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SUSTAINABILITY AND EFFICIENCY IN UNIVERSITY HOSPITAL STRATEGIC MANAGEMENT: INTELLECTUAL VALUE ADDED COEFFICIENT (VAIC)

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Ozgul Orsal[1], Nurullah Uckun[2]
[1]Eskisehir Osmangazi University, Department of Business Administration, Eskisehir, Turkiye.
oorsal@ogu.edu.tr , ORCID: 0000-0002-1315-7483
[2]Eskisehir Osmangazi University, Business Administration, Eskisehir, Turkiye.
nuckun@ogu.edu.tr , ORCID: 0000-0001-5073-5644

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ABSTRACT

Purpose- Changing economic approaches force the sustainability and efficiency of public health management structures to be provided with existing resources. In this direction, our study is aimed to evaluate the effect of the Intellectual Value Added Coefficient-VAIC of a university hospital, which has important resources in terms of high-level knowledge and skill use, on sustainability and efficiency.
Methodology- The financial reports of the university hospital; It was obtained from the precise and detailed trial balance, balance sheet, and income-expense statement data. Relevant data in the VAIC model were taken and analyzed by comparing them over three years.
Findings- The VAIC effectively increases the university hospital's efficiency and sustainability rates over three years. There was a statistically significant positive correlation between VAIC and ATO in all of the years 2014-2016. While there was no significant relationship between VAIC and ROA in 2014, there was a negative relationship in 2015, and a positive relationship in 2016.
Conclusion- There is an increasing relationship between the efficiency of the added value created by the components that make up the university hospital resources and the productivity. Between the efficiency of the added value and the profitability, as the debts that were taken over from the previous years are closed; while a relationship could not be established in 2014, it was determined that profitability decreased in 2015 and increased profitability in 2016. It has been determined that the VAIC Model can be used and effective in the evaluation of sustainability and efficiency in the strategic management of university hospitals. In addition, these results reveal that university hospitals should use these important powers by developing them. We claim that this new approach will contribute significantly to financial risks in the implementation of strategic management and cost analysis against financial dilemmas in ensuring the financial sustainability of university hospitals in Turkey.

Keywords: Public administration, Intellectual Value Added Coefficient (VAIC), university hospitals, financial sustainability, efficiency.
JEL Codes: H83, D24, M21, Q56

1. INTRODUCTION

The perspective of renewed strategic management is to increase productivity by producing added value by focusing on intellectual resources and talents (Marzo, 2021). Intellectual resources and talents increase the competitiveness of companies by creating momentum for tangible capital with the best knowledge. This is a source-based view theory. Resource-based view theory is a leading paradigm in the field of strategic management. The main focus of this theory is to achieve financial performance, namely sustainability, by providing profit and efficiency with the effective use of strategic resources. Businesses are obliged to measure and manage Intellectual capital (IC) because of its importance. The literature focuses on the definition of intellectual capital, its measurement, reporting in accounting, examining its effect on performance, and ultimately the management of intellectual capital in terms of businesses. (Marzo, 2021). Studies conducted in this direction have found that intellectual capital is related to many factors. Being the most important competitive tool of the enterprise in the institutionalization process (Demir, & Demirel, 2011), reaching 3-4 times the book value of the enterprise, developing the leadership roles of the managers, and contributing to the enterprises, economic and social value, when applied to the needs of the enterprise rather than a static entity, creates added value. It is reported that creating added value (Bontis, 1998; Mooneeapen et al., 2021), ensures sustainable performance (Bontis, 1998; Stewart, 2010), the value created by bringing together financial and non-financial elements, and corporate Efficiency (Mooneeapen et al., 2021) are possible with

intellectual capital. Therefore, for a better understanding of the IC concept, whether at the national, regional, or organizational level, its components need to be defined (Orsal, 2020). Efforts to identify the dimensions of analysis and IC components are attempts to better understand and improve the management process (Bontis, 1998; Orsal, 2020; Orsal, & Uçkun, 2022).

Intellectual capital (IC) is the stock of knowledge held by an organization (Dierickx & Cool, 1989). Intellectual capital; consists of three different elements: structural capital, human capital, and customer capital (Bontis, 1998). Knowledge is linked to economic wealth and value creation (Sánchez, et al., 2009) in organizations (Quinn, 1992) that are considered "repository of minds and coordinators" at the center of intellectual capital (Stewart, 2010). Therefore, for a better understanding of the concept of IC, whether at the national, regional, or organizational level, its components need to be defined (Orsal, 2020). Efforts to identify dimensions of analysis and IC components are attempts to better understand and improve the management process (Low, Samkin, & Li, 2015; Orsal, 2020; Orsal, & Uçkun, 2022). Intellectual capital (IC) is the stock of knowledge held by an organization (Dierickx & Cool, 1989). Intellectual capital consists of three different elements: structural capital, human capital, and customer capital (Bontis, 1998). Knowledge is linked to economic wealth and value creation in organizations (Quinn, 1992) considered "repository of minds and coordinators" at the center of intellectual capital (Stewart, 2010). There is increasing interest in the role of intellectual capital management in both research and practice in higher education, especially given the knowledge-oriented nature of its activities (Sánchez et al., 2009). There is increasing interest in the role of intellectual capital management in both research and practice in higher education, especially given the knowledge-oriented nature of its activities (Sánchez et al., 2009). In the literature, universities focus on Human Capital-HC and Structural Capital-SC, while the capital employed-CE is less focused (Low, Samkin, & Li, 2015; Sangiorgi and Siboni 2017). In particular, the undeniably important contribution of universities to the value creation process is identified with "structural capital-SC" (DiBerardino & Corsi, 2018).

