SOCIAL SCIENCE DEVELOPMENT JOURNAL
SSDjournal
Open Access Refereed E-Journal & Refereed & Indexed
http://www.ssdjournal.org / journalssd@gmail.com
Article Arrival Date: 25.10.2023 Published Date: 15.11.2023
Doi Number : http://dx.doi.org/10.31567/ssd.1059
Vol 8 / Issue 40 / pp: 186-201

ON THE RELATIONSHIP BETWEEN MODIFIED VAIC, TOBIN Q AND RATES OF RETURN: A CASE OF BIST-100 WHOLESALE&RETAIL INDUSTRY

DÜZELTİLMİŞ VAIC, TOBİN Q VE GETİRİ ORANLARI ARASINDAKİ İLİŞKİ ÜZERİNE: BIST-100 TOPTAN VE PERAKENDE SEKTÖRÜ ÖRNEĞİ

Dr. Yusuf POLAT
Aksaray Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İşletme Bölümü, yusufpolat@aksaray.edu.tr
Aksaray / Türkiye
ORCID: 0000-0002-2255-0658

ABSTRACT
It aims to study the correlations between intellectual capital components, Tobin Q and financial performance indicators of firms in the BIST-100 Wholesale and Retail sector. The research is designed as an effort to understand how intellectual capital conduces to the competitive advantages and value creation capacities of firms. For this purpose, Modified Value Added Intellectual Coefficient (MVAIC) was used to represent intellectual capital and return rates (ROA, RONA, ROE and ROI) to represent financial performance. The findings show that, apart from ROE, intellectual capital is a noteworthy source of value creation for companies in this sector and positively affects their financial performance. The scope of the study includes correlation and regression analyzes on the 10-year financial statements of the relevant sector between 2013 and 2022. This study highlights that businesses should consider intellectual capital management as a strategic priority.
Keywords: Modified Value Added Intellectual Coefficient, Tobin Q, Return Rates

ÖZET
Bu çalışma, BIST-100 Toptan ve Perakende sektöründeki firmaların entelektüel sermaye unsurlarını, maddi olmayan varlıkların değerini ve finansal performansları arasındaki ilişkileri incelemeyi amaçlamaktadır. Araştırma, entelektüel sermayenin işletmelerin rekabet avantajlarına ve değer yaratma kapasitelerine nasıl katkı sağladığını anlamaya yönelik bir çaba olarak tasarlanmıştır. Bu amaçla entelektüel sermayeyi temsilen Düzeltilmiş Katma Değerli Entelektüel Sermaye (MVAIC) yöntemine, finansal performansı temsilen de getiri oranlarına (ROA, RONA, ROE ve ROI) başvurulmuştur. Çalışmanın kapsamı 2013-2022 yılları arasında ilgili sektörün 10 yıllık finansal tablolarına ilişkin korelasyon ve regresyon analizlerini içermektedir. Bulgular, ROE dışında entelektüel sermayenin bu sektördeki firmalar için önemli bir değer yaratma kaynağı olduğunu ve finansal performanslarını olumlu yönde etkilediğini göstermektedir. Bu çalışma, işletmelerin entelektüel sermaye yönetimini stratejik bir öncelik olarak görmeleri gerektiğini vurgulamaktadır.
Anahtar Kelimeler: Düzeltilmiş Katma Değerli Entelektüel Katsayı, Tobin Q, Getiri Oranları

Social Science Development Journal 2023 November Volume: 8 Issue: 40 pp: 186-201
Doi Number : http://dx.doi.org/10.31567/ssd.1059

1. Introduction

From the Scientific Management Approach to the present day, the contemporary world is experiencing a transformation from an approach in which material assets are traditionally at the forefront, to intellectual capital that has started to prioritize people (Arenas and Lavanderos, 2008). In the past, cost-effective and production-focused firms held significant competitive advantages, but today, resources centered around knowledge, particularly those encompassing intellectual capital, have become the key determinants of competition. Knowledge of human, structural and relational resources play a life-sustaining role for firms. Naturally, this shift necessitates that companies prioritize knowledge-based resources over tangible elements; otherwise, their sustainability may be jeopardized, and they could lose their competitive edge. In this context, understanding and adapting to this new economic reality can enhance businesses' chances of survival (Bayraktar and Atasel, 2022).

In contemporary society, civilizations have undergone a historical evolutionary process through different stages: agrarian societies, industrial societies, and knowledge societies. During this evolution, the prominence of agricultural resources was followed by the rise of mass production and consumption, particularly with the Industrial Revolution. In subsequent stages, human capital and the knowledge society gained importance as knowledge became the primary production factor (Can and Bardi, 2020). In this phenomenal process, the role of human assets has gradually increased and their importance among the factors determining business value has also increased (Daloğlu, 2020). On the other hand, the fact that intellectual capital has become a critical vying distinction for firms has enabled investors to take it into consideration when evaluating a company's earnings potential and innovation capabilities. The capital required for the sustainability of firms is shifting towards knowledge capital, establishing a knowledge-based economy as dominant. Consequently, knowledge capital is a fundamental value that ensures the continuity of firms and contributes to economic growth by leading capital accumulation through the application of accumulated knowledge (Akgün and Günay, 2021; İşseveroğlu and Ercan, 2019).

In contrast to traditional approaches, the world is increasingly shifting its focus towards intellectual capital, reflecting its growing influence on firm’s success (Arenas and Lavanderos, 2008). Intellectual capital plays a decretory role in an industry that is knowledge-based and puts it in focus and is one of the fit factors of a firm's performance. Components of the relevant concept, such as Human Capital (HC), Structural Capital (SC), Relational Capital (RC), and Capital Employed (CE), are over-serious factors shaping a firm’s success (Majumder et al., 2021). Intellectual capital encompasses a series of elements that enhance a firm's value, despite not being visible in financial statements. Among these elements are knowledge, intellectual property, experience, expertise, organizational technology, corporate culture, and customer relationships. Intellectual capital reflects the perspective of being able to use knowledge rather than merely possessing it, making it a critical factor in increasing firm value and achieving sustainable competitive advantage (Aktaş and Atalay, 2020). Due to its complex nature, it can be defined in various ways by different researchers, as it encompasses essential factors such as innovation, productivity, competitiveness, and economic performance (Akçay, 2021).

