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The Role of Intellectual Capital Efficiency and Its Components in Predicting Stock Returns

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Abstract

Objectives: This study aims to examine the effect of intellectual capital efficiency and its components—human capital, structural capital, and employed capital—on the future stock returns of companies listed on the Tehran Stock Exchange. The Value-Added Intellectual Coefficient (VAIC) model is used to measure intellectual capital efficiency.

Methodology/Design/Approach: This applied study employs a descriptive-correlational and causal research design. The statistical population consists of all companies listed on the Tehran Stock Exchange from 2018 to 2023. A sample of 104 companies was selected using the systematic elimination method. Panel data analysis and multiple regression models were used to test the hypotheses, with EViews software employed for data analysis.

Findings: The results indicate that overall intellectual capital efficiency, human capital, and structural capital positively and significantly affect future stock returns, while employed capital shows no statistically significant relationship. Furthermore, control variables such as growth opportunities and sales growth also have significant impacts on market returns.

Innovation: The findings highlight the critical role of intangible assets—particularly human capital and organizational infrastructure—in value creation for shareholders. This underscores the importance of investing in knowledge-based resources to improve financial performance and stock market returns.

Keywords: Intellectual Capital, Human Capital, Structural Capital, Stock Return.

1. Introduction

In today's rapidly evolving global economy, intangible assets have become increasingly critical in determining the true value of economic entities. While traditional economic systems primarily recognized physical capital and tangible assets as the main sources of production and profitability, intellectual capital has emerged as a key driver of value creation and sustainable competitive advantage. This shift has placed intellectual capital at the forefront of modern theories in economics, financial management, and accounting (Bontis, 2001).

Intellectual capital encompasses a broad range of intangible assets, including employees' knowledge and skills, organizational structures, information systems, internal and external relationships, innovation capacity, and brand reputation. Although these elements may not be directly reflected in conventional financial statements, their impact on value creation and corporate profitability is undeniable (Lev, 2001). Consequently, recent decades have witnessed significant theoretical and empirical efforts to identify, measure, and analyze the influence of intellectual capital on financial performance.

One of the most widely used models for measuring intellectual capital is the Value-Added Intellectual Coefficient (VAIC) model, introduced by Pulic (2000). This model employs accounting data to quantify intellectual capital through three main components: human capital efficiency (HCE), structural capital efficiency (SCE), and capital employed efficiency (CEE). Due to its simplicity and applicability to publicly available data, the VAIC model has gained considerable attention, particularly in developing countries (Zeghal et al., 2010).

In financial literature, stock returns are regarded as a fundamental indicator of corporate performance and a critical criterion for investor decision-making. Researchers have long examined factors influencing stock returns, including profitability, cash flows, market-to-book ratios, and other financial metrics. However, in the era of knowledge-driven economies, the role of intangible assets—especially intellectual capital—has gained increasing prominence in predicting stock returns (Wang et al., 2005). Theoretical perspectives suggest that firms with stronger capabilities in generating, developing, and leveraging intellectual capital can achieve sustainable competitive advantages, ultimately leading to higher returns for shareholders.

Despite the theoretical importance of intellectual capital, empirical findings have been mixed. Some studies report a positive and significant relationship between intellectual capital efficiency and future stock returns, indicating that investors respond favorably to firms with strong knowledge-based assets (Xu et al., 2020). Others, however, find negative or statistically insignificant relationships, particularly in developing countries where intangible assets are often undervalued in financial analyses (Charles et al., 2024). These discrepancies may result from differences in institutional structures, market maturity, industry characteristics, or measurement methodologies.

In the context of Iran, intellectual capital has attracted growing attention in recent years, yet limited research has examined its role in predicting stock returns. Given the unique characteristics of the Iranian capital market—such as its emphasis on tangible assets, limited transparency, and reliance on traditional financial metrics—it is essential to empirically assess the impact of intellectual capital efficiency on stock market performance. Such an investigation may uncover overlooked dimensions of investor behavior and corporate valuation.

Therefore, this study aims to evaluate the effect of intellectual capital efficiency and its main components—human capital efficiency, structural capital efficiency, and capital employed efficiency—on stock return predictions for firms listed on the Tehran Stock Exchange. The findings are expected to provide empirical evidence from Iranian firms and offer insights into the significance of intellectual capital for value creation in Iran's financial market.