In the University's Structural Capital-SC information related to internal processes (Ramirez, Tejada, & Manzaneque, 2016), databases, intellectual property of faculty in research projects and inventions, (Leitner, et al., 2014) publications (Secundo, et al., 2016), etc. include intangible resources in the organization. Human capital is defined as the explicit and implicit knowledge of both academic and administrative staff (Ramirez, et al., 2016; Orsal, 2020), competence values (Leitner, et al., 2014; Orsal, 2020), and researcher identities (Secundo et al., 2016). Capital employed-CE is defined as the spectrum of value created by universities (Leitner, et al., 2014; Orsal, 2020), cooperation (Secundo et al., 2016), and relationships developed (Ramirez et al., 2016; Orsal, 2020). Management tools are increasingly used in universities to measure, manage and report the value of intangible assets (Bongiovanni, et al., 2020; Orsal, 2020; Orsal, & Uçkun, 2022). The European Universities Observatory recognizes the mandatory disclosure of intellectual capital-related information by universities (Sangiorgi & Siboni, 2017) as a necessary step to promote efficiency, effectiveness, and excellence (Bongiovanni et al., 2020; Orsal, 2020; Orsal, & Uçkun, 2022). The situation is similar in university hospitals, and successful treatment and surgeries by experienced experts in the technological materials used are an indication that that hospital is preferred and reliable. "Efficiency Scorecard" in hospitals is required to measure three inseparable values: business, employee, and patient (Orsal, 2020; Orsal, & Uçkun, 2022). The hospital business offers both jobs, careers, development, etc. to its employees. It creates value when it provides opportunities and provides patient satisfaction. Employees create value when they provide healthcare to patients and ensure patient satisfaction. On the other hand, patients create value when they constantly apply to that hospital business and that healthcare worker. Therefore, health outcomes and costs affect these three values together. When determining the value of an enterprise due to its intellectual capital, two important aspects are very important: the risks that threaten the knowledge and the efforts to continuously improve the knowledge (Orsal, 2020; Orsal, & Mavili, 2020; Orsal, & Uçkun, 2022). Therefore, intellectual capital should be addressed as a managerial priority in measuring and developing risks and development potential (Garlattil, et al., 2014; Orsal, 2020; Orsal, & Uçkun, 2022). In hospitals, it is necessary to measure the intellectual capital elements consisting of human capital, structural capital, and used capital based on business and elements (Orsal, 2020; Orsal, & Mavili, 2020; Orsal, & Uçkun, 2022). The Ministry of Health has evaluated only the Balanced Score Card application, which is one of the element-based measurement techniques in public hospitals, as a productivity scorecard (Public Hospitals Unions Efficiency Evaluation Regulation, 2014). However, university hospitals where the intellectual capital is the most, in a way where knowledge is graded and health personnel in many fields are taught at the university level, could not be included in this scope. On the other hand, as a natural result of university hospitals being service businesses, it is seen that there are many value movements within the business (Uçkun, & Şahin, Orsal, 2020; Orsal, & Uçkun, 2022; Orsal, & Mavili, 2020).

Changing economic approaches force the sustainability and efficiency of public health management structures to be provided with existing resources (Orsal, 2020; Orsal, & Uçkun, 2022). We claim that when this expectation is reflected in the cost of university hospitals with high intellectual capital, their efficiency will increase and their sustainability will be ensured (Orsal, 2020; Orsal, & Uçkun, 2022). In this direction, this study was carried out to evaluate the effect of the university hospital in providing sustainability and efficiency with its Intellectual Value Added Coefficient (VAIC) with this important resource. In the literature summary section of the research, the definition of the concept of intellectual capital and its importance in terms of

businesses are mentioned, then the Intellectual Value Added Coefficient method (VAIC), which is one of the methods and approaches developed to measure intellectual capital, the dimensions of intellectual capital in terms of health services, the difficulties in using intellectual capital in hospitals are included. Resource-based view theory is a leading paradigm in the field of strategic management (Orsal, 2020; Orsal, & Uçkun, 2022). The main focus of this theory is to achieve sustainability by providing profit and efficiency by using strategic resources effectively (Orsal, 2020; Orsal, & Uçkun, 2022). The theoretical structure of our study is based on the source-based view theory.

In this study, "How does the Intellectual Value Added Coefficient (VAIC) of a university hospital, which has important resources in terms of high-level knowledge and skill use, affect sustainability and efficiency? In order to answer the question, first of all, studies in the literature were examined. Later financial reports; The relevant data in the Intellectual Value Added Coefficient (VAIC) model were taken from the final and detailed trial balance, balance sheet, and income-expense statement and compared for three years. As a result, it is stated that the new approach makes a significant contribution to financial risks in the implementation of strategic management and cost analysis against financial dilemmas in ensuring the financial sustainability of university hospitals in Turkey.

2. LITERATURE REVIEW

2.1. Intellectual Capital Concept and Definition

In organizational and managerial terms, the concept of intellectual capital, firstly, is defined by Stewart as "Everything that employees know that will provide a competitive advantage to the enterprise in organizational terms" (Stewart, 2010). He also developed it as "intellectual material that can be put to use to create wealth, that is, a combination of knowledge, information, intellectual property and experience" (Stewart, 2010). OECD, on the other hand, is the economic value of two categories of intangible assets of the enterprise, whose definition includes organizational and human capital. According to Sveiby, who pioneered the development of accounting methods, the first theory of intellectual capital is the "Invisible Balance Sheet". Peter Drucker, who is accepted as the guru of business management, defines intellectual capital as a resource that provides a competitive advantage in the market and adds value to the business (Drucker, 1995; 59-60). Edvinsson, known as the first professional intellectual capital manager, deals with the knowledge that can be converted into value and as a matter of relations (Edvinsson, 1997: 366).

