FINANCIAL PERFORMANCE ANALYSIS OF A MINISTRY OF HEALTH HOSPITAL IN THE AEGEAN REGION BEFORE AND AFTER AFFILIATION [1]

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ABSTRACT

Effective management of both financial and operational performance is crucial for achieving high performance in health institutions. Effective performance management can lead to improved service delivery, patient recovery, and overall performance improvement. This study aims to assess the financial performance of a Ministry of Health hospital located in the Aegean region that was affiliated with a university hospital at the end of 2011. The study also aims to compare the financial performance data with the operational performance data of the hospital. The Ratio analysis method, which is widely accepted for measuring the financial performance of hospitals, is utilized in this study. Twelve ratio analysis methods used to measure financial performance were examined, and the financial performance of the hospital before and after the affiliation was compared and evaluated. Spearman correlation analysis was performed between the financial performance data and operational performance data of the hospital during the six-year operating period between 2009-2014. In conclusion, the healthcare institution faced challenges in meeting its short-term debt obligations and experienced cash shortages. The use of liabilities and debt was reduced after the affiliation, and the institution became profitable with successful management and health service delivery. Results from Spearman correlation analysis showed a positive correlation between the number of outpatients and return on equity and return on total assets. Similarly, the number of emergency admissions, surgeries, non-physician healthcare personnel, and childbirths were positively correlated with net profit margin, return on total assets, and return on equity. The number of radiological examinations and laboratory tests had significant correlations with the inventory turnover ratio.

***Keywords:** Affiliation, ratio analysis, financial performance*

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EGE BÖLGESİNDE BİR SAĞLIK BAKANLIĞI HASTANESİNİN AFİLİASYON ÖNCESİ VE SONRASI FİNANSAL PERFORMANS ANALİZİ [1]

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ÖZ

Sağlık kurumlarının yüksek düzeyde bir performans göstermesi genellikle finansal ve operasyonel performansların yönetimine bağlıdır. İyi performans yönetimi sonucu iyi hizmet sunumu, iyileşmiş hasta ve performans geliştirme oluşacaktır. Çalışmanın amacı, Ege bölgesinde faaliyet gösteren ve 2011 yılı sonunda, bir üniversite hastanesi ile afiliye olan bir Sağlık Bakanlığı hastanesinin afiliasyondan önceki ve sonraki dönemde finansal performansının değerlendirilmesi ve hesaplanan finansal performans verileri ile hastanenin operasyonel performans verilerinin karşılaştırılmasıdır. Çalışmada, hastanelerin finansal performans ölçümünde kullanılması genel kabul görmüş Rasyo analiz yöntemi ele alınmıştır. Finansal performans ölçülürken kullanılan, 12 rasyo analizi yöntemi incelenmiş, hastanenin, afiliye olmadan önceki ve afiliye olduktan sonraki, finansal performans durumu karşılaştırılarak değerlendirilmiştir. Hastanenin, 2009-2014 yılları arasındaki altı yıllık faaliyet dönemleri arasındaki finansal performans verileri ile operasyonel performans verileri arasında Spearman korelasyon analizi yapılmıştır. Sonuç olarak, kurumun genel olarak kısa vadeli borçlarını ödemede zorluk yaşadığı ve nakit sıkıntısı yaşadığı gözlemlenmiştir. Kurum afiliasyon öncesinde daha fazla yabancı kaynak kullanırken afiliasyondan sonra kurumda yabancı kaynak kullanımı azalmış, borç düzeyi düşmüştür. Kurum afiliasyon öncesinde zararla çalışırken afiliasyon sonrasında kâra geçmiştir, yönetimde ve sağlık hizmetinin üretilip dağıtılmasında başarı elde edilmiştir. Diğer taraftan, finansal performans verileri ile operasyonel performans verileri arasında yapılan Spearman korelasyon analizi sonuçlarına göre, poliklinik hasta sayısı açısından bu sayı ile öz sermaye getiri oranı ve toplam aktiflerin getiri oranı arasında anlamlı ve pozitif bir ilişki bulunmuştur. Acil müracaat sayısı, ameliyat sayısı, hekim dışı sağlık personeli sayısı ve doğum sayısı açısından, bu sayılarla, net kâr marjı, toplam aktiflerin getiri oranı ve öz sermaye getiri oranı arasında anlamlı ve pozitif bir ilişki, ayrıca, radyolojik tetkik sayısı ve laboratuvar tetkik sayısı açısından bu sayılar ile stok devir hızı arasında anlamlı ilişkiler bulunmaktadır.

Anahtar Kelimeler: *Afiliasyon, rasyo (oran) analizi, finansal performans*

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I. INTRODUCTION

Health and healthcare investments play a crucial role in improving the quality of life and extending the lifespan of individuals within society (Hall & Jones, 2007). Investing in healthcare is not only a desirable option but is also a necessary priority for most societies (Frenk, 2015). Generally, health investments are realized through health service institutions, which have diverse functions that determine their structural characteristics and service boundaries. Apart from their primary role as therapeutic units, health institutions serve as research facilities, educational institutions, and major employers in the community (Sultz & Young, 2014). Health institutions, such as hospitals, provide services at three distinct levels known as primary, secondary, and tertiary healthcare facilities (Mulligan & Fox-Rushby, 2003).

Primary health institutions: They are the initial point of contact for individuals seeking healthcare services. These institutions typically do not specialize in any particular medical field and offer both preventive and therapeutic healthcare services. Examples of primary health institutions include Family Health Centers (Čučković et al., 2021; Doshi et al., 2021).

Secondary health institutions: They provide a higher level of expertise than primary care facilities for patients who require more advanced treatment. Typically, these hospitals have between 200-800 beds and offer services that cannot be provided by primary care institutions. Examples of secondary health institutions include state hospitals that are not affiliated with a university, private branch hospitals, and social security institution (SSI) hospitals (Mulligan & Fox-Rushby, 2003; World Health Organization [WHO], 2022).

Tertiary health institutions: These hospitals are characterized by their advanced level of specialization and technical resources. These health institutions have a range of 300 to 1500 hospital beds and offer specialized clinical services, such as intensive care units and specialized imaging facilities, in addition to providing training services. These hospitals employ highly specialized personnel and utilize advanced technical equipment. Examples of such hospitals include maternity hospitals, children's hospitals, chest diseases hospitals, bone diseases hospitals, oncology hospitals, physical therapy and rehabilitation centers, and psychiatric hospitals (Mulligan & Fox-Rushby, 2003; WHO, 2022).