2. Literature Review

This section first examines the theoretical background of intellectual capital and then reviews empirical studies in this field.

2.1. Theoretical Background

Intellectual capital, as an intangible asset composed of three main pillars—human capital, structural capital, and employed capital—plays a foundational role in explaining corporate financial performance and market value, particularly in knowledge-based economies. Theoretical perspectives suggest that intellectual capital enables companies to leverage knowledge, skills, and organizational capabilities, enhancing their competitiveness and shareholder value (Bontis, 2001).

The Value-Added Intellectual Coefficient (VAIC) model, first introduced by Pulic (2000), quantifies intellectual capital efficiency by incorporating three components:

- **Human Capital Efficiency (HCE):** Measures the effectiveness of a company's workforce in generating value.
- **Structural Capital Efficiency (SCE):** Reflects the organizational infrastructure, systems, and processes supporting employee productivity.
- **Capital Employed Efficiency (CEE):** Assesses the company's ability to utilize physical and financial assets in value creation.

This model offers a practical framework for evaluating how firms utilize their intellectual and organizational resources, and it has been widely adopted in international research examining the relationship between intellectual capital and stock market performance (Firer et al., 2003).

Several studies have argued that intellectual capital positively influences stock returns, suggesting that firms with higher levels of intellectual capital tend to outperform others in financial markets. For example, Clarke et al. (2011) found that Australian firms with greater intellectual capital achieved higher stock returns, highlighting the importance of knowledge-based assets in investor valuation. Similarly, Pradana et al. (2023), using an updated VAIC model, reported that physical and human capital exert the strongest impact on stock returns, whereas structural capital showed no significant effect.

Conversely, some researchers have documented negative or statistically insignificant relationships between intellectual capital and stock performance. For instance, Firer and Williams (2003) found no substantial correlation between intellectual capital components and financial indicators in South Africa, concluding that traditional assets remained dominant in stock valuation. Likewise, Charles et al. (2024) reported that intellectual capital did not predict future stock returns in certain markets, emphasizing that factors such as economic structure, industry type, and investor behavior influence how capital markets perceive intangible assets.

2.2. Empirical Studies

Global empirical studies indicate that the impact of intellectual capital on stock returns varies according to market structure, industry characteristics, and the level of economic development. For example, Ghazal and Aziz (2025) studied Indian companies and found that overall intellectual capital negatively affected stock returns. Specifically, human capital efficiency exhibited a negative correlation, whereas employed capital had a positive effect, suggesting that investors in developing economies may undervalue intangible assets relative to physical capital.

Similarly, Weqar et al. (2021) examined the Indian banking sector and reported that employed capital efficiency was the strongest predictor of financial performance, while human and structural capital exerted a smaller influence. They emphasized that tangible assets remain highly influential in emerging financial markets. Meanwhile, Chatterjee et al. (2021) highlighted that the relationship between intellectual capital and stock returns is contingent on firm-specific factors such as firm age, leadership diversity, and

company size, indicating that organizational characteristics can shape financial outcomes.

In South Africa, Firer and Stainbank (2003) applied the VAIC model to assess intellectual capital and firm performance, concluding that no significant relationship existed between intellectual capital components and financial indicators, including return on assets and market value. Likewise, Xu et al. (2020) studied Taiwanese technology firms and found that human capital efficiency was the most influential component for stock returns, whereas structural and employed capital had a lesser effect, underscoring the industry-specific impact of intellectual capital.

In contrast, Clarke et al. (2011) found a positive relationship between intellectual capital and stock returns in Australia, particularly for firms with transparent financial disclosures and strong corporate governance. They suggested that well-regulated markets enable investors to better recognize and leverage intangible resources.

2.3. Iranian Context

Empirical evidence on the role of intellectual capital in Iran's stock market remains relatively limited. Khezrlou and Zeinali (2022) reported that human capital efficiency and capital employed efficiency exert a significant influence on firms' financial performance, whereas structural capital efficiency did not show a statistically meaningful effect. Similarly, Sinayi and Rangbari Khini (2014) compared the explanatory power of intellectual capital measures with traditional financial indicators and found that models incorporating intellectual capital variables provided superior predictive accuracy in stock valuation.

