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Analysis of Hospital Management based on the Characteristics of Hospitals: Focusing on Financial Indicators

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ABSTRACT

The purpose of this study is to evaluate and compare the financial indicators of hospitals by identifying the hospitals' characteristics. To evaluate indicators of hospital performance, liquidity, financial performance, turnover ratio, growth rate, and productivity indicators are selected. Data was collected from the reports of the Korea Health Industry Development Institute for the 2013 - 2016 period. The results of study confirmed the following: First, a comparison of financial indicators revealed that liability to total assets was generally declining. Second, for public hospitals, the total assets turnover was assessed to be actively utilized in hospitals with more than 160 beds in 2016. Third, in private hospitals, the total assets turnover did not meet in the recommended ratios. Fourth, the net profit to total assets of performance indicators was positive in private hospitals. Finally, the number of doctors per 100 beds did not change significantly, whereas the value added to personnel expenses was found to increase. The results of the study have important theoretical and practical implications for operational efficiency in hospital management based on characteristics of hospitals. This study contributes to both the practice of healthcare management and the body of literature by it employing new insights into how hospitals should operate to enhance organizational competitiveness based on a comparison of the financial indicators of Korean hospitals.

Keywords: Financial indicators, Ratio Analysis, Operational efficiency, Hospital management

1. Introduction

Healthcare institutions should be responsible for promoting the health and welfare of people since the general aim of transformative organizations is social well-being; the public interest that is promoted and secured to sustain national health and welfare (Hong and Lee, 2018; Lee, 2018). Global medical

tourism emphasizes the structural and conscious changes that are taking place in hospital management to satisfy the expectations of domestic and overseas medical consumers. However, today, various internal and external factors affecting the healthcare environment are causing deterioration in the profitability of medical institutions, the demands of consumers are diversifying, and governmental policies are continually aggravating the management of healthcare organizations (Hong and Lee, 2018; Lee, 2018; Lim et al., 2013; Nowicki, 2007).

According to OECD Health Statistics (2016), the

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countries with the longest expected life expectancy are Japan (83.7 years), Spain (83.3 years), and Switzerland (83.3 years); these countries are closely followed by Korea at 80.8 years. In 2013, the average health expenditure relative to the gross domestic product (GDP) of the Organization for Economic Co-operation and Development (OECD) countries was 9.1%, and the corresponding national values were the United States, 16.6%; Japan, 11.4%; Austria, 10.3%; and Korea, 7.1%. Further, in 2013, the average number of outpatient visits per capita in OECD countries was 7.0 times, and the corresponding national values were: Korea, 14.9; Japan, 12.8; and Austria, 6.8. The OECD average of a clinician per 1,000 population in 2014 was 3.3, while Korea, 14.9; Austria had 5.1; the United States, 2.6 (in 2013); Japan, 2.4; and Poland, 2.3. Further, the countries with the largest number of beds per 1,000 population were Japan (13.2 beds), Korea (11.7), Austria (7.6), Poland (6.6), and the United States (2.9 in 2013). According to these data, with the increase in life expectancy, the number of consumers visiting healthcare institutions will increase, which will lead to an increase in health care expenditure.

Healthcare institutions should optimize the effects of technology changes on operational efficiency and customer (patient) satisfaction (Hong and Lee, 2018; Lee, 2018). These changes in the medical environment directly affect the customer's willingness to return and the hospital's performance (Lee, 2018). The healthcare administrator may find how care service delivery could increase productivity and become more efficient (Lee, 2018). Therefore, efforts to realize strategic aspects of hospital management are necessary through indicators of organizational performance. In particular, the strategic approach to hospital management is important because of its managerial account deficit, the uncertainties in its financial structure, and the weakness of reinvestment capabilities (Curtright et al., 2000; Lee, 2016; Nowicki, 2007).