2.1.1. The Importance and Benefits of Measuring Intellectual Capital

Intellectual capital is a critical issue in general. The biggest proof of this is the important role that companies play in increasing their performance (Orsal, 2020). Expressed the reasons why intellectual capital is such a critical issue as follows.

a. Intellectual capital is the wealth that can be noticed and not depreciated in an organization's success. Many of the structural assets may depreciate from the day they are acquired. A manager must make intellectual capital productive and transform it into customer value.

b. It is argued that the developments in the service economy are direct, while the progress observed in the traditional manufacturing industry is indirect. The growth of the service economy gradually increases the importance of intellectual capital.

c. The fact that people with intellectual capital have different preferences about where they will work and want to be in a certain company is an important detail about themselves (volunteer employees). These employees are also more likely to find employment in many companies. This does not mean that employees work unpaid.

d. Most managers underestimate intellectual capital. The negative consequences of this situation; Increasing competition, increasing consumer demands, gradually decreasing management layer, increasing responsibilities, pressures created by different modern management practices, negatively affecting the business life of employees, and not staying in organizations for a long time can be counted both for managers and employees.

e. Another contribution of intellectual capital is that it notices and considers high-level employees for the organization.

f. If there is an increase in value recently when the market values of organizations are compared with their book values, the only significant and only reason is intellectual capital.

The difference between market values and book values is large in companies in the service sector where information is important. It can be eliminated by measuring the intellectual capital to eliminate the antiquities caused by the difference (Orsal, 2020; Orsal, & Uçkun, 2022; Roslender & Fincham, 2001). Although it is not easy to measure intellectual capital precisely at the moment, it is imperative to accurately measure such an important asset. Those that can be measured are controlled and managed (Orsal, 2020; Orsal, & Uçkun, 2022). Reasons for measuring intellectual capital: To show the

managers the value-creating elements of their businesses with a reliable measurement tool, to evaluate the business performance, and to evaluate the financial resources (payment power) of the business (Orsal, 2020; Orsal, & Uçkun, 2022; Orsal, & Mavili 2020).

Why should Intellectual capital be measured (Orsal, 2020)?

It is important to measure with a reliable measurement tool to show managers the value-creating elements of their business, evaluate business performance, and evaluate the financial resources (solvency) of the business (Orsal, 2020).

So, measuring intellectual capital, which variables benefit businesses in terms of efficiency, effectiveness, and performance? (Orsal, 2020).

- Detailed definition of assets and values that are not included in financial reports (financial reports), an inspection of active values by detailed planning and measurement, determination of ways to increase value and make them available for risk management,
- To increase the culture, perception, and performance of the employees of the institution,
- In determining the understanding created by knowledge in mutual relations and prioritizing according to its criticality and urgency,
- Increasing joint activities with the understanding of corporate social networks,
- Recognizing information flow patterns in communication capital and identifying representatives in social networks that create technological change,
- In accelerating learning models,
- In the creation of a shared / sharing-based information culture with information management,
- In increasing innovation (invention),
- Identifying the best and most appropriate evidence-based practices and providing the environment for the dissemination of the most appropriate evidence-based practice,
- We argue that it will provide effective benefits in the creation of a performance-based culture (Orsal, 2020).

2.1.2. Methods of Measuring and Reporting Intellectual Capital

For business managers to better manage intellectual capital, various indicators and measurement methods have been developed to measure this value. Two approaches that are particularly accepted are:

The first is financially measured at the enterprise level. The reason is that credit institutions, investors, suppliers, etc. may want to measure the intellectual capital of the enterprise and evaluate it as a whole (Gravili, et al., 2021). Intellectual capital can be measured on a business basis in three ways; Market Book and Book Value Method, Tobin's Q Ratio Method, and Calculated Intangible Value Method. While the measurement methods of intellectual capital on a firm basis show its possible share in the market value, it cannot explain its effects on value (Bontis, 1998).

The second considers human capital, structural capital, and customer capital separately, focusing on the measurement of its components rather than intellectual capital. The five measurement methods by element are: Intellectual Value Added Coefficient Method (Value Added Intellectual Capital - VAIC), Economic Value Added - EVA, Intellectual Capital Index (IC-Index), Balanced Scorecard, Skandia Guide (Skandia Navigator), and Intangible Assets Monitor.

2.1.3. Value Added Intellectual Capital (VAIC)

Pulic, Intellectual Value Added Coefficient method; management levels of the organization, personnel, investors, shareholders, partners, interest groups, resources, etc. developed to measure the value created by each (Pulic, 2004). According to Pulic, the Intellectual Value Added Coefficient (VAIC) is the method used by the organization to measure its performance in its intellectual - intangible assets and physical - tangible capital - value (Pulic, 2004). In summary, the intellectual capital value of the enterprises is the real value in the accounting records (Pulic, 2004: 63).

Application stages of the VAIC Method: It can be said that the application of this method consists of the following stages.