Intellectual capital is a concept that was first defined by Galbraith in 1969 and has been studied since the 1980s. This concept represents the combination of technology, branding, customer knowledge, commercial reputation, corporate culture, information, intellectual property, and experience that is necessary for firms to compete (Gülcemal and Çıtak, 2017). It is also diagnosed as the knowledge, intellectual property, and experience possessed by each employee, which can be useful in creating competitive opportunities. Intellectual capital is a significant component of corporate wealth, and it is believed that effective management and utilization of it can enhance a firm's performance (Diyanty et al.,2018). Continuously increasing or improving important ratios of firms such as intellectual capital and human capital can enhance their competitiveness.

These investments stimulate innovation, invest in quality human resources, and embrace a knowledge-based approach. As a result, the development of intellectual capital and human capital ratios over time can help firms achieve sustainable success and survive in a changing business environment (Çalışkan, 2015).

Intellectual capital is composed of components such as "human, structural, relational, and employed capital", and it should be noted right away that the effects of these elements can vary depending on the type, form, and size of the businesses (Çalışkan, 2015). For instance, in the service sector, it is considered a principal source of value for firm's sustainability (Bayraktar and Atasel, 2022). Some sources argue that intellectual capital encompasses "human, structural, and relational capital components", while others may consider four main components like "human, structural, customer, or social capital" (Erbaşı, 2018). Intellectual capital not only creates a competitive advantage for organizations but also holds great significance for societies, aiming to be prepared for strategic surprises in a constantly changing environment and continuously creating value (Shairi et al., 2021). Due to the difficulty of reflecting investments in intellectual property and their effectiveness in financial statements, measuring it requires a better understanding of a firm's cognitive and intangible resources (Majumder et al., 2021). Finally, intellectual capital is expressed as the "Value Added Intellectual Coefficient (VAIC)". Researchers, after reaching a consensus on the components of intellectual capital, have focused on making this capital measurable. During this process, different measurement methods have been developed, and while some are not widely accepted in the literature, the "Value Added Intellectual Coefficient" method developed by Pulic has been extensively used to calculate firms' intellectual capital (Sakur and Güngör, 2023). MVAIC, on the other hand, is a modified version of intellectual capital and is considered an advanced version that takes into account tangible elements as well as human elements.

Human capital, an important component of intellectual capital, encompasses attributes such as the genetic heritage, education, experience, and attitudes towards work and life of employees (Hudson, 1993). Additionally, among the components of human capital are technical knowledge (know-how), professional competence, the ability to generate knowledge, capacity for skill development, initiative, and an entrepreneurial spirit (Aslanoğlu and Zor, 2006). Effectively managing human capital for firms influences business success through factors like innovation, knowledge accumulation, expertise, and collaboration. Human capital is the cornerstone of a business's success, and investing in it through activities like education and training is crucial. When firms maximize the benefits from their employees' ideas, human capital creates value, which manifests through innovation, professional competence, technical knowledge, and efforts to generate knowledge. Therefore, preserving and enhancing this resource is one of the strategic goals of businesses (Acuner and Şahin, 2002).

Structural capital, unlike human capital, encompasses elements that are entirely under the control of the firms and are necessary for them to conduct its operations. This includes components such as the management approach, organizational culture, management processes, information technology infrastructure, organizational relationships, and financial structure of the firm. Additionally, it includes intellectual property rights, which are subcomponents of intellectual property, making up a part of structural capital (Ergün and Özcan, 2022). Structural capital can be described as a process that covers a wide range of elements, from tangible assets produced by firms, such as "patents, trademarks, and databases, to abstract concepts like culture, transparency, and trust among employees" (Kamal et al., 2012). In short, it encompasses all elements that enhance the effectiveness of human capital. Relational capital, also known as customer capital, represents the investment made by firms in marketing, sales, and distribution. Finally, capital employed typically represents firms' assets other than short-term liabilities used in financial ratios.

In this connection, the aim of the study is to check over the relations between commonly used return ratios such as ROA, RONA, ROE, and ROI, and MVAIC and Tobin Q ratios using the 10-year data (2013-2022) of the firms in the BIST-100 Wholesale and Retail Index. In this context, the study reviews the relevant literature in the following chapter and provides an overview of the research methodology in the third section. The findings of the conducted correlation and regression analyses are passed in the fourth section, and a general evaluation is made in the final section of the study.

2. Literature Review

A pioneering and important study conducted in the domestic literature on intellectual capital shows that firms had a concept based on tangible assets in the relevant periods and that intangible capital elements did not reach a sufficient level (Yörük and Erdem, 2008). In a study conducted using companies in the BIST-100 technology index, it is stated that the companies in the relevant sector do not attach sufficient importance to intellectual capital and base their activities mostly on physical assets, and furthermore, it is stated that the R&D investments of especially technology firms are currently insufficient (Kayalı et al., 2007). Again, in one of the pioneering studies conducted on banks traded in ISE, it was determined that the ratio of market value to equity book value had a moderate correlation with the relevant variables (Şamiloğlu, 2006). Over time, there have been positive changes in this perspective. As a matter of fact, subsequent studies show that although intellectual capital negatively affects liquidity risk, it has a reducing effect on exchange rate and credit risk (Baydaş and Türkan, 2021), on the other hand, it provides a sectoral competitive advantage and, in particular, human capital contributes to financial performance (Sakur and Güngör, 2023). In addition, it is understood from relevant studies that these components are related to ROA and ROE, which are the primary return rates of firms. For example, it is reported that human capital in particular enhances these performance indicators (Dönmez and Erol, 2016; Daloğlu, 2020). And the study conducted on SMEs emphasizes that intellectual capital has significant effects on performance indicators such as market value and profitability and that SMEs should use it as a strategic tool to increase their success (Şahin and Alabay, 2011). Similar effects were found in the study conducted on multinational firms traded on the ISE, but a special emphasis was placed on human capital (Özer and Özer, 2014). A similar finding was detected on airline companies and EBIT, and it was reported that human capital and structural capital contributed to the correlation (Odabaşoğlu, 2018). Similarly, in the study where the factors affecting the intellectual capital of banks are examined using panel data, the positive contributions of the ratio of net interest income to total assets and the price/earnings ratio are emphasized (Turgut, 2016). Similarly, a study conducted using the informatics index found an association in positive direction between capital used and human capital and financial performance indicators (Kendirli and Konak, 2015). On the other hand, cases where the findings vary, for example, studies in which structural capital was detected rather than human capital (Ertaş and Coşkun, 2005) or vice versa have also been reported (Sarışın and Özkan, 2022). At the point of R&D investments, which is a critical point for VAIC components, it is emphasized that these components are substantial in creating added value in the firms (Koc and Avcı, 2020). It has been reported that firm performance is acted positively by these components in terms of efficiency beyond profitability (İşseveroğlu and Ercan, 2019), and it is recommended to measure the sectors by taking their internal dynamics into consideration (Gülcemal and Çıtak, 2017).