The health service process and hospitals can be analyzed from various viewpoints, including biological, ethical, political, and economic perspectives. Nonetheless, the economic perspective holds a distinct significance among these approaches as it influences the incentives and actions of both healthcare providers and patients (Fuchs, 2015). The healthcare industry mostly consists of national, regional, and local economies. Differences and sometimes contradictions in medical technology, national policy changes, and local market factors can cause pressure and lack of support for health institutions, their staff, and resource providers (Bernstein, 2009).

A high level of performance of a health institution traditionally depends on the management of financial and operational performances. A more appropriate way to manage performance is by taking into account the basic principles of performance management, that is, by linking the data generated by operational and financial performance indicators to the service providers and users. This will result in good service delivery, good patient outcomes, and improved performance (Walburg et al., 2006). Therefore, management and financial management in health institutions have a great role and importance in this regard. Financial resources play a decisive role in the continuity of the functional operations of hospitals and the continuation of service provision. The expectation that gathers investors, partners, and the state on a common denominator is to reach the desired profit level by using the financial resources of the health institution efficiently and effectively (Gider, 2004).

According to Cleverley and Harley (1992), profitability should be the main performance criterion. Cleverley argues that today's health institutions can no longer survive and continue to exist without

making a profit. According to Cleverley's (1990) research, hospitals that prioritize acquiring items at the lowest possible cost, maintain low levels of investment in fixed assets and receivables, use debt moderately, allocate resources for institutional renewal, and have a high market share operate at a higher level in the market. Cleverley also emphasized that financial performance is a critical factor for hospitals to remain viable (Cleverley, 1990).

This study discusses an affiliated organizational structure formed by a university hospital and a state hospital, which contributes to the healthcare service process by incorporating education, research, and treatment services of the four functions of health institutions such as treatment services, education services, preventive and developmental health services, and research services. The impact of this organizational structure on the economic structure of the institution was calculated using financial efficiency measurement ratios. In addition, the ratios before and after the affiliation process were compared and interpreted.

II. CONCEPTUAL FRAMEWORK

2.1. Affiliation

Shortell et al. (1996) define affiliated healthcare as a collaborative approach that prioritizes meeting the healthcare needs of the community. This approach involves adjusting service capacity in response to community needs, coordinating and integrating healthcare, establishing information systems that connect health service providers with users and payers, and providing stakeholders with information about cost, outcomes, consumer satisfaction, and quality. Affiliated healthcare also utilizes financial incentives and organizational structures to facilitate collaboration between physicians, management, and other service providers, as well as to improve the quality of health services and overcome difficulties. According to the report published by WHO in 2008, affiliation is defined as the organization and management of health services for individuals to receive the health service they need at the time they need it, to achieve the desired outcomes, and to receive the health service at the most affordable price with maximum benefit (WHO, 2008).

In Turkey, affiliation is legalized by Amendments 1 and 9 of the Health Services Basic Law dated 07.05.1987 and numbered 3359. These articles were subjected to various amendments and the "Regulation on the Procedures and Principles of Joint Use and Collaboration between Health Institutions under the Ministry of Health and Related Units of Universities" numbered 27850 was published in the Official Gazette dated 18.02.2011. This regulation is implemented with the article *"In provinces with a total provincial population of up to 850,000 according to the results of the address-based population registration system, training, and research services may be provided by only one of the Ministry's training and research hospitals or university health practice and research centers, and in these provinces, the Ministry and the university shall enter into joint use and cooperation for medical undergraduate education and/or medical specialty education"* (T.R. Ministry of Health, 2011).

2.2. Performance

If there is a need for quality improvement, cost control, and improved patient-physician relationships in the competitive environment, in which the healthcare institution operates, then health institutions must implement, a well-defined quality measurement to inform the market it serves. Achieving the desired level of managerial healthcare and managerial competition depends on performance indicators that provide valuable information (Davies & Lampel, 1998). The performance criterion for the patient is the quality of the service provided in the health institution, the performance criterion for the physician providing the service is the achievement of the targeted clinical outcomes, the performance criterion for the hospital is financial capacity, and the performance criterion for the payers is low cost. Performance indicators are used due to two basic principles. One is external accountability and the other is internal quality improvement (Li & Benton, 1996). One of them is the operational performance of the health institution, and the other is the financial performance of the institution. In hospital organizations,

indicators such as the number of hospital beds, occupancy rate and number of outpatients, the number of inpatients, the number of personnel, the number of service delivery types, the number of laboratory tests, and the number of radiological examinations are also considered operational performance indicators. In addition to quantitative indicators, some indicators are considered operational performance indicators in hospitals. These include the presence of highly skilled physicians, good patient-physician relationships, access time to services, waiting times, prices of services, quality of medical care, perceived quality of healthcare, number of insurance companies with which agreements are made, the scope of policies with insurance companies, projected hospital admission rate, cost per capita per month, and number of outpatient examinations (Gider, 2011; Nerenz & Neil, 2001). The operational indicators of hospitals have a direct impact on their financial performance. Effective management of a hospital's financial performance enhances efficiency, prolongs the hospital's operational lifespan, and ensures the continuous provision of healthcare services (Dubas-Jakóbczyk et al., 2020). Financial performance plays a crucial role in the sustainability of both private and public hospitals. Furthermore, improved financial performance enhances the quality of care and enables access to innovations, facilities, and opportunities (Aksoylu & Çavmak, 2023). Key components of financial performance include operating profit, operating expenses, total margin, operating margin, asset turnover ratio, and various other indicators (Nerenz & Neil, 2001). The strategic points that hospitals should consider to increase their financial performance can be listed as increasing their market share, and system affiliation (for example, when a hospital has a certain number of beds, it can functionally merge with another hospital to increase its bed capacity and thus its market share), as well as avoiding overcharging, controlling costs, avoiding excessive borrowing, increasing profit share, and income diversification (Cleverly, 1990).