Healthcare organizational performance can be measured through various approaches, such as financial and non-financial indicators (e.g., customer satisfaction, outcomes of care service) (Kang et al., 2014). Although

most firms evaluate organizational performance using financial and non-financial indicators, hospitals can have difficulty in assessing with these indicators (Goldstein et al. 2002), because service evaluations of non-financial performances depend on the perceptions of the patient and employee, including the effectiveness of a doctor's treatment process (Kang et al., 2014). However, as financial performance and condition are important factors of any organizations, analysis of financial statements and conditions, including operating indicators, should be performed to assure sustainability of business (Curtis and Roupas, 2009; Ding et al. 2018). Ensuring the financial stability of the hospital is simultaneously a goal of hospital management and a social demand.

The function of a hospital is to help prevent and cure diseases and maintain patients' health. The hospital's goal is to continuously improve the quality of its care services. To achieve its goals, the hospital should have the ability and flexibility to manage internal and external issues pertaining to hospital operations. Although the external factors may not be controlled, the internal environment can be created through management ability or performance, which is measured as efficiency or effectiveness, including the quantity and quality of care, patient satisfaction, and the degree of healing (Kang et al., 2014). This internal management capability is related to the institution's financial performance, which can be generally assessed by analyzing the financial ratio. However, the financial ratio analysis does not reveal the most important measure among all the analytical indicators, and the most important ratio cannot be identified by imply aggregating all the ratios. Therefore, to effectively use the financial ratio analysis, a comprehensive assessment should be performed by selecting the major proportion of these rates that affect the efficiency and effectiveness of hospitals (Kang et al., 2014; Lee, 2015, 2016; Lim et al., 2013; Nowicki, 2007).

The results of these internal evaluations provide an opportunity to improve the vulnerability of a hospital and to provide the information that is necessary to establish relevant healthcare policies. Therefore,

high-quality care services should indicate the financial soundness of hospital management. In addition, to diagnose and overcome management limitations, it is essential to conduct an accurate analysis of the financial indicators that represent management performance (Curtight et al., 2000; Lee, 2015).

With the increasing importance of the internal and external factors surrounding the healthcare environment and the maintenance of the financial stability of the hospital, an analysis of the factors affecting organizational performance is required to assess the financial soundness. The Korea Health Industry Development Institute (KHIDI) collects and analyzes the management records of all Korean hospitals and annually publishes the *Statistics for Hospital Management* as part of improving the management of medical institutions. Therefore, the purpose of this study is to present the basic data necessary for improving hospital management by identifying the characteristics of hospitals in Korea that affect financial indicators based on KHIDI's reports from 2013 to 2016.

The specific research objectives of the study are as follows: First, the study analyzes the major financial indicators of a hospital. Second, we select the financial indicators that explain management performance and analyze the distribution of the values. Third, we suggest the hospital's operational strategic plans after comparing and analyzing the relationship between the hospital's characteristics and financial indicators. The rest of the paper is organized as follows: Section 2 reviews relevant literature; in Section 3, research methodology is presented; Section 4 reports the results of data analysis; and Section 5 provides the conclusion, implications, and limitations of the study, including directions for future research.

II. Theoretical Background

The financial stability of hospitals should be ensured by considering the essential characteristics of each healthcare institution. However, healthcare

institutions should secure financial soundness, while generating sufficient revenue through investing assets to maximize efficiency. In particular, private hospitals should make financial investments through their own resources, whereas public hospitals are often financed by public funds. However, both private and public hospitals should conduct revenue operations in a manner that ensures their financial soundness and efficiency (Lilford and Pronovost, 2010). The financial status and profit structure of a hospital can be assessed objectively through the evaluation of the relationship between its financial indicators in the form of ratios (Kang et al., 2014).