Studies in the literature on the modified VAIC method were mostly conducted for Asian countries. In one of these studies, it is understood that the modified value added coefficient is in accordance with the general framework mentioned above, and the human capital coefficient remains at the forefront in the modified version (Diyanty et al., 2018). There are some important studies carried out in Indonesia regarding MVAIC. In a study conducted in this context, it was reported that the modified version was related to ROA, ROE, PD/DD and P/E ratios. The study states that this perspective can also bear fruit in terms of the future situations of the firms (Ulum and Syam, 2017).

In another study by the authors, it was reported that intellectual capital can lead to more successful results in non-financial firms rather than financial firms (Ulum and Jati, 2016). In a study conducted in Malaysia, the connection between the human capital coefficient and ROA is emphasized (Mohammad and Bujang, 2019). In a study aiming to go over the effect of intellectual capital on cost stickiness through the data of manufacturing firms operating in Indonesia, it was emphasized that the intellectual capital applied by firms is effective in reducing cost stickiness and this can increase the financial performance of the firms (Irawan, 2021). A study conducted on banks also reiterates that the modified version of intellectual capital has positive contributions to the profitability of firms; additionally, the study shows that human capital remains more prominent compared to other components (Murugesan et al., 2018). However, the results of a work examining the effect of intellectual capital on financial performance in the Malaysian Stock Exchange show that MVAIC can also negatively affect (Saddam et al., 2021). Finally, in a study examining the relationship between intellectual capital of financial firms traded on BIST and financial failure, the findings regarding VAIC and MVAIC mention the positive contribution of structural capital in eliminating the failure in question, and on the contrary, the negative contribution of human capital (Gürol, 2021).

3. Methodology

The study was conducted on a sample of 13 out of a total of 25 firms from the Wholesale and Retail sector listed on the BIST-100 index, operating between the years 2013 and 2022. The firms included in the study are as follows:

Table 1. List of Firms

FIRM CODE	FIRM NAME
BIMAS	BİM BİRLEŞİK MAĞAZALAR A.Ş.
BIZIM	BİZİM TOPTAN SATIŞ MAĞAZALARI A.Ş.
CASA	CASA EMTİA PETROL KİMYEVİ VE TÜREVLERİ SANAYİ TİCARET A.Ş.
DOAS	DOĞUŞ OTOMOTİV SERVİS VE TİCARET A.Ş.
INTEM	İNTEMA İNŞAAT VE TESİSAT MALZEMELERİ YATIRIM VE PAZARLAMA A.Ş.
MEPET	MEPET METRO PETROL VE TESİSLERİ SANAYİ TİCARET A.Ş.
MGROS	MİGROS TİCARET A.Ş.
PSDTC	PERGAMON STATUS DIŞ TİCARET A.Ş.
SANKO	SANKO PAZARLAMA İTHALAT İHRACAT A.Ş.
SELEC	SELÇUK ECZA DEPOSU TİCARET VE SANAYİ A.Ş.
TGSAS	TGS DIŞ TİCARET A.Ş.
TKNSA	TEKNOSA İÇ VE DIŞ TİCARET A.Ş.
VAKKO	VAKKO TEKSTİL VE HAZIR GİYİM SANAYİ İŞLETMELERİ A.Ş.

In the study, the following financial performance indicators, Tobin's Q, and formulations for modified VAIC and its components were utilized:

Social Science Development Journal 2023 November Volume: 8 Issue: 40 pp: 186-201
Doi Number : http://dx.doi.org/10.31567/ssd.1059

Table 2. List of Formulations Referenced in Analysis

MVAIC	Modified Value-Added Intellectual Coefficient	HCE + RCE + SCE + CEE
HCE	Human Capital Efficiency	VA / HC
RCE	Relational Capital Efficiency	RC / VA
SCE	Structural Capital Efficiency	SC / VA
CEE	Capital Employed Efficiency	VA / CE
VA	Value Added	EBIT + Personnel Expenses + Depreciation and Amortization
HC	Human Capital	Personnel Expenses
RC	Relation Capital	Marketing Sales and Distribution Expenses
SC	Structural Capital	VA - HC
CE	Capital Employed	WC + FA
Tobin Q	Tobin Q	(Market Value + Total Liabilities) / Book Value of Total Assets
ROA	Return on Assets	Net Profit / Total Assets
RONA	Return on Net Assets	Net Profit / Net Assets
ROE	Return on Equity	Net Profit / Equity
ROI	Return on Investments	EBIT / Net Assets

Within the scope of the study, multiple regression and correlation analyses were conducted. The research problems formulated for this purpose are as follows:

$$ROA_t = \beta_0 + \beta_1 MVAIC_t + \beta_2 TQ_t + \varepsilon_t$$
$$RONA_t = \beta_0 + \beta_1 MVAIC_t + \beta_2 TQ_t + \varepsilon_t$$
$$ROE_t = \beta_0 + \beta_1 MVAIC_t + \beta_2 TQ_t + \varepsilon_t$$
$$ROI_t = \beta_0 + \beta_1 MVAIC_t + \beta_2 TQ_t + \varepsilon_t$$
$$ROA_t = \beta_0 + \beta_1 HCE_t + \beta_2 RCE_t + \beta_3 SCE_t + \beta_4 CEE_t + \varepsilon_t$$
$$RONA_t = \beta_0 + \beta_1 HCE_t + \beta_2 RCE_t + \beta_3 SCE_t + \beta_4 CEE_t + \varepsilon_t$$
$$ROE_t = \beta_0 + \beta_1 HCE_t + \beta_2 RCE_t + \beta_3 SCE_t + \beta_4 CEE_t + \varepsilon_t$$
$$ROI_t = \beta_0 + \beta_1 HCE_t + \beta_2 RCE_t + \beta_3 SCE_t + \beta_4 CEE_t + \varepsilon_t$$
$$TQ_t = \beta_0 + \beta_1 HCE_t + \beta_2 RCE_t + \beta_3 SCE_t + \beta_4 CEE_t + \varepsilon_t$$