Moreover, Shahreza et al. (2022) examined the Iranian banking sector and demonstrated that financial capital efficiency had the strongest impact on profitability, while human capital efficiency positively affected earnings. In contrast, structural capital and innovation capital were negatively associated with profitability, indicating that Iranian financial institutions continue to rely more heavily on traditional, tangible assets than on intangible resources.

Overall, the evidence from Iranian studies suggests that, although intellectual capital is increasingly recognized as a value-relevant factor, its components do not exert uniform effects on market and financial performance. In particular, financial and human capital efficiencies appear to play a more prominent role than structural capital, reflecting the specific institutional and market characteristics of Iran's capital market.

3. Research Methodology

3.1. Study Type and Scope

This study is applied in terms of purpose and adopts a descriptive, correlational, and causal research design. The statistical population comprises all companies listed on the Tehran Stock Exchange during the period 2018–2023. Using a systematic elimination procedure, a final sample of 104 firms that satisfied the study's selection criteria was identified for empirical analysis.

3.2. Data Collection and Analysis

To test the research hypotheses, panel data techniques and multiple regression models were employed, with all data processing and estimations conducted using EViews software. Four regression models were specified to examine the effects of overall intellectual capital efficiency and its individual components on future stock returns, as follows:

$$RI_{it} = \alpha + \beta_1 IC_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 SG_{it} + \beta_6 MTB_{it} + \varepsilon_{it}$$

$$RI_{it} = \alpha + \beta_1 HCE_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 SG_{it} + \beta_6 MTB_{it} + \varepsilon_{it}$$

$$RI_{it} = \alpha + \beta_1 SCE_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 SG_{it} + \beta_6 MTB_{it} + \varepsilon_{it}$$

$$RI_{it} = \alpha + \beta_1 CEE_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 SG_{it} + \beta_6 MTB_{it} + \varepsilon_{it}$$

Where:

- **Independent Variables:**
  - **IC** = Intellectual Capital Efficiency
  - **HCE** = Human Capital Efficiency
  - **SCE** = Structural Capital Efficiency
  - **CEE** = Capital Employed Efficiency
- **Dependent Variable:**
  - **RI** = Predicted Stock Returns
- **Control Variables:**
  - **SIZE** = Company Size (Natural Log of Total Assets)
  - **ROA** = Return on Assets (Net Profit / Total Assets)
  - **LEV** = Financial Leverage (Total Debt / Total Assets)
  - **MTB** = Market-to-Book Ratio (Market Value of Equity / Book Value of Total Assets)
  - **SG** = Sales Growth (Annual Change in Revenue)

3.3. Data Validity and Model Selection

Before estimating the regression models, several classical regression assumptions were evaluated. The Breusch–Pagan–Godfrey test was applied to examine heteroskedasticity, and the results confirmed the presence of non-constant error variance across all estimated models. Accordingly, the generalized least squares (GLS) estimation method was employed to obtain efficient and reliable parameter estimates.

To determine the appropriate panel data specification, both the Chow test and the Hausman test were conducted. The test results supported the fixed-effects panel model as the most suitable approach for data analysis. Furthermore, multicollinearity among the independent variables was assessed using the variance inflation factor (VIF), and the findings indicated that multicollinearity did not pose a serious concern in the estimated models.

4. Research Findings

4.1. Descriptive Statistics

To provide a comprehensive overview of the sample, descriptive statistics were calculated for all key variables, including independent, dependent, and control variables. These statistics encompass the mean, median, minimum, maximum, standard deviation, skewness, and kurtosis, offering insights into the central tendency, dispersion, and distributional characteristics of the data.