1. It is the calculation of the added value obtained by the business in a period, in other words, the value created in a period. To calculate the CEE, HCE, and SCE values, the total value added (VA) created by the business must first be calculated. This value is defined as the difference between business outputs and inputs. In short, VA expresses the income generated from all products and services sold by the enterprise, that is, the difference between total sales and all expenditures made by the

enterprise (Public, 2004: 64). Based on Pulic's definition, Firer and Williams state that value-added, in more detail, is equal to the sum of the following business accounts (Bontis, 1998).

Equation1; VA= I + DP + D + T + M + R + WS

VA: Total Added Value Created by the Business, I: Interest expenses, DP: Depreciation Expenses, D: Dividends, T: Corporation Tax, M: Participation Profit, R: Undistributed Profits, WS: Total Salary and Fees Expenses.

2. Calculation of the effectiveness of the added value that arises as a result of physical, financial, and intellectual capital,

3. Finding the effectiveness of human capital and structural capital,

4. Structural capital efficiency; Structural capital is considered the difference between intellectual capital and human capital. The added value created by the structural capital and human capital in production enterprises is small, and the added value of the capital used is large. In knowledge-based businesses, the added value of structural capital and human capital is greater. The enterprise obtains the capital used as book value and the total added value created from the sum of its human and structural value. It deals with human capital based on total salary and wage expenses.

The efficiency coefficient calculations that make up the VAIC of the enterprise are below (Pulic, 2004: 64-65).

Equation2; CEE = VA/CE, Equation3; HCE= VA/HC, Equation4; SCE= SC/VA, SC= VA-HC

VA: Total Added Value Created by the Business, CE: Used Capital in the Business (Book Value of Assets), HC: Human Capital of the Business (Total Salary and Wage Expenses), SC= Structural capital of the business (added value excluding human greenhouse).

5. Intellectual Value Contribution Coefficient (VAIC); is the sum of the results of the four stages of implementation (Pulic, 2004: 65). Equation5; VAIC= CEE + HCE + SCE

With the increase in the intellectual value-added coefficient of the enterprise, the added value created by its total resources also increases in parallel (Pulic, 2004). The effects of business-specific factors and performance criteria should be investigated. Advantage; Since accounting data is standardized, objective, and verifiable since it is audited data, consistent as it can be obtained from all businesses and sectors, and mathematically calculated, comparable analyzes can be made as a fixed criterion. In summary; The Intellectual Capital Value Additive Coefficient is superior to other element-based methods as it is a real performance measurement based on accounting records.

2.2. Dimensions of Intellectual Capital in terms of Health Business

2.2.1. How has intellectual capital research developed in the healthcare business?

While only one article was seen abroad before 2000, 14 articles were published between 2000 and 2005, 48 articles were published in 2006-2010, 91 articles were published in 2011-2015, and 101 articles were published between 2016 and 2019. In this case, the number of intellectual capital research in the health sector has increased over the years. Quantitative methods were used in 43.53% (111 articles) and qualitative methods in 36.47% (93 articles) of the analyzed articles.

2.2.2. What are the main topics discussed in this field literature?

Considering the importance of intellectual capital, especially in knowledge-intensive sectors such as health care, the results of previous studies should be organized conceptually (Orsal, 2020).

In the systematic review of Paoloni et al.; Out of 255 articles, 42 articles; Information Transfer and Sharing & Human Capital, Relational Capital, Structural Capital, 42 articles; Services & Technology & Structural Capital, 28 articles; Performance & Human Capital, 14 articles; Management & Structural Capital, 5 articles; Partnership and Network & Relational Capital variables are examined (Paoloni et al., 2020).

In Tiwari's research, the relationship between the intellectual capital and profitability of 84 healthcare companies in India was analyzed by the Indian Economy Monitoring Center (CMIE). It has been determined that the most relational & capital is used to increase profitability (Tiwari, 2022).

In the systematic review by Gravili et al., 4 articles from 28 European countries were evaluated and the performance of intellectual capital (IC), human capital, relational & employed capital, and structural capital health companies was examined. It has been determined that the positive effect of human, used and structural capital in the performance indicator is the country, the ratio of the number of beds to the population, and its effects are variability (Gravili et al., 2021).

In the study conducted by Sulaiman et al., Health Services Companies Listed in Nigeria were examined. It has been found that there is an inverse relationship between managerial ownership and moderate value-added intellectual capital on financial performance, supporting the consolidation effect (Sulaiman et al., 2021).

In the study of Tafazzoli-Harandi et al. in a health center in Tehran, they found that human capital has a significant effect on intellectual capital (Tafazzoli-Harandi et al., 2020).

In the literature, it is seen that structural capital is mostly discussed and examined in private health enterprises and hospitals that are included in the market index. The results obtained due to the volumes of hospitals, physical equipment, differences in service delivery, number of beds, differences in the fields of specialization and expertise of the employees, and differences in the variables discussed prevent generalizations as in other sectors. In addition, studies on VAIC in university research and practice hospitals with high knowledge and skills are scarce or not found in the literature. And there is a big gap in this regard.

So, what is the situation in our country? How has intellectual capital research developed in the health sector in Turkey?

What are the main topics discussed in the field literature in Turkey?