2.3. Financial Analysis

The financial performance of health institutions is assessed using financial analysis methods. Conducting a comprehensive financial analysis of hospitals provides authorities with valuable information regarding their financial status, facilitates resource allocation decisions, and enables them to identify potential opportunities. The financial analysis serves as a robust tool for ensuring the long-term sustainability of organizations. Therefore, it is a widely favored analytical approach to obtain critical insights into the financial aspects of an organization (Aksoylu & Çavmak, 2023). The financial analysis employs several key tools that offer convenience to finance managers. These tools include Ratio Analysis, Comparative Analysis, Trend Percentages Analysis, Profit Transition Analysis, Operating Leverage, Financial Leverage, Fund Flow Analysis (Fund Sources and Uses), Distributable Fund Analysis, and Cash Flow Analysis Generated as a Result of Operations (Akgüç, 1998). According to Cleverley (1993), financial ratio analysis methods are considered appropriate for evaluating the financial status of health institutions. These analyses are widely accepted and utilized in the literature for assessing the financial performance of hospitals and other healthcare organizations. The study focuses on the ratio analysis method, which is one of the most commonly employed tools in financial analysis. While there are various academic studies on financial performance analysis of public and private hospitals in the healthcare industry, there is no universally accepted set of standard ratios. Consequently, the 12 financial ratios proposed by Cleverley (1993) are regarded as the standard ratios commonly used in financial ratio analysis.

2.3.1. Ratio Analysis

In the ratio analysis technique, the relationship between the financial statement items is calculated by taking the ratio of the figures. In other words, in this method called "Ratio Analysis", the financial structure, liquidity strength, profitability, and the ability to use assets effectively are measured by establishing mathematical relationships between accounts or account groups (Akdoğan & Tenker, 2007).

Cleverley mentioned that 34 ratios are useful for the financial analysis of health institutions due to their characteristics. Under the structure of the study, Cleverley's 12 financial ratios presented under four categories were used. These financial ratios are as follows: Liquidity ratios are listed as financial

structure ratios, Activity (efficiency) ratios, and Profitability ratios (Cleverley, 1993; Cleverley et al., 2011).

2.3.1.1 Liquidity Ratios

In the study, the current ratio, acid test ratio, and cash ratio are considered liquidity ratios.

Current Ratio: It is the ratio that shows that the current assets of the health institution are at a level to pay its short-term debts under normal conditions. It shows the solvency of the institution. For hospital institutions, a ratio of 2 in developed countries and 1.5 in developing countries is considered positive. This ratio is calculated by dividing current assets by short-term liabilities (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Current\ Ratio = \frac{Current\ Assets}{Short\ term\ Liabilities}$$

Acid Test Ratio: This is another ratio used in liquidity analysis. This ratio determines whether the institution can pay short-term debts by using other current assets, especially in cases where inventories cannot be converted into cash. An acid test ratio of 1 in developed countries and a value between 0.65-0.80 in developing countries is considered positive (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Acid\ Test\ Ratio = \frac{(Current\ Assets - Inventories)}{Short\ term\ Liabilities}$$

Cash Ratio: It is used to determine whether the health institution can pay its short-term debts with its cash and cash equivalents such as bank and free securities. This ratio is expected not to fall below 0.20 (Cleverley, 1993; Cleverley et al., 2011).

$$Cash\ Ratio = \frac{Liquid\ Assets}{Short\ term\ Liabilities}$$

2.3.1.2 Financial Structure Ratios

These ratios reveal the extent to which liabilities are used in the financing of the institution (Cleverley, 1993; Cleverley et al., 2011). Among the financial structure ratios, equity to total assets ratio, leverage ratio, and debt/equity ratio were considered in the study.

Equity to Total Assets Ratio: This ratio shows how much of the health institution's assets are financed by equity. An equity to total assets ratio of 0.50 (50%) is considered positive and is calculated as follows (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Equity\ to\ Total\ assets\ Ratio = \frac{Equity}{Total\ Assets}$$

Leverage Ratio: It is the ratio that shows how much of the health institution consists of debt and how much equity is. It is considered positive when this ratio does not exceed 0.50 (Cleverley, 1993; Cleverley et al., 2011).

$$Leverage\ Ratio = \frac{Short\ term\ Liabilities + Long\ term\ Liabilities}{Total\ Assets}$$

Debt to Equity Ratio: This ratio shows the relationship between the liabilities provided by the health institution through borrowing and equity capital. In developed countries, this ratio should be at most 1:1

(100%). A ratio between 1.50 (150%) and 2 (200%) can be considered sufficient for Turkey (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Depts/Equity\ Ratio = \frac{Depts(Short\ term\ Liabilities + Long\ term\ Liabilities)}{Equity}$$

2.3.1.3. Activity (Efficiency) Ratios

These ratios show how effectively and efficiently health institutions use their assets in the service-rendering process (Cleverley, 1993). Among the operating ratios in the study, inventory turnover ratio, asset turnover ratio, and average collection period of receivables were taken into account.

Inventory Turnover Ratio: It is the ratio that shows how fast stocks are sold in an institution. For health institutions, it is a ratio that shows how long it takes to replenish stocks. Although there is no standard ratio for inventory turnover, it is acceptable for this ratio to be 50 in the hospital industry. It is calculated as follows (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Turnover\ Ratio = \frac{Cost\ of\ Sales}{Inventory\ Average}$$

Asset Turnover Ratio: It is used to evaluate the efficiency and effectiveness of the assets owned by the institution. This ratio was taken as 1.75 in a study conducted in the US. The asset turnover ratio is calculated by dividing net sales by total assets (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Asset\ Turnover\ Ratio = \frac{Net\ Sales}{Total\ Assets}$$

Average Collection Period of Receivables: In US hospitals, this period is 57 days, and is calculated as follows (Cleverley, 1993).

$$Average\ Collection\ Period\ of\ Receivables = \frac{Trade\ Receivables}{(Gross\ Sales)/360}$$

2.3.1.4. Profitability Ratios

These ratios are used to measure the success achieved as a result of operations. These ratios help to seek an answer to the following questions: Is the profit obtained as a result of the services provided by the institution satisfactory? Is it at a sufficient level? (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011). In this study, net profit margin, return on total assets, and return on equity ratios are considered profitability ratios.