Table (1) Descriptive statistics

Skewness	Elongation	Standard deviation	The lowest	The most	Middle	Average		name
4.250	1.372	3.356	1.411	14.214	4.010	4.997	IC	Intellectual capital efficiency
4.602	1.512	3.087	1.054	12.747	2.957	4.019	HCE	KaraYiColdYHHumanY
2.428	0.501	0.155	0.100	0.660	0.301	0.330	CEE	KaraYiColdYHUsed
2.428	-0.672	0.243	0.096	0.937	0.674	0.614	SCE	KaraYiColdYHStructureY
2.898	1.046	0.749	-0.056	2.486	0.405	0.718	RI	Stock return forecasting
2.088	-0.009	0.185	0.180	0.827	0.507	0.504	LEV	Financial leverage
4.025	1.371	3.827	0.901	14.872	3.253	4.608	MTB	Growth opportunities
2.566	0.443	0.382	-0.093	1.339	0.484	0.535	SG	Sales growth
2.694	0.537	1.395	13.505	18.801	15.571	15.700	SIZE	Company size
2.312	0.433	0.138	0.001	0.490	0.191	0.203	ROA	Return on assets

4.2. Regression Model Results

Before model estimation, the classical regression assumptions were assessed to ensure the statistical validity of the results. The Breusch–Pagan–Godfrey test indicated the presence of heteroskedasticity across the estimated models; therefore, the generalized least squares (GLS) method was employed to obtain efficient and unbiased estimates. In addition, the results of the Chow and Hausman tests supported the use of a fixed-effects panel data model as the most appropriate specification for the analysis.

The first hypothesis examines whether overall intellectual capital efficiency (IC) significantly affects future stock returns (RI). The regression results demonstrate that the model exhibits substantial explanatory power, with an adjusted R^2 of 0.37, indicating that approximately 37% of the variation in stock returns is explained by the included variables. The F-statistic is statistically significant ($F = 62.62$; $p < 0.001$), confirming the overall validity of the estimated model.

Moreover, the coefficient of intellectual capital efficiency is positive and statistically significant ($\beta = 0.035$; $t = 4.513$; $p < 0.001$), providing strong evidence that higher levels of intellectual capital efficiency are associated with superior stock returns. These findings suggest that firms that more effectively utilize intellectual capital—particularly intangible and knowledge-based resources—are better positioned to create long-term value and achieve higher market performance, thereby supporting theoretical perspectives that emphasize the role of intellectual capital in sustainable value creation.

Model 1: Intellectual Capital Efficiency and Stock Returns

Results from the estimation of the research model (1)

Inflation factor	Meaning fulness	Statistics	Standard error	Coefficient	Symbol	name
1.287	0.000	4.513	0.008	0.035	IC	Intellectual capital efficiency
1.878	0.720	0.358	0.022	0.008	SIZE	Company size
1.596	0.075	1.784-	0.192	-0.343	ROA	Return on assets
1.338	0.078	1.767	0.132	0.234	LEV	Financial leverage
1.062	0.040	2.061	0.061	0.125	SG	Sales revenue growth
1.773	0.000	14.336	0.007	0.107	MTB	Growth opportunities
-	0.535	-0.620	0.364	-0.225	C	Width from origin
	62/62		Statistics	0/37		Adjusted coefficient of determination
	0/000		Statistical probability	01/2		Watson camera

Model 2: Human Capital Efficiency and Stock Returns

Results from the estimation of the research model (2)

Inflation factor	Meaning fulness	Statisticst	Standard error	Coefficient	Symbol	name
1.265	0.000	4.592	0.008	0.038	HCE	Human capital efficiency
1.877	0.689	0.401	0.022	0.009	SIZE	Company size
1.578	0.088	1.710-	0.191	-0.326	ROA	Return on assets
1.338	0.082	1.744	0.132	0.231	LEV	Financial leverage
1.062	0.046	2.003	0.061	0.122	SG	Sales revenue growth
1.768	0.000	14.449	0.007	0.107	MTB	Growth opportunities
-	0.545	-0.606	0.363	-0.220	C	Width from origin
	82/62		StatisticsF	0/37		Adjusted coefficient of determination
	0/000		Statistical probability	01/2		Watson camera

The second hypothesis investigates the role of human capital efficiency (HCE) in predicting future stock returns. The regression results indicate that the coefficient of HCE is positive and statistically significant ($\beta = 0.038$; $t = 4.592$; $p < 0.001$), confirming a strong association between human capital efficiency and stock performance. The adjusted coefficient of determination remains at 0.37, reflecting the model's robust explanatory power.

These findings underscore human capital as a critical driver of firm value and financial performance. Firms with more skilled, knowledgeable, and committed employees tend to achieve superior stock returns, highlighting the strategic importance of investment in employee development, learning, and retention as key sources of competitive advantage.