When the studies in the national thesis center are examined; 2 theses on intellectual capital in the health sector in Turkey in 2009 (Bozdemir, 2009; Gül, 2009), 2 theses in 2014 (Cezlan, 2014; Karaman, 2014), 1 thesis in 2019 (Özgün, 2019), 2020 1 doctorate It is seen that a total of 6 theses, including thesis (Orsal, 2020), have been written. Of the analyzed theses, 2 are master's (Bozdemir, 2009; Gül, 2009), 4 are doctoral (Cezlan, 2014; Karaman, 2014; Özgün, 2019; Orsal, 2020), and 2 theses are quantitative (Karaman, 2014; Orsal , 2020), qualitative (Bozdemir, 2009; Cezlan, 2014; Gül, 2009; Özgün, 2019) method was used in 4 theses. In this case, it is seen that intellectual capital theses in the health sector in Turkey have been made in the last 13 years and their number is very low.

Gül completed her thesis titled “Dimensions of intellectual capital in physical therapy and rehabilitation training and research hospitals” in 2009. In the Institution Information Guides, intellectual capital is discussed in terms of structural capital, and human and relational capital. In the focus of the thesis, ISO 9001:2000 Quality Management System and Ministry of Health Service Quality Standards; structural capital dimension, patient rights, relationship capital dimension, human capital dimension, professional skills, and training of employees. In the results obtained, it is emphasized that human and relational capital are effective on structural capital in quality management.

Bozdemir completed his thesis on the effects of intellectual capital on the organization and examples from practice in 2009. The focus of the thesis is on the performance and competitiveness of businesses and their ability to use their intellectual capital effectively. According to the results of the data analysis, it has been determined that it is the most effective option for intellectual capital management, employee performance, patient satisfaction, and competitive advantages in health enterprises.

Cezlan's thesis named "The effect of intellectual capital on firm innovation and firm performance: An application for health enterprises" was made in 2014. He dealt with intellectual capital in the dimension of knowledge management. In the focus of the thesis, its components are human, organizational, and relationship capital. The effects of these components on innovation and performance in public and private health enterprises were examined. In the results obtained, human, organization, and relationship capital increase its effect on innovation and performance in public and private health enterprises.

Karaman completed his thesis in 2014, titled Intellectual capital, its measurement by value-added coefficient (VAIC) method, and an application in the health sector. The data used for the VAIC method calculations are obtained from the balance sheet, income statement in the accounting records, and the revolving fund accounting offices of the health enterprises traded in the BIST, the Public Disclosure Platform of the Capital Markets Board. It has been determined that the investments made in intellectual capital elements contribute to the profitability of health enterprises to a large extent and cera tain extent to productivity.

Özgün researched the relationship between social capital, intellectual capital, innovation, and performance: Health institutions in 2019. He dealt with intellectual capital in the dimensions of organizational social capital and performance. The focus of the thesis is on innovation studies that increase performance. According to the results obtained, it has been determined that it increases organizational social capital and performance.

2.2.3. Difficulties in Using Intellectual Capital in Hospitals

The quality method is used effectively in university hospitals.

1. The absence of an item called intellectual capital in the accounting system

2. For the university hospitals to be well-known field specificity to them and to be compared, they are not prepared and calculated according to a general set of criteria (the results are not disclosed, such as the companies registered in the ISE in the banking sector), and they are not reported by a system outside the enterprise.
3. According to the benefit-cost analysis, a general calculation is not made for the service provided in university hospitals (not calculating how much money the successful surgeries bring to the hospital and the individual compared to the unsuccessful surgeries on a patient basis) because there are too many types of diseases. Although there are few focused studies based on the unit, they are very insufficient as they remain in expressing the holistic approach (10%).

2.3. Theory and Hypothesis Development

Our work is based on the source-based view theory. The quality of corporate governance practices have tried to identify their role in improving financial performance and minimizing different types of risks that may occur in the future (Orsal, & Uçkun 2022). If institutions have strong public management structures, they explain the Intellectual Value Added Coefficient (VAIC) method. The resource-based view theory is the main driving force behind the Firm's financial growth. This success is based on the firm's tangible or intangible assets that can lead to a competitive advantage. Numerous studies have described the role of tangible assets in job growth, but the strategic role of intangibles needs to be explored. The resource-based view theory is a leading paradigm in the field of strategic management that will become increasingly familiar in all areas of business and economics and is an indicator of competitiveness. The main focus of this theory is to achieve financial performance, namely sustainability, by providing profit and efficiency by using strategic resources effectively. The theoretical structure of our study is based on the source-based view theory. Therefore, based on the resource-based perspective theory, our study will examine the H1, H2, H3, and H4 hypotheses of visible and invisible resources, using the intellectual Value Added coefficient VAIC model (2014-2016) by considering financial data for the three years.

H1. Capital employed (CEE) has a greater impact on intellectual capital than other components.

H2. Structural capital (SCE) has a greater impact on the efficiency (ATO) of the university hospital than other intellectual capital components.

H3. Human capital (HCE) has a greater impact on university hospital profitability (ROA) than other intellectual capital components.

H4. On the intellectual capital (VAIC) of the university hospital, efficiency (ATO) has more impact than profitability (ROA).

3. DATA AND METHODOLOGY

The main problem that the research focuses on is to evaluate the effect of intellectual capital on productivity in universities and specifically university hospitals, where intellectual capital is the highest, with a cost approach. It can make it possible to increase efficiency and maintain the functions of hospitals effectively by using intellectual capital in cost analysis. The Intellectual Value Added Coefficient (VAIC) method, which is compatible with cost analysis in intellectual capital measurements, was used to measure business performance as well as to determine the values of tangible and intangible assets. Researcher; Cost and efficiency criteria / strategic targets/steps to be followed were determined for a three-year application with a team of 14 people (7 managers, 7 experts). The results were analyzed and cost and efficiency were evaluated. Hospital senior manager (n=1) and assistant manager (n=3). Hospital chief manager (n=1), financial services manager (n=1), assistant finance manager (n=1), experts determined by senior managers (n=7).