Net Profit Margin: It is the ratio that gives the profitability percentage of net sales. A high ratio is considered positive. In US hospitals, this ratio is around 0.027 and is calculated by dividing net profit by net sales (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Net\ Profit\ Margin = \frac{Net\ Profit}{Net\ Sales}$$

Rate of Return on Total Assets: This ratio determines the profitability of the investment made by the institution, that is, how efficiently the current and fixed assets of the health institution are used in providing health services. In US hospitals, this ratio is around 0.038 and is calculated by dividing net profit by total assets (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Rate\ of\ Return\ on\ Total\ Assets = \frac{Net\ Profit}{Total\ Assets}$$

Return on Equity Ratio: This ratio is used to assess how much capital is invested, and how much profit is generated in return. This ratio is around 0.074 in US hospitals. This ratio is formulated as follows (Akgüç, 1998; Cleverley, 1993; Cleverley et al., 2011).

$$Return\ on\ Equity\ Ratio = \frac{Net\ Profit}{Equity}$$

III. MATERIALS AND METHOD

3.1. Aim

This study aims to assess the financial performance of a Ministry of Health hospital in the Aegean region before and after its affiliation with a university hospital at the end of 2011. Additionally, this study aims to compare the financial performance data with the operational performance data of the hospital. The primary focus of the study is to examine the impacts of organizational structural changes, such as affiliation, on hospitals with a matrix management structure.

3.2. Methodological Model

In this study, financial data from the revolving fund balance sheet and income statements of an affiliated Ministry of Health hospital with a full integration model in the Aegean region for the past six activity periods between 2009 and 2014 were used to determine the level of success of the integration of a Ministry of Health hospital and a university hospital, which use common resources to increase the effectiveness and efficiency of hospitals and also to fulfill educational missions.

The ratio analysis method was used for analysis since it is frequently used in the financial performance measurement of hospital organizations. This study uses the calculation of 12 financial ratios proposed by Cleverley, (1993), which are included in ratio analysis and accepted as a reference in hospital financial performance measurement. In the analysis of the data, firstly, the balance sheets and income statements between 2009 and 2014 were used in the Excel program to calculate the financial ratios specified in the literature section.

Descriptive statistics for the continuous variables were presented as mean, and standard deviation, while count and percentages for categorical variables. Spearman correlation coefficients were computed to determine relationships between the variables. The statistical significance level was considered as 5% and SPSS (ver:21) statistical program was used for all statistical computations.

The Spearman correlation test was used in the SPSS package program to examine whether there is a correlation between the operational performance indicators that are likely to affect financial performance and the financial ratios obtained. The main reason for choosing the Spearman correlation test is to determine the dependence between financial indicators and operational indicators, as well as the direction and level of this dependence. It allows us to determine whether the link between any two variables is positive (+) or negative (-) and whether the link between these two variables is strong or weak.

3.3. Study Population and Sampling

The study population consists of the financial data of a Ministry of Health hospital operating in the Aegean region, which has been affiliated with a university hospital at the end of 2011. To evaluate the financial data of the above-mentioned hospital, revolving fund balance sheets and income statements

for the years 2009-2014, as well as 12 operational performance indicators such as the number of hospital beds, occupancy rate, and the number of outpatients in the same period were used.

3.4. Data Sources

The data source used were the balance sheet and income statement financial records of the relevant hospital for the past 6 activity periods between 2009-2014, obtained from its revolving fund financial system. In addition, the operational indicators of the institution for 3 years before the affiliation (2009-2011) and 3 years after the affiliation (2012-2014) were obtained from the statistics unit.

The operational indicators used in the study include the number of beds, number of physicians, number of non-physician personnel, average length of stay, bed occupancy rate, number of outpatients, number of inpatients, number of surgeries, number of childbirths, number of radiological examinations, number of laboratory examinations, and number of emergency service admissions.

3.5. Limitations

The study is limited to the balance sheet and income statement financial data of a Ministry of Health hospital between 2009 and 2014, and operational performance indicators covering the same period.

3.6. Ethical Approval

Ethical approval for the research was obtained from the Scientific Research and Publication Ethics Committee of Muğla Sıtkı Koçman University (Date: 21.03.2016, number: 55), and permission for gathering financial and operational data for the study was obtained from the Public Hospitals Administration of Turkey (Date: 19.04.2016, number: 31261031/774.99).

VI. RESULTS

In the study, financial data for the years 2009-2014, current ratio, acid test ratio, and cash ratio used in Liquidity Analysis, equity to total assets ratio, debt to equity ratio and leverage ratio used in Financial Structure Analysis, inventory turnover, asset turnover and average collection period of receivables used in Activity Analysis, net profit margin, return on total assets and return on equity ratio used in Profitability Analysis were used in performance analysis. Although there are some academic studies on the financial performance analysis of public or private hospitals in the healthcare industry, there are no generally accepted standard ratios. Consequently, the 12 financial ratios proposed by Cleverley (1993) are regarded as the standard ratios commonly used in financial ratio analysis. Moreover, operational indicators such as the number of beds, number of physicians, number of other personnel, the average length of stay, bed occupancy rate, number of outpatients, number of inpatients, number of surgeries, number of childbirths, number of radiological examinations, number of laboratory examinations, and number of emergency service admissions were used.

In this study, we assess the financial performance of hospitals based on their affiliation, using financial ratios as indicators. It is important to note that multiple factors influence the financial and operational performance of a hospital. From a theoretical perspective, affiliated hospitals have the advantage of accessing consultations from specialists, engaging in discussions about treatment options, and utilizing a wider range of resources such as equipment, healthcare professionals, treatment protocols, and knowledge. Consequently, these hospitals can enhance the quality of care, leading to fewer medical errors, more accurate decision-making in diagnosis and treatment, and improved patient outcomes. On one hand, it is expected that affiliation with other institutions has a positive financial impact on hospitals. On the other hand, factors such as the competitive environment, financial and operational strategies, the organizational structure of the hospital, and government policies also play a significant role in shaping financial performance outcomes (Jin & Nembhard, 2022).

This study primarily focuses on the affiliation policy, which has been implemented in the Turkish healthcare industry in recent years. The aim is to examine whether this policy has an impact on the financial performance of hospitals using financial ratio analysis. It is important to acknowledge that multiple factors can influence the financial performance of hospitals. These factors may include the cost of healthcare services, supply terms, employee compensation, and the presence of any extraordinary conditions during the relevant years. In this analysis, the objective is to assess the financial situation of the hospital during two specific periods: the pre-affiliation period and the post-affiliation period. To achieve this, universally recognized financial ratios are utilized. It should be noted that the focus of this study is limited to the influence of the affiliation policy on financial performance while considering that various other factors may also contribute to the overall financial outcomes of hospitals.