Social Science Development Journal 2023 November Volume: 8 Issue: 40 pp: 186-201
Doi Number : http://dx.doi.org/10.31567/ssd.1059

4. Findings

The return (ROA, RONA, ROE and ROI), Tobin Q and MVAIC ratios for the firms included in the study and traded in the BIST-100 Wholesale and Retail Index over the years are as follows:

Table 3. Firms' Return, Tobin Q and MVAIC Ratios

FIRMS	ROA	RONA	ROE	ROI	Tobin Q	MVAIC
BIMAS	0,122729	0,277267	0,345826	0,353801	2,564056	4,911144
BIZIM	0,027806	0,114782	0,180170	0,193776	1,489310	5,227891
CASA	-0,053260	-0,299120	-2,122650	-0,162680	0,925472	4,750520
DOAS	0,124880	0,273579	0,298057	0,396998	1,343251	6,571020
INTEM	0,001279	0,098876	-0,094560	0,134324	1,853171	6,000114
MEPET	0,018655	0,023255	0,026073	0,040322	1,467497	6,994826
MGROS	-0,017080	-0,026330	-1,632350	0,128812	1,414070	4,506929
PSDTC	0,013003	0,313079	0,320167	0,122891	1,030961	3,125659
SANKO	0,065675	0,092997	0,098613	0,086755	1,202094	7,360909
SELEC	0,064238	0,165392	0,172357	0,199108	1,132886	4,290852
TGSAS	0,003311	0,143301	0,147471	0,196376	1,011575	4,300809
TKNSA	-0,025370	0,305778	0,295775	1,919696	1,509602	9,265084
VAKKO	0,065701	0,121873	0,170230	0,234127	1,452298	4,759934

The descriptive statistics for the firms in the BIST-100 Wholesale and Retail Sector are presented in Table 4. According to the table, the average ratios for these firms are as follows:

- Net Profit to Total Assets Ratio: Approximately 3%
- Net Profit to Net Assets Ratio: Approximately 12%
- Earnings Before Interest and Taxes to Net Assets Ratio: Approximately 30%
- Net Profit to Total Equity Ratio: Approximately -13%
- Tobin's Q Ratio: Approximately 1.4
- Modified Value Added Intellectual Coefficient Ratio: Approximately 5.5

These statistics provide an overview of the financial performance and firms' market value within the sector.

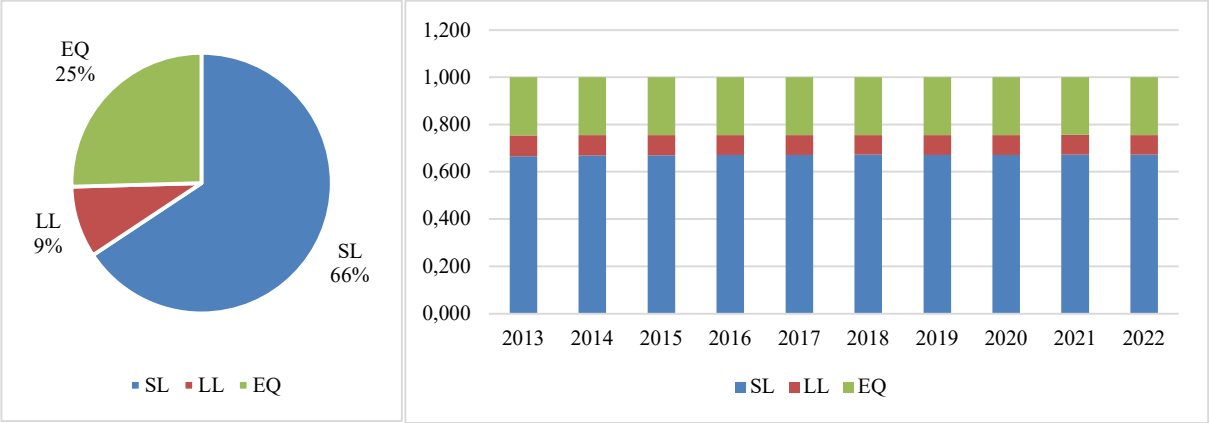
Table 4. The Sectors' Return, Tobin Q and MVAIC Ratios

	N	Mean		Std. Dev.
	Statistic	Statistic	Std. Error	Statistic
ROA	130	0.032	0.007	0.079
RONA	130	0.123	0.068	0.777
ROE	130	-0.138	0.180	2.055
ROI	130	0.296	0.148	1.692
TOBINQ	130	1.415	0.060	0.688
HCE	130	3.154	0.166	1.898
RCE	130	0.663	0.057	0.644
SCE	130	0.587	0.023	0.260
CEE	130	1.139	0.391	4.454
MVAIC	130	5.544	0.422	4.806

The significant difference between ROA and RONA indicates that short-term liabilities constitute a substantial proportion of the capital structure. Furthermore, the negative ROE also supports this situation.

As shown below, throughout the study period, the ratio of short-term liabilities to total assets is 66%, while the equity ratio is 25%. It can also be observed that this capital structure has not undergone significant changes over the years.