The third hypothesis evaluates the effect of structural capital efficiency (SCE) on future stock returns. The regression results reveal that the coefficient of SCE is positive and statistically significant ($\beta = 0.385$; $t = 4.153$; $p < 0.001$), indicating that structural capital efficiency plays a meaningful role in explaining variations in stock returns. The adjusted coefficient of determination for this model is 0.36, which, although slightly lower than that of the preceding models, still reflects a substantial level of explanatory power.

These findings suggest that organizational infrastructure, internal processes, information systems, and innovation-related capabilities contribute positively to firms' stock market performance. Structural capital enhances the effectiveness of human capital by providing supportive mechanisms that facilitate knowledge utilization and organizational learning, thereby generating a synergistic effect that strengthens overall value creation.

Model 3: Structural Capital Efficiency and Stock Returns

Results from the estimation of the research model (3)

Inflation factor	Meaningfulness	Statisticst	Standard error	Coefficient	Symbol	name
1.207	0.000	4.153	0.093	0.385	SCE	Structural capital efficiency
1.795	0.323	0.989	0.021	0.021	SIZE	Company size
1.564	0.114	1.582-	0.188	-0.298	ROA	Return on assets
1.342	0.049	1.976	0.120	0.238	LEV	Financial leverage
1.061	0.086	1.720	0.060	0.103	SG	Sales revenue growth
1.762	0.000	12.741	0.008	0.108	MTB	Growth opportunities
-	0.155	1.425-	0.353	-0.504	C	Width from origin
	41/60		StatisticsF	0/36		Adjusted coefficient of determination
	0/000		Statistical probability	00/2		Watson camera

Model 4: Capital Employed Efficiency and Stock Returns

Results from the estimation of the research model (4)

Inflation factor	Meaningfulness	Statisticst	Standard error	Coefficient	Symbol	Persian name
1.207	0.928	0.091-	0.191	0.017-	CEE	Efficiency of capital employed
1.346	0.000	5.566-	0.047	0.260-	SIZE	Company size
1.755	0.282	1.076	0.334	0.360	ROA	Return on assets
1.760	0.001	3.308-	0.293	0.968-	LEV	Financial leverage
1.348	0.119	1.564	0.076	0.118	SG	Sales revenue growth
1.060	0.000	7.194	0.013	0.092	MTB	Growth opportunities
-	0.000	5.783	0.817	4.723	C	Width from origin
	89/2		StatisticsF	0/24		Adjusted coefficient of determination
	0/000		Statistical probability	2/35		Watson camera

The final hypothesis examines the effect of capital employed efficiency (CEE) on future stock returns. The regression results indicate that the coefficient of CEE is negative and statistically insignificant ($\beta = -0.017$; $t = -0.091$; $p = 0.928$), suggesting that capital employed efficiency does not contribute meaningfully to explaining variations in stock returns. In addition, the adjusted coefficient of determination for this model (Adjusted $R^2 = 0.24$) is notably lower than that of the other estimated models, indicating weaker explanatory power.

These findings imply that the efficiency of physical and financial capital plays a relatively limited role in stock valuation compared to intellectual and intangible resources. This result is consistent with the characteristics of knowledge-driven markets, in which investors place greater emphasis on firms' intellectual capital and growth-related capabilities rather than on traditional asset-based measures.

With respect to the control variables, the market-to-book ratio (MTB) exhibits a strong and positive association with stock returns ($p < 0.001$), underscoring the importance of growth opportunities in shaping market expectations. In contrast, financial leverage (LEV) shows a negative and statistically significant effect on stock returns ($p = 0.001$), indicating that higher debt levels are perceived unfavorably by investors and may weaken confidence in firms' future performance.

5. Discussion and Conclusion

This study investigated the role of intellectual capital efficiency and its components in predicting future stock returns of firms listed on the Tehran Stock Exchange. Drawing on the resource-based view, human capital theory, and signaling theory, the findings provide empirical evidence that intellectual capital constitutes a critical determinant of market-based performance in an emerging economy context.