4.1. Calculations for the Related Operating Cycle

4.1.1. Liquidity Analyses

The current ratio, Acid test ratio, and Cash ratio were used as liquidity analyses. According to Figure 1, the data from the university hospital used in the study show that the current ratio fluctuated between 0.8-1.6 from 2009-2014. During the same period, the acid test ratio fluctuated between 0.4-1.1, rising to a level of 1 only in 2010 but remaining below in all other years. The cash ratio showed a generally decreasing trend in the range of 0-0.2. In general, it can be concluded that the hospital had difficulties in paying its short-term debts, and was unable to use its funds in a balanced manner. Moreover, it can also be stated that the institution is generally experiencing a cash shortage. It started to improve after 2013.

Figure 1: **Liquidity Analysis**
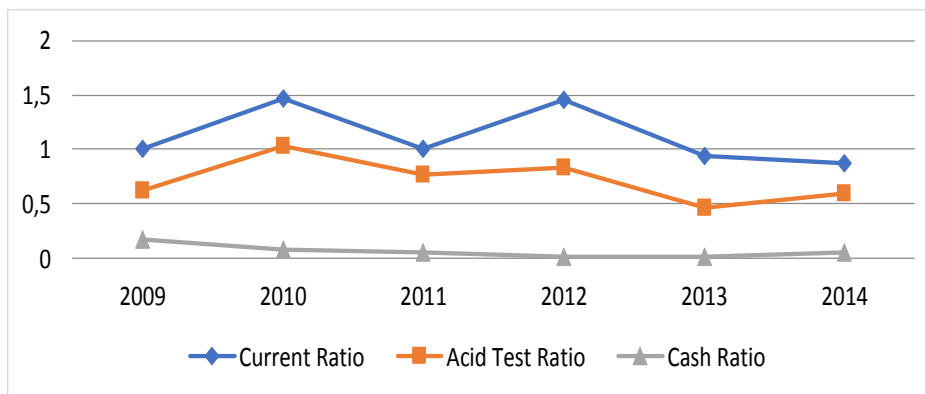
It can be stated that the institution had difficulties in paying its short-term debts before and after the affiliation. Moreover, while the hospital held more liquid assets before the affiliation, the liquid assets held after the affiliation decreased. This means that there may be limited resources and interruptions in the provision of healthcare services. This continued until 2013 but started to improve after 2013.

4.1.2. Financial Structure Analyses

Among the financial structure analyses, equity to total assets ratio, leverage ratio, and debt to equity ratio was used. According to Figure 2, the data of the university hospital used in the study show that the equity-to-total assets ratio fluctuated between 0.15-0.50, the leverage ratio between 0.50-0.85, and the debt-to-equity ratio between 1-4.75 in 2009-2014. In general, it can be stated that the health institution is experiencing financial difficulties in payments, liabilities are used more in the institution, and the safety margin of the institution is low.

Figure 2: Financial Structure Analyses
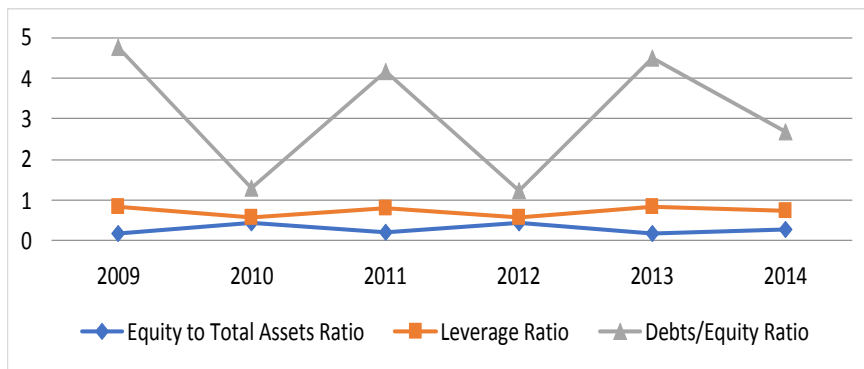
Affiliated in 2011, the hospital was mainly financed by liabilities before and after the affiliation. In general, the financial status started to improve after 2013, i.e. the health institution started to use more equity after 2013. In summary, while the hospital used more liabilities before the affiliation, after the affiliation, the use of liabilities decreased, the level of debt decreased, and the use of equity increased; in other words, the financial strength of the institution started to increase after the affiliation.

4.1.3. Activity Ratio Analysis

Among the activity analyses, inventory turnover ratio, asset turnover ratio, and average collection period of receivables were used. According to Figure 3, the inventory turnover ratio of the university hospital used in the study varies between 4 and 22 in 2009-2014, which is below the standard figures determined for the hospital industry, meaning that there is not much mobility of pharmaceuticals and medical supplies in the health institution. The asset turnover ratio fluctuates between 2-5, and the average collection period of receivables fluctuates between 22-60 days for the studied period. In general, it can be stated that the rate of risk in the health institution is low, and equity is used efficiently, that is, the hospital can generate a high level of income with the available assets and is profitable. In addition, the fact that the collection period of the receivables shows a declining trend shows that credit receivables can be collected regularly and in short periods.

Figure 3: Activity Ratio Analysis
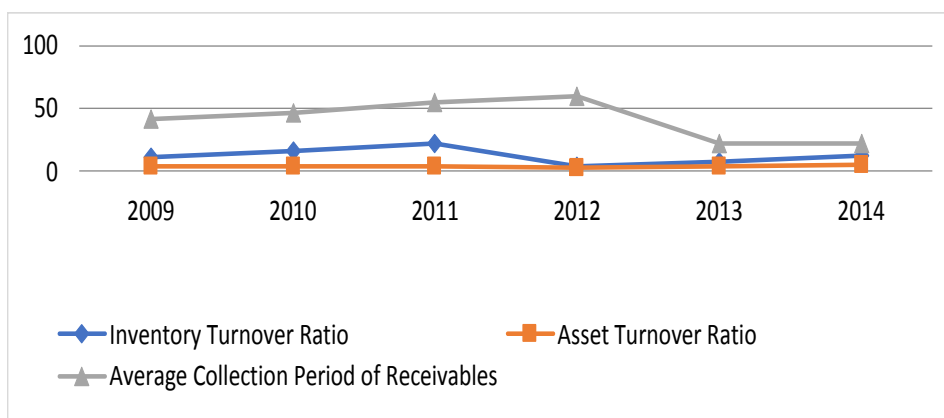
When compared to the affiliation, while the hospital had problems in collecting overdraft receivables before the affiliation, this situation improved afterward. Productivity in the institution did not change much before and after the affiliation, but it can still be interpreted that the institution served more efficiently in the post-affiliation period. The inventory turnover ratio decreased after the affiliation, meaning that the service operations in the institution did not increase after the affiliation.