Figure 1. Capital Structures of the Firms



Correlation and regression analyses were conducted to inspect the affair among return ratios and the modified intellectual capital coefficient along with its components, as well as the Tobin Q ratio. The indications of the correlation analysis, including the direction and strength of the relations of the variables, are depictured below:

Table 5. Correlation Results for Variables

CORRELATIONS

		ROA	RONA	ROE	ROI	TOBINQ	HCE	RCE	SCE	CEE	MVAIC
ROA	Pearson Cor.	1									
	Sig.										
RONA	Pearson Cor.	.198	1								
	Sig.	.012									
ROE	Pearson Cor.	.206	.173	1							
	Sig.	.009	.024								
ROI	Pearson Cor.	.074	.732	.045	1						
	Sig.	.202	.000	.305							
TOBINQ	Pearson Cor.	.419	.122	.078	.103	1					
	Sig.	.000	.083	.189	.122						
HCE	Pearson Cor.	.431	.101	.115	.062	.055	1				
	Sig.	.000	.127	.096	.241	.266					
RCE	Pearson Cor.	-.427	-.128	-.143	-.057	-.059	-.487	1			
	Sig.	.000	.073	.052	.259	.254	.000				
SCE	Pearson Cor.	.463	.132	.138	.117	.180	.619	-.848	1		
	Sig.	.000	.067	.059	.092	.020	.000	.000			
CEE	Pearson Cor.	.009	.297	-.057	.845	.078	-.013	.032	.032	1	
	Sig.	.460	.000	.259	.000	.189	.442	.360	.361		
MVAIC	Pearson Cor.	.146	.305	-.019	.807	.096	.351	-.075	.214	.928	1
	Sig.	.048	.000	.414	.000	.139	.000	.199	.007	.000	

Social Science Development Journal 2023 November Volume: 8 Issue: 40 pp: 186-201
Doi Number : http://dx.doi.org/10.31567/ssd.1059

When examining the correlations between the dependent variables, the following relationships were observed based on the information in Table 5:

- ROA has a correlation with RONA and ROE, and the direction of it is positive. Accordingly, regarding the severity of the determined relationship, it can be said that there is an affirmative connection between ROA and RONA at a rate of 19.8% and a significance level of .012, and between ROA and ROE at a rate of 20.6% and a significance level of .009.
- RONA has correlations with ROE and ROI at significance levels of .024 and .000, respectively. An increase of 1 unit in ROE results in a 17.3% increase in RONA, and an up of 1 unit in ROI leads to a 73.2% rise in RONA.

Regarding Tobin Q, there is a correlation with ROA but no significant relationship with other dependent variables was found. For the correlations between the dependent variables and MVAIC, excluding ROE, there are significant and positive correlations:

- An up of 1 unit in ROA results in a 14.6% rise in MVAIC at a significance level of .048.
- An up of 1 unit in RONA leads to a 30.5% rise in MVAIC at a significance level of .000.
- An up of 1 unit in ROI results in an 80.7% rise in MVAIC at a significance level of .000.

The correlations between MVAIC and the independent variables are as follows:

- ROA has significant correlations with human, relational, and structural capital coefficients at a significance level of .000, with correlations of 43.1%, -42.7%, and 43.6%, respectively.
- RONA has an affirmative linear relationship with the capital employed coefficient at a significance level of .000 (Pearson value 29.7%).
- ROI has a direct correlation with the capital employed at a significance level of .000 and a correlation of 84.5%.

The findings of the regression analysis between return ratios, MVAIC, and Tobin Q are presented in Table 6. According to the table, a significant relationship was found between all constants and independent variables except for ROE. Specifically:

- There is a statistically valid dependence between MVAIC and Tobin Q with ROA at a significance level of .000, RONA at a significance level of .001, and ROI at a significance level of .000. The explanatory power of the regression varies, with R-squared values of 18.7%, 8.8%, and 64.6% for ROA, RONA, and ROI, respectively.

These results indicate that MVAIC and Tobin Q are significantly related to return ratios (ROA, RONA, and ROI), except for ROE, and they explain a varying degree of variance in these ratios.

Table 6. Regression Analysis of Dependent Variables with Tobin Q and MVAIC

ANOVA								
Model		**Sum of Sq.**	**df**	**Mean Sq.**	**F**	**Sig.**	**R^2**	**Adj. R^2**
ROA	Reg.	,150	2	,075	14,581	,000	,187	,174
MVAIC	Res.	,655	127	,005				
TobinQ	Total	,805	129					
RONA	Reg.	7,924	2	3,962	7,197	,001	,102	,088
MVAIC	Res.	69,915	127	,551				
TobinQ	Total	77,839	129					
ROE	Reg.	3,695	2	1,848	,434	,649	,007	-,009
MVAIC	Res.	541,209	127	4,261				
TobinQ	Total	544,904	129					
ROI	Reg.	240,711	2	120,356	118,675	,000	,651	,646
MVAIC	Res.	128,799	127	1,014				
TobinQ	Total	369,510	129					

Social Science Development Journal 2023 November Volume: 8 Issue: 40 pp: 186-201
Doi Number : http://dx.doi.org/10.31567/ssd.1059

The findings regarding the coefficients are presented in Table 7. The following relationships have been observed:

- There is a direct dependence between ROA and Tobin's Q at the .000 significance level. Accordingly, a 1 unit up in Tobin Q ratio causes a 4.7% rise in ROA. In other words, a unit up in the ratio of market value to total assets causes a rise of approximately 5% in the ratio of net profit to total assets.
- Secondly, a 1 unit up in MVAIC causes a 4.8% rise in RONA at the .001 significance level and a 28.3% rise in ROI at the .000 significance level. Unit increases in the modified intellectual capital coefficient contribute positively to the ratio between assets and net profit, causing an increase of approximately 5%. On the other hand, the same reflexion contributes approximately 30% to the EBIT to net assets ratio.

Additionally, a similar effect is observed in the ratio of EBIT to net assets, with a 1-unit increase in MVAIC contributing relevantly and leading to approximately a 30% increase in this ratio. These findings suggest that there are significant relationships between intellectual capital (as measured by MVAIC) and financial performance ratios (ROA, RONA, and ROI), indicating the importance of intellectual capital in explaining variations in financial performance.