A. Financial Indicators of Hospital Operations

Research on the financial indicators and organizational performance of hospitals should be based on the characteristics of hospitals (Bema et al., 2014; Kang et al., 2014; Lee, 2015, 2018; Hong and Lee, 2018). In the case of financial ratios, analyses started in the US (Cleverley and Nilsen, 1980; Cleverley and Rohleder, 1985; Zeller et al., 1996). Financial performance analysis of the hospital reflects the unique characteristics of the hospital in terms of its financial state. In addition, organizational performance of hospitals may be difficult to assess since it is reflected in the hospitals' care services and organizational operations (Goldstein et al., 2002). Since financial indicators are used to analyze forecasts and causes of bankruptcy, such indicators are commonly analyzed and evaluated.

One of the assessment indexes of a hospital's soundness entails the assessment of its financial indicators, such as liquidity, performance, turnover ratios, and growth rates. Major financial indicators include the debt ratio, current ratio, net profit to total assets ratio, fixed assets turnover, debt-to-equity ratio, and inventory turnover ratio. Zeller et al. (1996) empirically examined financial performance by looking at hospital ownership structure, hospital mission, and hospital location. Watkins (2000) measured financial performance by examining profitability, capital structure, working capital efficiency, fixed asset efficiency,

fixed asset age, liquidity, return on equity, and debt coverage. Zeller and Stanko (1997) suggested six characteristics to discern the financial health of hospitals: profitability factor, fixed-asset efficiency, capital structure, fixed-asset age, working capital efficiency, and liquidity. In addition, KHIDI collects and analyzes data on hospital management to improve the efficiency of hospitals and conducts a hospital management analysis based on the hospital performance indexes. In general, a hospital's management analysis indicators are classified into financial, productivity, utilization, operating revenues, and personnel and others (Kang et al., 2014).

Since earlier studies on the selection of financial indicators for the organizational performance analysis of hospitals differ according to the intentions of the researcher, they rely on diverse analysis methods and difficult to identify a common theme to explain the data analysis. For example, earlier studies often highlighted the positive effects of organizational performance, management of the revenue cycle, and profitability (Singh and Wheeler, 2012), as well as the negative correlation between the levels of profitability and liquidity (Eljelly, 2004; Michalski, 2009).

Many studies identified the variables that affect the profitability of hospitals, for instance, Coyne et al. (1982) reported on debt dependence, hospital size, and market share; Choi et al. (2008) suggested the year of foundation, debt dependence, and number of medical services; Gapenski et al. (1992) addressed the number of beds, asset portfolios, the age of the hospital, regional factors, tax benefits, and business risks; and Ozcan et al. (1992) discussed ownership structure, size, and market share. Singh and Wheeler (2012) proposed that higher patient revenue would increase operating and total profit margins in hospitals.

However, on reviewing the comprehensive analyses performed by earlier studies and institutional reports on organizational performance of hospitals focusing on financial indicators, we find that the number of beds, workforce, indicators related to employees, utilization, employee efficiency, and ownership significantly influence a hospital's organizational performance and affect its financial indicators

(Marquis and Huston, 2011; Lim et al., 2013). Financial indicators are variables that account for the performance of hospitals because they are calculated by considering data concentrated on management activities; further, they are variables that reflect the characteristics of healthcare organizations (Kang et al., 2014). In other words, hospitals provide care services by using relevant input resources and subsequently generate results (e.g., productivity, efficiency, revenue, etc.). In this case, inputs can be perceived as independent variables and outputs as dependent variables, which can be calculated by analyzing financial indicators. Therefore, several variables are generally used for hospital management analyses, including financial indicators, productivity indicators, utilization data, operating revenue, personnel data, data on major facilities, and outsourcing data (Kang et al., 2014; KHIDI, 2016).

Financial indicators assess the financial status of hospitals by categorizing and aggregating the revenue, expenses, profits and losses pertaining to a certain period, and information on the indicators of liquidity, performance, turnover ratios, growth rate, and healthcare expenses (Kang et al., 2014; KHIDI, 2016). Since financial ratios are calculated by comparing two different items among the various items on financial indicators, we can calculate different financial ratios. In this study, financial indicators were selected according to specific criteria and the representative financial ratio of each index. The representative financial ratios were selected separately to obtain an accurate understanding of the objective of the financial analysis. The reason is that the analysis must be simplified to the extent that it does not affect the usefulness and efficiency of the representative analytical financial ratio, among several prominent financial ratios, in measuring the overall business performance. Further, it is necessary to simplify the usefulness and efficiency of financial ratios within a range that does not have negative effects in measuring organizational performance.