The results demonstrate that overall intellectual capital efficiency exerts a positive and statistically significant effect on future stock returns. This finding suggests that firms capable of efficiently transforming intangible resources into value are more likely to achieve superior market performance. In environments characterized by increasing uncertainty and competition, intellectual capital serves as a strategic asset that enhances firms' ability to generate sustainable returns and signal long-term growth potential to investors.

Among the components of intellectual capital, human capital efficiency emerged as the most influential factor in explaining stock returns. This result highlights the central role of employees' knowledge, skills, and expertise in value creation. Firms that effectively invest in workforce development, learning, and innovation are better positioned to improve productivity and competitiveness, which is ultimately reflected in higher market valuations. This finding supports the notion that, in knowledge-driven economies, human capital represents the core mechanism through which intellectual capital affects financial outcomes.

Structural capital efficiency was also found to have a positive and significant relationship with stock returns. This indicates that organizational processes, information systems, routines, and internal infrastructures play a complementary role in enhancing firm performance. Structural capital enables firms to codify knowledge, support employee effectiveness, and ensure continuity of value creation beyond individual human resources. Consequently, strong structural capital enhances the scalability and sustainability of intellectual capital benefits.

In contrast, capital employed efficiency did not exhibit a significant effect on stock returns. This finding suggests that traditional physical and financial assets are less relevant in explaining market performance compared to intangible resources. In the context of the Tehran Stock Exchange, investors appear to place greater emphasis on growth potential and knowledge-based capabilities rather than on the efficiency of tangible capital utilization. This result aligns with the gradual shift in capital markets toward

valuing intangible assets over conventional accounting-based indicators.

Overall, the findings indicate that intellectual capital—particularly its human and structural components—plays a more prominent role than physical capital in shaping investor expectations and stock return behavior. This underscores the growing importance of intangible assets in firm valuation and highlights the need for both managers and investors to reconsider traditional approaches to performance assessment.

These results align with studies by Clarke et al. (2011), Wang et al. (2005), and Xu et al. (2020), reinforcing that firms with higher intellectual capital efficiency outperform competitors in stock markets. The lack of significance for capital employed efficiency mirrors findings in developing economies, where investor focus shifts from tangible assets to knowledge-based resources.

5.1. Managerial Recommendations

Based on the findings of this study, several practical implications can be drawn for corporate managers and policymakers. First, managers should place greater strategic emphasis on the development and retention of human capital. Investments in employee training, knowledge enhancement, and skill development are not merely operational decisions but key drivers of long-term firm value and market performance.

Second, firms should strengthen their structural capital by improving organizational processes, information systems, and internal control mechanisms. Efficient structures facilitate knowledge sharing, innovation, and operational consistency, thereby amplifying the value generated by human capital. Enhancing structural capital also reduces firm dependence on individual employees and supports sustainable performance over time.

Third, given the limited explanatory power of physical capital efficiency, managers should avoid overreliance on asset-heavy growth strategies. Instead, they should focus on leveraging intellectual resources and integrating them into corporate strategy and decision-making processes.

Finally, firms are encouraged to improve the transparency of disclosures related to intellectual capital. Clear communication of investments in human resources, innovation, and organizational capabilities can reduce information asymmetry and enable investors to better assess the firm's long-term value creation potential.

6. Suggestions for Future Research

Future research may extend the findings of this study in several directions. First, scholars can examine the mediating or moderating roles of innovation capability, corporate governance quality, or information transparency in the relationship between intellectual capital and stock returns. Such analyses may provide deeper insights into the mechanisms through which intellectual capital influences market performance.

Second, industry-specific studies could be conducted to explore whether the impact of intellectual capital varies across different sectors, particularly between knowledge-intensive and asset-intensive industries. This would help clarify the contextual nature of intellectual capital valuation.

Third, future studies may incorporate alternative measures of intellectual capital beyond the VAIC model or combine quantitative and qualitative approaches to better capture the multidimensional nature of intangible assets. Such approaches could enhance the robustness and explanatory power of intellectual capital research in emerging markets.

References

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17(1), 99-120.* https://doi.org/10.1177/014920639101700108.

Becker, G. S. (1993). Human capital: A theoretical and empirical analysis, with special reference to education (3rd ed.). *The University of Chicago Press.*

https://doi.org/10.7208/chicago/9780226041223.001.0001.