Table 7. Coefficients for Dependent Variables, Tobin Q, and MVAIC

COEFFICIENTS						
Model		**Unstd. Coefficients**		**Std. Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
ROA	(Constant)	-,045	,016		-2,840	,005
	TOBINQ	,047	,009	,408	5,081	,000
	MVAIC	,002	,001	,107	1,333	,185
RONA	(Constant)	-,292	,162		-1,802	,074
	TOBINQ	,106	,095	,094	1,112	,268
	MVAIC	,048	,014	,296	3,504	,001
ROI	(Constant)	-1,364	,220		-6,205	,000
	TOBINQ	,064	,130	,026	,492	,623
	MVAIC	,283	,019	,804	15,280	,000

Table 8 tells the indications of the ANOVA test between ROA and the components of MVAIC. The model's explanatory power is 25.5%. In light of the outcomes, there is a noteworthy association (p-value .000) between ROA and the variables. This suggests that the variables related to MVAIC are collectively significant in explaining variations in ROA.

Table 8. Results on Regression Between ROA and MVAIC Components

ANOVA[a]								
Model		**Sum of Sq.**	**df**	**Mean Sq.**	**F**	**Sig.**	**R^2**	**Adj. R^2**
1	Reg.	,206	4	,051	10,714	,000[b]	,255	,231
	Res.	,600	125	,005				
	Total	,805	129					

a. ROA
b. CEE, HCE, RCE, SCE

When we look at the coefficients related to the analysis, there is an upward association (Pearson value .010, p-value .015) between ROA and the human capital coefficient. In other words, a one-unit increase in the value of added by employees as a proportion of total personnel expenses contributes to a 10% increase in net profit as a proportion of total assets.

Social Science Development Journal 2023 November Volume: 8 Issue: 40 pp: 186-201
Doi Number : http://dx.doi.org/10.31567/ssd.1059

Table 9. Coefficients of Regression Between ROA and MVAIC Components

COEFFICIENTS						
Model		Unstd. Coefficients		Std. Coefficients	t	Sig.
		B	Std. Error	Beta		
ROA	(Constant)	-,020	,037		-,531	,596
	HCE	,010	,004	,245	2,478	,015
	RCE	-,019	,018	-,157	-1,069	,287
	SCE	,054	,050	,178	1,088	,279
	CEE	,000	,001	,011	,146	,884

The findings from the regression analysis conducted between RONA and the variables related to MVAIC (HCE, RCE, SCE, and CEE) are depictured below, in Table 10. The R-squared value is 10.9%, and the significance level is .006.

Table 10. Results on Regression Between RONA and MVAIC Components

ANOVA[a]								
Model		Sum of Sq.	df	Mean Sq.	F	Sig.	R^2	Adj. R^2
1	Regression	8,492	4	2,123	3,827	,006[b]	,109	,081
	Residual	69,347	125	,555				
	Total	77,839	129					

a. RONA
b. CEE, HCE, RCE, SCE

When examining the coefficients, it can be observed that there is a direct relationship between RONA and CEE at a relevance level of .001, with a Pearson value of 5.3%.

Table 11. Coefficients of Regression Between RONA and MVAIC Components

COEFFICIENTS						
Model		Unstd. Coefficients		Std. Coefficients	t	Sig.
		B	Std. Error	Beta		
RONA	(Constant)	,128	,400		,319	,750
	HCE	,022	,044	,054	,501	,617
	RCE	-,153	,194	-,127	-,790	,431
	SCE	-,056	,536	-,019	-,104	,917
	CEE	,053	,015	,302	3,553	,001

As shown in Table 12, no relevant association was found between the components of MVAIC and ROE.

Table 12. Results on Regression Between ROE and MVAIC Components

ANOVA[a]								
Model		Sum of Sq.	df	Mean Sq.	F	Sig.	R^2	Adj. R^2
1	Regression	14,303	4	3,576	,842	,501[b]	,026	-,005
	Residual	530,600	125	4,245				
	Total	544,904	129					

a. ROE
b. CEE, HCE, RCE, SCE

Social Science Development Journal 2023 November Volume: 8 Issue: 40 pp: 186-201
Doi Number : http://dx.doi.org/10.31567/ssd.1059

Table 13 demonstrates the results of the regression analysis for ROI with respect to the variables related to MVAIC. The model's R-squared value is 72.4%, and the adjusted R-squared value is 71.5%. The model's significance level is .000.

Table 13. Results on Regression Between ROI and MVAIC Components

ANOVA[a]

Model		Sum of Sq.	df	Mean Sq.	F	Sig.	R^2	Adj. R^2
1	Regression	267,378	4	66,844	81,811	,000[b]	,724	,715
	Residual	102,132	125	,817				
	Total	369,510	129					

a. ROI
b. CEE, HCE, RCE, SCE

Table 14 presents the findings regarding the coefficients. There is a significant (p-value .000) and positive (Pearson value 32.1%) relationship between ROI and CEE.

Table 14. Coefficients of Regression Between ROI and MVAIC Components

COEFFICIENTS

Model		Unstd. Coefficients		Std. Coefficients	t	Sig.
		B	Std. Error	Beta		
ROI	(Constant)	-,280	,485		-,577	,565
	HCE	,026	,054	,029	,488	,626
	RCE	-,079	,235	-,030	-,334	,739
	SCE	,306	,650	,047	,470	,639
	CEE	,321	,018	,845	17,833	,000

Regression analysis was applied to the components between Tobin Q and MVAIC, and findings with a significance level of .046 and explanatory power of 7.4% were obtained.

Table 15. Results on Regression Between Tobin Q and MVAIC Components

ANOVA[a]

Model		Sum of Sq.	df	Mean Sq.	F	Sig.	R^2	Adj. R^2
1	Regression	4,506	4	1,127	2,493	,046[b]	,074	,044
	Residual	56,481	125	,452				
	Total	60,988	129					

a. TOBINQ
b. CEE, HCE, RCE, SCE

According to this relationship, a relationship was found with a significance level of .041 for relational capital and .004 for structural capital. Therefore, a rise of 1 unit in relational capital would result in a rise of 36.1% in Tobin Q, while a 1 unit up in structural capital would lead to a 141.2% rise in Tobin Q.