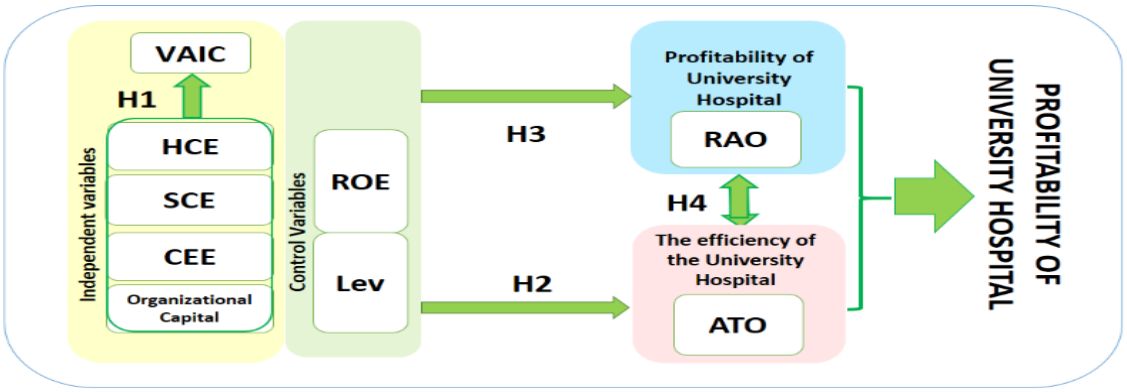
This cross-sectional study was obtained from 83 data in the Final Financial Statements (General budget n = 38, Revolving fund n = 45) for the years 2014-2015-2016. Together with the expert team (n = 14), 32 data meeting the intellectual capital variables were selected and used in the analysis. With 32 data, 0.15 effect size, and 0.05 alpha in G-Power analysis, the effective power of our study is 96%.

Limitation of the Research; It is limited to only one university hospital.

Original Value: Today, healthcare services are structured into a competitive market with the build-operate-transfer philosophy. The closure of state hospitals by opening city hospitals with health policies is a concrete indication that competitive markets will be operated in non-profit public hospitals very shortly. This indicator obliges hospitals to get the best efficiency and service output with their resources. This obligation will especially contribute to university hospital managers, who provide health services with the highest level of knowledge, in using intellectual capital effectively.

The main problem that the research focuses on will make an original contribution, as it will focus on a new approach in management and cost analysis applications by evaluating the effect of intellectual capital on the efficiency of public health institutions with a cost approach. Intellectual capital is not used in current cost calculations. This comparison will be made for the first time in health institutions. In this respect, it is thought that it will make an important contribution to the literature.

Figure 1: Research Model



3.1. Research Model

Within the framework of the theoretical studies in the literature section, the data set that will constitute the intellectual capital values of the university hospital, which is one of the semi-autonomous public enterprises, has been determined. In our model consisting of VAIC parameters, HCE, SCE and CEE constituted our independent, Lev and ROE control, and RAO and ATO dependent variables. In Table 2, the revolving fund and added budget (general budget) capital calculations of the university hospital are formulated according to the VAIC parameters. Then, with the VAIC method, which is an economic analysis method, the effect of intellectual capital values on productivity covering the years 2013-2014-2015 was examined.

3.2. Data Set and Variables

Within the framework of the theoretical studies in the literature section, the revolving fund and the added budget (general budget) capital accounts of the university hospital, which are semi-autonomous public enterprises, were handled separately, and the data set that would form the intellectual capital values was determined from the sum of the two. Determination of input and output from the balance sheet, if the income – expense difference is positive (participation gains from the other income part of the income statement; (operation incomes, for example, canteen, in-kind and solid incomes donations) are taken. Interest expenses, Depreciation expenses, Corporate Tax, Participation Earnings, Undistributed profits, Total salary and wage expenses, The capital used of the enterprise (book values of the assets), the total salary and wage expenses of the enterprise, Dividends, The independent variables to be used in the cost analysis of the structural capital of the enterprise. The independent variables obtained from the balance sheet are the HCE, SCE, and CEE parameters in our model, form ed the independent variables.

4. FINDINGS AND DISCUSSIONS

The efficiency (ATO) and profitability (ROA) of the university hospital were evaluated (2014-2015-2016) according to the VAIC parameters. There is an increasing relationship between the effectiveness of the added value created by the components that make up the university hospital resources and efficiency and sustainability. It was determined that negative accounts and debts that could not be closed until 2014 were reduced by the efficient use of resources. It is seen that the steady productivity and sustainability approaches made in 2014 continued in 2015, and the increase in human capital, especially by the state, started to rise again in 2016. In other words, when investing in people using structural capital, both Human Capital and Structural capital are contributed. When the average values are examined, they will be able to increase their productivity, especially when they use their intellectual capital better in the university hospital. The intellectual capital efficiency coefficient (ICE) has grown steadily over three years. When the average values of the dependent variables are examined, it is seen that the profitability (ROA), which shows the earning power of assets, has increased regularly over the years. ROA shows how efficiently assets (in terms of normal assets on the balance sheet) are used to generate income or profits. That is, “the higher the ratio, the more efficient the use of assets” is interpreted as, therefore, more efficiency is achieved by using fewer assets to generate higher profits through more sales. When this situation is evaluated according to the active turnover rate (ATO), it is proportional to the number of patients who applied to the health institution in the years 2014-2015-2016. It has been found that the efficiency increases simultaneously with the number of patients admitted to the university hospital, especially with the active turnover rate (ATO).

