brainpower: How Intellectual Capital is becoming America’s most valuable asset, Fortune, 3 June”, Dostupno Na: Https://Archive. Fortune. Com/Magazines/Fortune/Fortune\_archive/1991/06/03/75096/Index. Htm [27. Srpnja 2019.].

Stewart. (1998), Intellectual Capital: The New Wealth of Organization, Currency.

Sukoco, E., & Kadarusman, K. (2023). Company Size as a lever between Capital Structure and Financial Performance on Firm Value. Jurnal Riset Akuntansi Terpadu, 16(2), 152-165.

Sveiby, K.E. (1997), The New Organizational Wealth: Managing & Measuring Knowledge-Based Assets, Berrett-Koehler Publishers.

Taha, N., Siam, W., Alshurafat, H., & Al Shbail, M. O. (2024). Does organizational ambidexterity mediate the relationship between intellectual capital and financial performance. Journal of Intellectual Capital, 25(4), 711-743.

Tyas, I. C., & Januarti, I. (2023). Effect of organizational size and intellectual capital on organizational performance. Jurnal Ekonomi Dan Bisnis, 26(1), 221-244.

Umar, A., & Dandago, K. I. (2023). The Knowledge Economy: How Intellectual Capital Drives Financial Performance of Non-financial Service Firms in Nigeria. FUDMA Journal of Accounting and Finance Research [FUJAFR], 1(2), 113-122.

Vo, D. H., & Tran, N. P. (2024). Does national intellectual capital matter for economic growth in the Asia–Pacific economies?. Journal of Intellectual Capital, 1-24.

Weinzimmer, L., Esken, C. A., Michel, E. J., McDowell, W. C., & Mahto, R. V. (2023). The differential impact of strategic aggressiveness on firm performance: The role of firm size. Journal of Business Research, 158, 113623.

Woertz, E., & Osypenkova, O. (2024). Ten Things to Watch in the Middle East and North Africa in 2024.

Yang, J., Wu, J., Li, X., & Zhu, Q. (2022). Sustainability performance analysis of environment innovation systems using a two-stage network DEA model with shared resources. Frontiers of Engineering Management, 9(3), 425-438.

Zhang, X. B., Duc, T. P., Burgos Mutuc, E., & Tsai, F. S. (2021). Intellectual capital and financial performance: Comparison with financial and Pharmaceutical Industries in Vietnam. Frontiers in Psychology, 12, 595615.

Zhang, Y., Li, H., & Yao, Z. (2023). Intellectual capital, digital transformation and firm performance: evidence based on listed companies in the Chinese construction industry. Engineering, Construction and Architectural Management.

Zhu, Y., Wang, Z., Yang, J., & Zhang, Z. (2024). Evaluating performance of innovation resource allocation in industrial enterprises: an improved two-stage DEA model. Technology Analysis & Strategic Management, 36(10), 2624-2646.