Table 16. Coefficients of Regression Between Tobin Q and MVAIC Components

COEFFICIENTS						
Model		Unstd. Coefficients		Std. Coefficients	t	Sig.
		B	Std. Error	Beta		
Tobin Q	(Constant)	,462	,361		1,280	,203
	HCE	-,039	,040	-,109	-,989	,325
	RCE	,361	,175	,339	2,065	,041
	SCE	1,412	,484	,533	2,920	,004
	CEE	,008	,013	,049	,563	,574

5. Discussion

In today's business landscape, companies are finding it increasingly challenging to attain sustainable competitive advantage solely through investments in physical assets or by basing their business strategies solely on production resources. Numerous studies in this regard have shown that over time, companies are reducing their investments in tangible and physical assets. Instead, there is a growing trend towards investing in intangible and abstract assets (Bayraktar & Atasel, 2022). The Intellectual Capital Value Added Ratio (ICVA) and its advanced version, the Modified Intellectual Capital Value Added Ratio (MICVA), which place a significant emphasis on human capital, are considered useful ratios, particularly in sectors where the qualifications of employees are crucial, such as the service industry. Drawing conclusions from the findings of our study, it can be inferred that one of the primary concerns in the Turkish Wholesale and Retail sector is the equity amounts specific to individual firms and, more broadly, their capital structure. The analysis of the studied firms and the respective period indicates that the equity amounts of firms are considerably lower than generally accepted standards and that this is being compensated for by short-term liabilities. Furthermore, the regression analysis conducted in the study did not yield any significant results regarding the returns on equity.

According to the findings, relationships were identified between Return on Assets and the Human Capital Coefficient, Return on Net Assets, Return on Investments, and Capital Employed Coefficient. Therefore, it can be accepted, with the exception of ROE, that the hypothesis of the existence of a correlation between generally accepted return ratios and the Modified Intellectual Capital Value Added Ratio and Tobin's Q is valid. In other words, it is possible to say that MVAIC can strongly represent the firm's return ratios, excluding ROE. These relationships contribute to our understanding of firms' value creation capabilities and competitive advantages. In future studies, more in-depth analyses and investigations that shed further light on business strategies will be necessary.

AUTHOR DECLARATIONS

Declarations of Research and Publication Ethics: This study has been prepared in accordance with scientific research and publications ethics.

Ethics Committee Approval: This research does not include analyzes that require ethics committee approval, it does not require ethics committee approval.

Author Contributions: The author has done all the work alone.

Conflict of Interest: There is no conflict of interesting arising from the study for the author or third parties.

REFERENCES

Acuner, T., & Şahin, K. T. (2002). Entelektüel Sermayenin Ölçülebilirliği Üzerine Sezgisel Bir Araştırma. 10. Ulusal Yönetim Organizasyon Kongresi Bildiri Kitabı, 40-56.

Akçay, A. Ö. (2021). Yönetim Kurulu Yapısı Çeşitliliği ve Entelektüel Sermaye Performansı: Borsa İstanbul Firmaları Üzerine Dinamik Panel Veri Analizi. Yüzüncü Yıl Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (53), 355-380.

Akgün, A. İ., & Günay, B. (2021). Entelektüel sermaye etkinliğinin önceliklendirilmesinde çok kriterli karar verme modellerinin kullanılması: Bir Sağlık Hizmetleri Sektörü Örneği. Sosyoekonomi, 29(47), 337-365.

Aktaş, Z., & Atalay, M. Ö. (2020). Yönetim Kurulu Yapısı Çeşitliliğinin Entelektüel Sermaye Üzerindeki Etkisi: BİST Sürdürülebilirlik Endeksi Firmaları Üzerine Bir Araştırma. Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 22(2), 823-854.

Arenas, T., & Lavanderos, L. (2008). Intellectual capital: object or process? Journal of Intellectual Capital, 9(1), 77-85.

Aslanoğlu, S., & Zor, İ. (2006). Bilgi Varlıklarının Değerlemesi: Entelektüel Sermaye Ölçüm ve Değerleme Modelleri - Karşılaştırmalı Bir Analiz. Muhasebe ve Finansman Dergisi, (29), 152-165.

Baydaş, Y., & Türkan, Y. (2021). Entelektüel sermayenin firma riski üzerine etkileri: BİST'te işlem gören imalat işletmeleri üzerine bir uygulama. Van Yüzüncü Yıl Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 6(11), 1-14.

Bayraktar, Y., & Atasel, O. Y. (2022). Değiştirilmiş Entelektüel Katma Değer Katsayısı ile Finansal Performans Arasındaki İlişkinin İncelenmesi: BIST Banka Endeksi'nde Bir Araştırma. Muhasebe Enstitüsü Dergisi, (67), 27-55.

Can, A. V., & Bardi, Ş. (2020). Entelektüel Sermaye İle Firma Performansı Arasındaki İlişki: BİST Kobi Sanayi Endeksi'nde Yer Alan Firmalar Üzerine Bir Araştırma. Journal of Accounting and Taxation Studies, 13(3), 709-738.

Çalışkan, T. (2015). Bilgi ekonomisinde entelektüel sermaye: Borsa İstanbul'da bankacılık sektörü uygulaması. Journal of Management and Economics Research, 13(3), 121-137.

Daloğlu, P. (2020). Entelektüel Sermaye Unsurlarının Karlılık Üzerine Etkisi. Muhasebe ve Finans İncelemeleri Dergisi, 3(1), 1-12.

Diyanty, V., Restuti, M. D., Diyanti, V., & Shauki, E. R. (2018). Intellectual Capital and Firm Performance: Applying a Modified Value-Added Coefficient. In Asia Pacific Business and Economics Conference (APBEC 2018) (pp. 114-123). Atlantis Press.

Dönmez, A., & Erol, İ. (2016). Entelektüel Sermayenin Ölçülmesi: VAIC Yöntemi Yardımıyla BIST-Sürdürülebilirlik Endeksi İşletmeleri Üzerine Bir Uygulama. Mali Çözüm Dergisi, 26, 27-56.

Erbaşı, A. (2018). İlçeler Düzeyinde Entelektüel Sermaye Ölçümü ve Uygulaması. Eskişehir Osmangazi Üniversitesi İktisadi ve İdari Bilimler Dergisi, 13(2), 163-184.