The relations of all the variables with each other according to the years 2014-2016 were evaluated by correlation analysis. The correlation distribution of dependent/independent and control variables according to the Intellectual capital models of the university hospital in 2014 is given in Table 1. There is a statistically significant positive correlation between VAIC and SCE

(r=.486), ATO (r=.254), and ROE (r=.237) (p<0.01). (Table 1). Between CEE and HCE (r=.631), ATO (r=.361), Lev (r=.420) and ROE (r=.446), positive directional, between SCE (r=-.224) negative directional, statistical there is a significant relationship (p<0.01). There was a positive directional between HCE and ATO (r=.551), Lev (r=.542), and ROE (r=.515), negative directional, statistically significant relationship between SCE (r=-.549) and ATO (r=.348).

The increase in the leverage ratio affects the asset turnover rates of the enterprises positively and the decrease negatively. The increase or decrease in the investments made in Human capital (HCE) in the university hospital, will affect the Structural capital at the same rate. Human capital investments increase knowledge, skill development, and business performance. In particular, it ensures the effective use of R&D investments and the technological structure of the enterprise. This will contribute to the increase of the service performance, that is, the efficiency of the health enterprise.

Table 1: The Efficiency (ATO), and Profitability (ROA) of the University Hospital in 2014 according to the VAIC Parameters

		VAIC	CEE	HCE	SCE	ATO	ROA	Lev	ROE
VAIC	r	1,000							
	p	.							
CEE	r	-,033	1,000						
	p	,725	.						
HCE	r	,052	**,631****	1,000					
	p	,578	**,000**	.					
SCE	r	**,486****	**-,224***	**-,549****	1,000				
	p	**,000**	**,016**	**,000**	.				
ATO	r	**,254****	**,361****	**,551****	**-,193***	1,000			
	p	**,006**	**,000**	**,000**	**,038**	.			
ROA	r	-,004	-,141	**-,348****	,150	**-,880****	1,000		
	p	,966	,131	**,000**	,109	**,000**	.		
Lev	r	**,186***	**,420****	**,542****	-,168	**,779****	**-,550****	1,000	
	p	**,045**	**,000**	**,000**	,072	**,000**	**,000**	.	
ROE	r	**,237***	**,446****	**,515****	-,075	**,780****	**-,548****	**,984****	1,000
	p	**,011**	**,000**	**,000**	,423	**,000**	**,000**	**,000**	.

The correlation distribution of dependent / independent and control variables according to the Intellectual capital coefficient of the university hospital in 2015 is given in table 2. Between VAIC and SCE (r= ,435), ATO (r=,485), Lev (r=,448) and ROE (r=.485), positive directional, between ROA (r=-,485) negative directional, statistical there is a significant relationship (p<0.01). This means that human capital and structural capital efficiency significantly affect productivity. Between CEE and HCE (r=.910), SCE (r=.415), ATO (r=.586), Lev (r=.557) and ROE (r=.586), positive directional, between ROA (r=-.586) negative directional, statistical there is a significant relationship (p<0.01). There was a positive directional between HCE and ATO (r=.653), Lev (r=.674), and ROE (r=.653), negative directional, statistically significant relationship between ROA (r=-.653) (p<0,01), (Table 2). This means that the efficiency of structural capital and human capital significantly affects productivity. There is a statistically significant positive correlation between ATO and Lev (r=.993), ROE (r=.780) (p<0.001). It can be said that equity efficiency significantly affects profitability. There is a statistically significant negative correlation between ATO and ROA (r=-.880) (p<0.001), (Table 2).

Table 2: The Efficiency (ATO), and Profitability (ROA) of the University Hospital in 2015 according to the VAIC Parameters

		VAIC	CEE	HCE	SCE	ATO	ROA	Lev	ROE
VAIC	r	1,000							
	p	.							
CEE	r	-,274	1,000						
	p	,106	.						
HCE	r	,229	**,910****	1,000					
	p	,179	**,000**	.					
SCE	r	**,435****	**,415***	,088	1,000				
	p	**,008**	**,012**	,611	.				
ATO	r	**,485****	**,586****	**,653****	-,189	1,000			
	p	**,003**	**,000**	**,000**	,271	.			
ROA	r	**-,485****	**-,586****	**-,653****	,189	**-,880****	1,000		
	p	**,003**	**,000**	**,000**	,271	**,000**	.		
Lev	r	**,448****	**,557****	**,674****	-,276	**,993****	**-,993****	1,000	
	p	**,006**	**,000**	**,000**	,103	**,000**	**,000**	.	

ROE	r	**,485***	**,586****	**,653****	-,189	**,780****	**-,995****	**,995****	1,000
	p	**,003**	**,000**	**,000**	,271	**,000**	**,000**	**,000**	.
r=Spearman's Coefficient	p=statistical significance								

The correlation distribution of dependent/independent and control variables according to the Intellectual capital models of the university hospital in 2016 is given in Table 3. There is a statistically significant positive correlation between VAIC and HCE (r=.651), ROA (r=.800), ATO (r=.802), Lev (r=.772) and ROE (r=.809) (p<0.01), (Table 3).