4.1.4. Profitability Ratio Analysis

Among the profitability ratio analyses, net profit margin, return on total assets, and return on equity were used. According to Figure 4, net profit margin, return on total assets and return on equity generally increased between 2009 and 2014.

Figure 4: Profitability Ratio Analysis
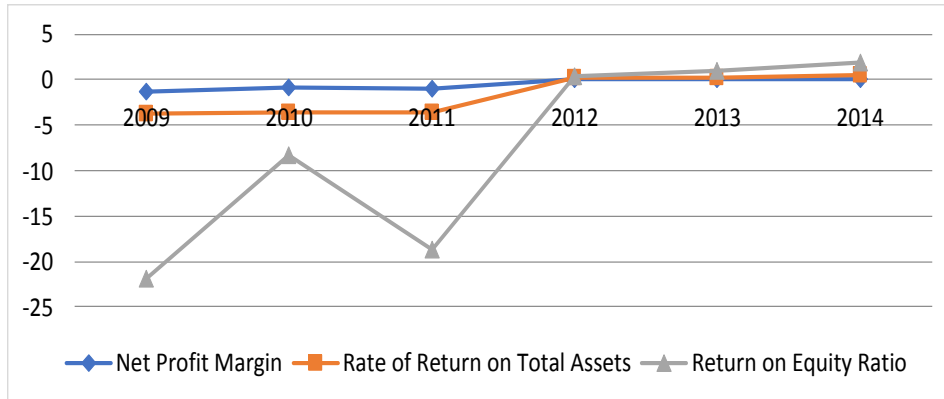
According to the ratios, the hospital's ratios in the period before the affiliation, i.e. between 2009 and 2011, were below the ratios set for the hospital industry, which means that the hospital was making a loss before the affiliation. After 2011, i.e. after the affiliation, the ratios exceeded the standard ratios, indicating that the hospital started to make a profit after the affiliation. From another point of view, an increasing trend of hospital profitability ratios in general shows that hospital management and health institution are successful in health service production and provision. While the hospital was operating at a loss before the affiliation, after the affiliation, assets were used efficiently and effectively, profit was made, and success was achieved in management and the production and provision of health services.

4.2. Operational Performance Indicators for the Relevant Operating Cycle

Table 1. Operational Performance Indicators between 2009-2014

	2009	2010	2011	2012	2013	2014
Number of Beds	501	501	501	501	501	501
Number of Physicians	80	91	99	124	81	212
Number of Non-Physician Personnel	587	591	600	603	850	1.111
Average Length of Stay	4.30	4.40	4.20	4.70	5.20	4.40
Bed Occupancy Rate	59.2%	61.4%	60.8%	57.5%	62.3%	54.4%
Number of Outpatients	613.224	631.300	654.010	649.735	704.399	757.335
Number of Inpatients	23.692	24.112	24.266	23.944	24.743	24.179
Number of Surgeries	32.046	33.264	34.100	35.907	41.335	41.482
Number of Childbirths	648	793	860	873	1037	1041
Number of Radiological Examinations	268.237	309.592	319.556	244.344	283.178	293.141
Number of Laboratory Tests	669.741	784.413	861.760	603.584	718.951	784.975
Number of Emergency Service Admissions	110.226	114.210	118.647	121.267	147.037	155.049

Table 1 presents the operational performance indicators examined during the study period of 2009-2014. The analysis encompasses a total of 12 operational performance indicators, which are discussed in this study.

4.3. Financial Performance Indicators for the Relevant Operating Cycle

Table 2. Financial Performance Indicators between 2009-2014

Years	2009	2010	2011	2012	2013	2014
Liquidity Analyses						
Current Ratio	1	1.47	1	1.45	0.94	0.88
Acid Test Ratio	0.62	1.03	0.77	0.83	0.46	0.6
Cash Ratio	0.18	0.08	0.06	0.01	0.01	0.05
Financial Structure Analyses						
Equity to Total Assets Ratio	0.17	0.43	0.19	0.44	0.18	0.27
Leverage Ratio	0.83	0.57	0.81	0.56	0.82	0.73
Debt to Equity Ratio	4.75	1.3	4.16	1.24	4.5	2.68
Activity Ratio Analysis						
Inventory Turnover Ratio	11	16	22	4	7	12
Asset Turnover Ratio	3.05	4.04	3.54	2.55	4.09	4.88
Average Collection Period of Receivables	41	46	55	59	22	22
Profitability Ratio Analysis						
Net Profit Margin	-1.24	-0.89	-1.02	0.06	0.04	0.11
Rate of Return on Total Assets	-3.8	-3.62	-3.61	0.17	0.17	0.52
Return on Equity Ratio	-21.87	-8.33	-18.64	0.37	0.93	1.91

Table 2 provides an overview of the financial performance indicators for the period of 2009-2014. These metrics encompass the 12 indicators proposed by Cleverley, which are widely recognized and utilized in the literature to assess the financial performance of the hospitals.

4.4. Correlation Matrix between Operational and Financial Indicators***

Table 3. Correlation Matrix between Operational Indicators and Financial Indicators