Bontis, N. (2001). Assessing knowledge assets: A review of the models used to measure intellectual capital. *International Journal of Management Reviews, 3(1), 41-60.* https://doi.org/10.1111/1468-2370.00053.

Charles, Y., & Yahaya, O. A. (2024). The value relevance of intellectual capital. *Journal of Intellectual Capital, 25(2), 233-254.* https://doi.org/10.1108/JIC-02-2024-0187.

Chatterjee, S., Chaudhuri, R., Thrassou, A., & Sakka, G. (2021). Impact of a firm's intellectual capital on firm performance: A study of Indian firms and the moderating effects of age and gender. *Journal of Intellectual Capital, 23(1), 103-126.* https://doi.org/10.1108/JIC-12-2020-0378.

Clarke, M., Seng, D., & Whiting, R. H. (2011). Intellectual capital and firm performance in Australia. *Journal of Intellectual Capital, 12(4), 505-530.* https://doi.org/10.1108/14691931111181706.

Edvinsson, L., & Malone, M. S. (1997). *Intellectual capital: Realizing your company's true value by finding its hidden brainpower.* Harper Business.

Firer, S., & Stainbank, L. (2003). Testing the relationship between intellectual capital and a company's performance: Evidence from South Africa. *Meditari: Research Journal of the School of Accounting Sciences, 11(1), 25-44.* https://doi.org/10.10520/EJC72462

Ghazal, S., & Aziz, T. (2025). Does intellectual capital predict future stock returns? An Indian perspective. *Managerial Finance, 51(6), 896-915.* https://doi.org/10.1108/MF-04-2024-0162.

Khezrlou, J., & Zeinali, M. (2022). Investigating the relationship between the efficiency of intellectual capital components and the financial performance of companies listed on the Tehran Stock Exchange. Accounting and Management Outlook, 5(63), 45-58. [In Persian].

Lev, B. (2001). *Intangibles: Management, measurement, and reporting.* Brookings Institution Press.

Pradana, R. W., & Chalid, D. A. (2023). Intellectual capital and a firm's financial distress risk: Evidence from developed and developing countries. *Jurnal Manajemen Teori Dan Terapan, 16(2), 309-320.* https://doi.org/10.20473/jmtt.v16i2.2023.309-320.

Pulic, A. (2000). VAICTM—An accounting tool for IC management. *International Journal of Technology Management, 20(5-8), 702-714.* https://doi.org/10.1504/IJTM.2000.002891.

Putra, J. M., Soehaditama, J. P., Hernawan, M. A., Yulihapsari, I. U., & Sova, M. (2023). Implementation of the capital asset pricing model in stock return prediction: A literature review. *Journal of Finance and Economics.* https://doi.org/10.2139/ssrn.370590653.

Shahreza, A., Faghani Makrani, K., & Fazeli, N. (2022). Ranking accounting and environmental factors affecting the profitability of commercial banks. Financial Accounting and Auditing Research, 14(56), 89-114. [In Persian]

Sinayi, H., & Rangbari Khini, M. (2014). Examining the effects of economic value added and intellectual capital on the market price of company stocks. Journal of Financial Accounting Research, 6(3), 85-98. [In Persian]

Wang, W. Y., & Chang, C. (2005). Intellectual capital and performance in causal models: Evidence from the information technology industry in Taiwan. *Journal of Intellectual Capital, 6(2), 222-236.* https://doi.org/10.1108/14691930510592825.

Weqar, F., Khan, A. M., Raushan, M. A., & Haque, S. I. (2021). Measuring the impact of intellectual capital on the financial performance of the finance sector of India. *Journal of the*

Knowledge Economy, 12(3), 1134-1151. https://doi.org/10.1007/s13132-020-00728-2.

Xu, J., & Liu, F. (2020). The impact of intellectual capital on firm performance: A modified and extended VAIC model. *Journal of Competitiveness, 12(1), 161-176.* https://doi.org/10.7441/joc.2020.01.11.

Zeghal, D., & Maaloul, A. (2010). Analyzing value added as an indicator of intellectual capital and its consequences on company performance. *Journal of Intellectual Capital, 11(1), 39-60.* https://doi.org/10.1108/14691931011039317.