Ergün, İ., & Özcan, İ. (2022). Endüstri 4.0 Döneminde Entelektüel Sermaye: Bilişim Sektörü Üzerine Bir Araştırma. Muhasebe Enstitüsü Dergisi, (66), 79-94.

Ertaş, F. C., & Coşkun, M. (2005). Turizm işletmelerinde entelektüel sermayenin ölçülmesi ve İMKB'deki turizm şirketlerinde ampirik bir uygulama. Sosyal Ekonomik Araştırmalar Dergisi, 5(10), 121-138.

Gülcemal, T., & Çıtak, L. (2017). Entelektüel katma değer katsayısı yöntemi ile ölçülen entelektüel sermayenin firma performansı üzerindeki etkisi. Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi, 18(1), 35-55.

Gürol, B. (2021). Entelektüel Sermaye ile Finansal Başarısızlık İlişkisi: Borsa İstanbul Mali Kuruluşlar Endeksi Örneği. İstanbul Ticaret Üniversitesi Girişimcilik Dergisi, 5(9), 31-44.

Hudson, W. J. (1993). Intellectual Capital: How to Build It, Enhance It, Use It. Wiley.

Irawan, D. (2021). Intellectual Capital On Cost Stickiness: A Modified Value Added Intellectual Coefficient (MVAIC) Approach. Jurnal Reviu Akuntansi dan Keuangan (JRAK), 11(2), 285-293.

İşseveroğlu, G., & Ercan, C. (2019). Entelektüel sermaye bileşenlerinin teknoloji şirketleri üzerine etkisi: BİST'de ampirik bir uygulama. Muhasebe ve Finansman Dergisi, (83), 111-130.

Kamal, M. H., Mat, R. C., Rahim, N. A., Husin, N., & Ismail, I. (2012). Intellectual capital and firm performance of commercial banks in Malaysia. Asian Economic and Financial Review, 2(4), 577-590.

Kayalı, C. A., Yereli, A. N., & Ada, Ş. (2007). Entelektüel katma değer katsayısı yöntemi kullanılarak entelektüel sermayenin firma değeri üzerindeki etkisinin belirlenmesine yönelik bir araştırma. Yönetim ve Ekonomi Dergisi, 14(1), 67-90.

Kendirli, S., & Konak, F. (2015). Entelektüel Performansı Üzerinde Etkisi: Borsa İstanbul'da İşlem Gören Bilişim Şirketleri Üzerine Bir Uygulama. Sakarya İktisat Dergisi, 4(1), 31-51.

Koc, F., & Avcı, E. (2020). R&D investments and intellectual capital: an application on BIST. Journal of Economics, Finance and Accounting (JEFA), 7(4), 374-391.

Majumder, S. C., Appiah, B. K., & Cardorel, O. C. (2021). Determinants of market to book value and financial performance of Chinese listed firms: implication of MVAIC model. International Journal of Learning and Intellectual Capital, 18(2), 131-153.

Mohammad, H. S., & Bujang, I. (2019). Performance of Malaysian financial firms: An intellectual capital perspective using MVAIC model. Asian Economic and Financial Review, 9(7), 752-765.

Murugesan, S., Vadivel, T., Chinnadurai, K., & Dhamotharan, D. (2018). Intellectual capital: Its effect on financial performance of Indian private sector banks. International journal of advanced scientific research and management, 3(11), 116-123.

Odabaşoğlu, Ş. (2018). The Effect of Intellectual Capital on Financial Performance in the Context of Airline Companies. International Journal of Social Science Research, 7(2), 211-237.

Özer, A., & Özer, N. (2014). Kaynak Temelli Yaklaşım ve Paydaş Yaklaşımı Açısından Entelektüel Sermayenin BIST'deki Çokuluslu İşletmelerin Finansal Performansına Etkisi. BDDK Bankacılık ve Finansal Piyasalar Dergisi, 8(2), 119-149.

Saddam, S. Z., Jaafar, M. N., Ahmad, I., & Abd Rahman, N. H. (2021). The Nexus between Intellectual Capital and Firm's Financial Performance: ACE Market Vantage Point. International Journal of Academic Research in Economics and Management Sciences, 10(3), 1-6.

Sakur, R., & Güngör, B. (2023). Entelektüel Sermaye Firma Finansal Performans İlişkisi: Bıst Sınai Endeksi Firmaları Üzerine Bir Ekonometrik Analiz. Muhasebe Bilim Dünyası Dergisi, 25(1), 70-97.

Sarışın, E., & Özkan, N. (2022). Entelektüel Sermayenin Hayat Dışı Sigorta Şirketlerinin Finansal Performansına Etkisi. Finansal Araştırmalar ve Çalışmalar Dergisi, 14(26),, 209-228.

Shairi, S. A., Mohammad, H. S., & Tuyon, J. (2021). Intellectual capital and firm performance: Evidence from technology sector in Malaysia. International Journal of Academic Research in Economics and Management and Sciences, 10(1), 244-258.

Şahin, O., & Alabay, N. (2011). KOBİ'lerde Entelektüel Sermayenin Firma Performansı Üzerine Etkileri. Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (14), 249-268.

Şamiloğlu, F. (2006). Entelektüel sermaye: İMKB'de hisse senetleri işlem gören bankalar üzerine bir uygulama. Muhasebe ve Finansman Dergisi, (31), 78-89.

Turgut, O. (2016). Borsa İstanbul'da İşlem Gören Bankaların Entelektüel Sermayelerini Etkileyen Faktörler: 1990-2014 Dönemi. Finans Politik ve Ekonomik Yorumlar, (616), 39-48.

Ulum, I. K., & Syam, D. (2017). Modified value-added intellectual coefficient (MVAIC) and traditional financial performance of Indonesian biggest companies. International Journal of Learning and Intellectual Capital, 14(3), 207-219.

Ulum, I., & Jati, A. W. (2016). Intellectual capital performance: A comparative study between financial and non-financial industry of Indonesian biggest companies. International Journal of Economics and Financial Issues, 6(4), 1436-1439.

Yörük, N., & Erdem, N. S. (2008). Entelektüel Sermaye Ve Unsurlarinin, İmkb'de İşlem Gören Otomotiv Sektörü Firmalarinin Finansal Performansi Üzerine Etkisi. Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 22(2), 397-413.