		Current Ratio	Acid Test Ratio	Cash Ratio	Equity to Total Assets Ratio	Leverage Ratio	Debt to Equity Ratio	Inventory Turnover Ratio	Asset Turnover Ratio	Average Collection Period of Receivables	Net Profit Margin	Rate of Return on Total Assets	Return on Equity Ratio
Number of outpatients	r	-0.754	-0.600	-0.667	0.086	-0.086	-0.086	0.029	0.714	-0.464	0.714	**0.899***	**0.829***
	p	0.084	0.208	0.148	0.872	0.872	0.872	0.957	0.111	0.354	0.111	0.015	0.042
Number of Emergency Admissions	r	-0.667	-0.543	**-0.812***	0.257	-0.257	-0.257	-0.257	0.600	-0.406	**0.886***	**0.986****	**0.943****
	p	0.148	0.266	0.050	0.623	0.623	0.623	0.623	0.208	0.425	0.019	0.000	0.005
Number of Surgeries	r	-0.667	-0.543	**-0.812***	0.257	-0.257	-0.257	-0.257	0.600	-0.406	**0.886***	**0.986****	**0.943****
	p	0.148	0.266	0.050	0.623	0.623	0.623	0.623	0.208	0.425	0.019	0.000	0.005
Bed occupancy rate	r	0.162	-0.087	0.000	-0.377	0.377	0.377	0.174	0.116	-0.088	-0.464	-0.353	-0.232
	p	0.759	0.870	1.000	0.461	0.461	0.461	0.742	0.827	0.868	0.354	0.493	0.658
Average Number of Days of Hospitalization	r	-0.088	-0.261	-0.765	0.290	-0.290	-0.290	-0.754	0.203	-0.250	0.638	0.529	0.696
	p	0.868	0.618	0.077	0.577	0.577	0.577	0.084	0.700	0.633	0.173	0.280	0.125
Number of Inpatients	r	-0.493	-0.486	-0.493	-0.143	0.143	0.143	0.257	0.657	-0.377	0.257	0.493	0.49%
	p	0.321	0.329	0.321	0.787	0.787	0.787	0.623	0.156	0.461	0.623	0.321	0.33%
Number of Physicians	r	-0.174	0.143	-0.464	0.714	-0.714	-0.714	0.086	0.200	0.203	0.771	0.754	0.60%
	p	0.742	0.787	0.354	0.111	0.111	0.111	0.872	0.704	0.700	0.072	0.084	0.208
Number of Other Health Personnel	r	-0.667	-0.543	**-0.812***	0.257	-0.257	-0.257	-0.257	0.600	-0.406	**0.886***	**0.986****	**0.943****
	p	0.148	0.266	0.050	0.623	0.623	0.623	0.623	0.208	0.425	0.019	0.000	0.005
Number of Childbirths	r	-0.667	-0.543	**-0.812***	0.257	-0.257	-0.257	-0.257	0.600	-0.406	**0.886***	**0.986****	**0.943****
	p	0.148	0.266	0.050	0.623	0.623	0.623	0.623	0.208	0.425	0.019	0.000	0.005
Number of Radiology Examinations	r	-0.029	0.143	0.319	-0.029	0.029	0.029	**0.943****	0.486	-0.058	-0.200	-0.087	-0.086
	p	0.957	0.787	0.538	0.957	0.957	0.957	0.005	0.329	0.913	0.704	0.870	0.872
Number of Laboratory Tests	r	-0.319	-0.086	0.203	-0.086	0.086	0.086	**0.886***	0.600	-0.203	-0.029	0.145	0.086
	p	0.538	0.872	0.700	0.872	0.872	0.872	0.019	0.208	0.700	0.957	0.784	0.872

*: Significant correlation at 0.05 margin of error (pairwise), **: Significant correlation at 0.01 margin of error (pairwise), ***: Spearman correlation test

The association between financial performance indicators and operational performance indicators was investigated using the non-parametric Spearman correlation test, as presented in Table 3. This choice was based on the limited number of observations and the non-normal distribution of the data. The obtained results are as follows:

In terms of the number of outpatients, there is a significant relationship between this number and the rate of return on total assets (r=0.899, p<0.05), and the rate of return on equity (r=0.829, p<0.05). There is a significant positive correlation between the number of outpatients and the rates of return on total assets and equity. This implies that an increase in the number of outpatients is associated with a higher rate of return on total assets and equity.

In terms of the number of emergency admissions, there is a significant relationship between this number and net profit margin (r=0.886, p<0.05), return on total assets (r=0.986, p<0.01), and return on equity (r=0.943, p<0.01). There is a significant positive correlation between the number of emergency admissions and the net profit margin, return on total assets, and return on equity. This suggests that an increase in the number of emergency admissions leads to a corresponding increase in the net profit margin, return on total assets, and return on equity.

Concerning the number of operations, a significant relationship was observed with the net profit margin (r=0.886, p<0.05), return on total assets (r=0.986, p<0.01), and return on equity (r=0.943, p<0.01). This indicates a strong positive correlation between the number of operations and the net profit margin, return on total assets, and return on equity. Consequently, an increase in the number of operations is associated with an improvement in the net profit margin, return on total assets, and return on equity.

Regarding the number of non-physician healthcare personnel, a significant relationship was found with the net profit margin (r=0.886, p<0.05), return on total assets (r=0.986, p<0.01), and return on equity (r=0.943, p<0.01). These findings indicate a strong positive correlation between the number of non-physician healthcare personnel and the net profit margin, return on total assets, and return on equity. Therefore, an increase in the number of non-physician healthcare personnel is associated with an increase in the net profit margin, return on total assets, and return on equity.

In terms of the number of radiological examinations and laboratory examinations, significant relationships were observed with the inventory turnover ratio (r=0.943, p<0.01) and (r=0.886, p<0.05), respectively. These findings indicate a strong positive correlation between the number of radiological examinations and laboratory examinations with the inventory turnover ratio. Therefore, an increase in the number of radiological examinations and laboratory examinations is associated with an increase in the inventory turnover ratio.

V. DISCUSSION AND CONCLUSION

The financial condition of a hospital is directly influenced by the operational performance indicators that shape the hospital's environment. Factors such as the number of inpatients, outpatients, medical personnel (physicians, nurses, etc.), and the volume of patient examinations, which are indicative of operational performance, play a crucial role in maintaining the financial sustainability of hospitals. Higher levels of operational efficiency are associated with increased profitability, allowing hospitals to generate profits that can be reinvested in equipment and workforce, thereby enhancing their competitiveness within the healthcare market. Consequently, hospitals can allocate resources to equipment and personnel, leading to increased competitiveness in the healthcare market (Wu, 2023).

Based on the literature, it can be asserted that analyzing changes in the business environment requires examining the financial status. Accordingly, this study employs information on liquidity, financial position, operational status, and profitability. The study aims to shed light on the intricate nature of healthcare services and to explore the impact of affiliation on financial and operational performance in

this context. Hence, the study aims to assess the degree to which the affiliation process affects the financial performance of a university hospital in the Aegean region.

Analyzing the financial position of a hospital through financial ratio analysis provides a robust method for assessing health service provision. Cleverley and Harvey (1992) conducted a comprehensive study comparing the financial data of 470 companies from non-healthcare industries with that of 1200 hospitals spanning the period from 1885 to 1990. In their analysis, they employed various financial ratios including measures of profitability, liquidity, return on investment, borrowing capacity, asset and technology replacement, accounts receivable turnover, and average collection period of accounts receivable. Additionally, Cleverley (1990), conducted a financial analysis of 50 hospitals and identified eight key strategic factors that are important for hospitals to maintain high financial performance, such as high market share, affiliation, pricing, cost management, avoidance of excessive borrowing, capital intensity, investment in accounts receivable, and revenue diversification. They concluded that maintaining low levels of investment in fixed assets and accounts receivable, along with acceptable levels of debt and a high market share, can contribute to achieving good financial performance for hospitals, ensuring their long-term viability and sustainability. Moreover, Cleverley (1990) suggested that hospital affiliation is a factor that is expected to improve the financial status of hospitals. In line with this, our study also observed an improvement in the financial status of the hospital following affiliation.