There is a statistically significant positive correlation between CEE and HCE (r=.543), ROA (r=.658), ATO (r=.660), Lev (r=.616) and ROE (r=684) (p<0.01). There is a statistically significant positive correlation between HCE and ROA (r=.800), ATO (r=.803), Lev (r=.809) and ROE (r=.772) (p<0.01), (Table 3). There is a statistically significant positive correlation between ROA and ATO (.980), Lev (r=.998), and ROE (r=990) (p<0.001), (Table 3). This situation increases the productivity of structural capital and equity capital while increasing the profitability of enterprises together. In other words, it significantly affects productivity and profitability. There is a statistically significant positive correlation between ATO and Lev (r=.995) and ROE (r=999) (p<0.001). There is a statistically significant positive correlation between control variables Lev and ROE (r=.954) (p<0.001), (Table 3).

Table 3: The Efficiency (ATO), and Profitability (ROA) of the University Hospital in 2016 according to the VAIC Parameters

		VAIC	**CEE**	**HCE**	**SCE**	**ROA**	**ATO**	**Lev**	**ROE**
VAIC	r	1,000							
	p	.							
CEE	r	,138	1,000						
	p	,414	.						
HCE	r	**,651****	**,543****	1,000					
	p	**,000**	**,001**	.					
SCE	r	,130	-,273	,010	1,000				
	p	,442	,102	,952	.				
ROA	r	**,800****	**,658****	**,800****	-,271	1,000			
	p	**,000**	**,000**	**,000**	,105	.			
ATO	r	**,802****	**,660****	**,803****	-,271	**,980****	1,000		
	p	**,000**	**,000**	**,000**	,105	**,000**	.		
Lev	r	**,772****	**,616****	**,809****	**-,374****	**,998****	**,995****	1,000	
	p	**,000**	**,000**	**,000**	**,023**	**,000**	**,000**	.	
ROE	r	**,809****	**,684****	**,772****	,161	**,990****	**,999****	**,954****	1,000
	p	**,000**	**,000**	**,000**	,340	**,000**	**,000**	**,000**	.
r=Spearman's Coefficient	p=statistical significance								

In Tables 1, 2, and 3, the relationship between the efficiency (ATO) and profitability (ROA) of the university hospital for three years and the independent and control variables according to the VAIC parameters were examined. In the literature, some researchers have found that IC has a mediating role in the process (Wu and Hu, 2012) and human resource management (Yang and Lin, 2009; Tiwari, 2022) on performance. The impact of IC on performance (Peng, Pike, & Roos, 2007), sustainability of hospitals (Tiwari, 2022; Hamzah, et al., 2018), and financial structure is not understood (Pirozzi & Ferulano, 2016). They defined the concept of efficiency applied to the public sector and efficiency from a managerial point of view (Linna, et al., 2010; Orsal, & Uçkun, 2022). Intellectual capital emerges as an important element that helps managers plan their ventures to be supported by structural, used, and social capital (Tiwari, 2022; Mura, et al., 2014). It reveals that intellectual capital is an important driver of corporate performance and that healthcare companies in emerging economies should develop their intellectual potential. Therefore, companies and governments in emerging economies should encourage investments in intellectual capital development for improved corporate performance and economic growth (Tiwari, 2022; Sulaiman, et al., 2022; Orsal, & Uçkun, 2022). It has been found that when effective intellectual capital is adopted in corporate governance, it maintains a high level of firm performance, minimizes financial distress, and protects companies from the risk of financial distress (Tiwari, 2022; Nawaz, 2017; Luqman et al., 2018). The key findings of these studies support the role of IC as a strategic asset in minimizing the firm's competitiveness, firm value, asset management capabilities, and thus the risk of financial distress. It can be used as a reference by policymakers when drafting future policy for the development of intellectual capital and, in particular, the health sector. The resource-based view theory shows organizational performance, namely sustainability, by increasing profit and productivity with the effective use of visible and invisible resources with the models that corporate governance applies within the institution.

5. CONCLUSION AND IMPLICATIONS

According to the analysis results: There is a statistically significant positive correlation between the VAIC of the university hospital and the ATO in all the years 2014-2016. According to the results of the analysis, there is an increasing relationship

between the efficiency of the added value created by the components that make up the university hospital resources and the productivity. As for the university hospital's VAIC and ROA, while there was no significant relationship in 2014, there was a statistically significant relationship in the negative direction in 2015 and the positive direction in 2016. According to the results of the analysis, it is seen that there is no relationship between the efficiency of added value and profitability, since the debts carried over from previous years were closed in 2014, it decreased the profitability in 2015, but increased the profitability in 2016**.** It is observed that the variables that affect profitability the most are structural capital efficiency, equity efficiency, and human capital efficiency. The capital efficiency leverage ratio affects profitability in all years in parallel. These results show that there is a relationship between intellectual capital and profitability. Structural capital efficiency also strongly affects profitability in university hospitals. When the analysis results are evaluated in terms of efficiency; there are statistically significant relationships between independent variables and asset turnover rate. This means that investments in intellectual capital elements, especially human capital, affect productivity. The fact that there is a correlation between ICE and increased human capital productivity (HCE) in the same period can be interpreted as an indicator of high trust in people. Based on the findings of the analysis, it will make a unique contribution as it will focus on a new approach in the management and cost analysis applications where intellectual capital is effective in the efficiency evaluations of university hospitals. The VAIC Model is effective and can be used by university administrations in evaluating efficiency and sustainability. Since university hospitals in Turkey are semi-autonomous public hospitals, inefficiency assessments cannot be taken into account due to the high uncertainty in public hospitals. However, when we focus on this new approach in management and cost analysis applications, we think that it will make a significant contribution to university hospitals against financial risks.

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