Lee (2015) investigated the financial performance of 10 university hospitals in Korea from 2008 to 2011 and found that several universities experienced a decline in their financial position and operating performance during this period. The study showed an overall decrease in total assets, debt, and total medical revenue, with many hospitals having persistent account deficits. In contrast, our study found an increase in the total assets and a decrease in the debt of the institution. Based on the findings of the financial ratio analysis, it was observed that following the affiliation, there was a decrease in the utilization of liabilities, a reduction in the level of debt, and an increase in the utilization of equity. These results indicate an improvement in the financial strength of the institution after the affiliation.

Gider (2011) analyzed the financial ratios of a private healthcare institution, Acıbadem Sağlık Hizmetleri ve Ticaret Corp., for the period 1998-2003 and used Spearman correlation analysis to examine the correlation between these ratios and factors that may affect financial performance. The results of the study indicated that most of the financial ratios reached desired levels and that these ratios were affected by both financial and operational factors. The economic crises of November 2000 and February 2001 had a negative impact on the hospital, but this impact did not persist in subsequent years, according to the study. Alparslan et al. (2015), conducted a ratio analysis of working capital and financial performance indicators of 118 hospitals in the provincial center of the Ministry of Health from 2008 to 2012. The study found that 29.15% of hospitals had negative net working capital, while 70.85% had positive net working capital. Furthermore, 59.49% of the hospitals had low financial performance, while 40.51% had high financial performance. Furthermore, a study conducted by Aksoylu and Çavmak (2023) investigated the financial sustainability of hospital services in Turkey using financial ratios. Their findings indicated that hospitals in Turkey still face significant challenges in effectively managing the growth of hospitals and ensuring profitability, which hinders their financial sustainability. In contrast, our study revealed that the financial performance of the hospital improved, and its financial strength increased after affiliation. The results of the financial and correlation analyses suggest that debt levels decreased, the use of equity increased, and the inventory turnover ratio improved. The enhanced financial strength of the institution can be attributed to the improved service production of the hospital and the optimal allocation of resources following affiliation. Consequently, the hospital has enhanced its profitability and financial standing.

Using the ratio analysis method and Spearman correlation test, Avcı (2014), examined the relationship between financial and operational performance indicators of a private branch training and research hospital in the provincial center of Ankara during the period 2005-2011. The findings of the analysis showed that the hospital had a low utilization rate of short-term liabilities, was generally equity-

weighted in its financial structure, operated with losses since 2007 except for 2010, and was not financially well managed. Similarly, a study conducted by Ercan et al. (2013) assessed the financial performance of 12 public health institutions in Kastamonu province between 2008 and 2012. The analysis revealed that while the operating ratios, which reflect the efficiency of asset utilization, improved over the five years, there was no corresponding improvement in the profitability ratios, which indicate the efficiency of resource utilization. In contrast, our study demonstrated that the hospital operated at a loss before the affiliation. However, after the affiliation, there was a notable enhancement in the efficiency and effectiveness of asset utilization, leading to increased profitability and successful management, production, and delivery of health services. One of the main factors contributing to the hospital's newfound profitability post-affiliation may be the institution's effective management of health service production, provision, and resource allocation.

Overall, this study revealed that the healthcare institution encountered challenges in meeting its short-term debts and struggled to maintain a balanced fund utilization, leading to a cash shortage. Additionally, the institution faced difficulties in collecting receivables. However, a positive development was observed in the institution's liquidity situation after the implementation of an equity-based financing policy in 2013. As a result, the hospital's risk ratio has decreased, and its equity is being utilized efficiently, leading to increased income generation and profitability. Furthermore, the decreasing trend in the collection period of receivables indicates that the hospital can consistently collect credit receivables within shorter periods.

Generally, when hospital profitability ratios increase, it is an indication of successful hospital management and efficient delivery of health services. In the study, positive correlations were found between operational indicators such as the number of outpatients, emergency admissions, surgeries, health personnel, and childbirths and profitability ratios such as net profit margin, return on total assets, and return on equity.

Moreover, significant positive relationships were observed between the number of radiological and laboratory examinations and inventory turnover ratio, as an increase in these figures led to a higher turnover ratio.

To summarize, comparing the data before and after the affiliation of the hospital leads to the following conclusions:

- Before the affiliation, the hospital had more liquid assets, but after the affiliation, the liquid assets decreased. This suggests that there may be a risk of interruptions to medical activities and limited resources available for the provision of healthcare services.

- Before the affiliation, the hospital relied more on debt financing, but after the affiliation, the use of debt decreased, and equity financing increased. As a result, the financial strength of the institution started to increase.

- Before the affiliation, the hospital had difficulties collecting on overdrafts, but after the affiliation, the financial position of the hospital improved, and productivity increased.

- Previously, the hospital operated at a loss, but after the affiliation, assets were utilized efficiently, profits were generated, and successes were achieved in the management and delivery of health services.

The financial indicators suggest that the hospital's financial behavior improved after the affiliation. It is expected that the operational performance indicators, such as the number of patients, surgeries, and other health personnel, would be positively correlated with the profitability ratios, such as net profit

margin, return on total assets, and return on equity, as they ultimately affect the hospital's financial position.

Despite the improvements observed after the affiliation, the hospital still faces liquidity shortages and struggles to pay short-term debts. While the situation has improved, the liquidity and financial analysis ratios are still lower than desired. Therefore, it is recommended that steps be taken to enhance the institution's financial structure, reduce reliance on borrowing, and position the hospital as a preferred healthcare service provider.

The organization should aim to turn these shortcomings and risks into opportunities and objectives. This means that the healthcare institution should view these criticisms as constructive feedback and use them to enhance its financial performance positively.

Ethical Approval: Ethical approval for the research was obtained from the Scientific Research and Publication Ethics Committee of Muğla Sıtkı Koçman University (Date: 21.03.2016, number: 55), and the permission for gathering financial and operational data of the study was obtained from Public Hospitals Administration of Turkey (Date: 19.04.2016, number: 31261031/774.99).

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