The criteria for selecting variables are as follows:

- (1) The ratios that were considered important by earlier studies

- (2) The ratios that are easily interpreted and commonly used
- (3) Theoretically, the ratio is deemed effective as a predictor of hospital performance
- (4) Selection of one representative financial ratio for each indicator from the chosen financial ratios

Based on these selection criteria, the current study analyzed organizational performance of Korean hospitals by focusing on liquidity, performance, turnover ratio, growth rate, and productivity indicators. The representative financial ratios for each financial indicator were selected as shown in Table 1. Financial ratios and ratio definitions are used based on previous study of Cleverley and Nilsen (1980), Zeller et al. (1996), Watkins (2000), Kang et al. (2014), and KHIDI (2016).

1. Liquidity: Liabilities to Total Assets

The liquidity indicators used in this study include the debt ratio, fixed ratio, and liability to total assets; further, the liability to total assets was selected as the representative ratio for liability indicators. The liability to total assets is an indicator of the soundness of the hospital’s capital structure, solvency, and ability to pay back liabilities, as well as the appropriateness of fund operation.

2. Performance Indicators: Net Profit to Total Assets

Performance indicators determine whether the proportion of capital invested to profit is adequate, measure the performance of a hospital over a period of time, and analyze the causes of this performance.

It is notable that high values for these indicators imply better outcomes since, in such cases, the various profit margins are higher and include the net profits to total assets, operating profit on assets, and net profit to gross revenues. In this study, the net profits to total assets was selected as the ratio that represents profitability, since the indicator can be explained for both commercial and nonprofit aspects.

3. Turnover Ratios: Total Assets Turnover

Turnover ratios indicate how effectively the hospital invests its capital to increase operating revenue and assess the performance of business activities, such as inventory asset and nonperforming receivable management. In general, operating revenue includes those pertaining to inpatient, outpatient, and other medical activities (including other activities revenues and adjusted operating revenues). However, hospitals with different missions and who care for more critically ill patients have different mixes of assets, and thus turnover ratios of inpatient and outpatient will differ depending on the severity of the patient.

The indicators include the total assets turnover, turn period of total assets, inventory turnover, patient receivables turnover, and the average collection period. In this study, the total assets turnover was selected as the representative of turnover ratios.

4. Growth Rate Indicators: Growth Rate of Inpatient, Outpatient, and Operating Revenue

Growth rate indicators reveal whether the operating revenue, total capital, and number of patients are increasing every year or not. High values for these

Table 1. Representative financial indicators

Financial Indicators	Financial ratio	Formula
Liquidity	Liability to Total Assets	$(\text{Liability}/\text{Total Assets}) \times 100$
Performance	Net Profit to Total Assets	$(\text{Net profit of this term} / \text{Total Assets}) \times 100$
Turnover Ratio	Total Assets Turnover	$(\text{Operating Revenues}/\text{Total Assets}) \times 100$
Growth Rate	Growth Rate of Inpatient, Outpatient, and Operating Revenue	$[(\text{current term} - \text{preceding term})/\text{Net profit of preceding term}] \times 100$
Productivity	Value Added Ratio to Gross Revenue	$(\text{value added} / \text{Operating Revenue}) \times 100$

indicators imply that the hospital's performance is improving. The indicators include the growth rate of inpatient, outpatient, and operating revenue; total assets turnover; patient growth rate; and growth rate of net assets. The growth rate of inpatient, outpatient, and operating revenue refers to an increase above the previous year's performance of operating revenue during the year. In this study, the growth rate of inpatient, outpatient, and operating revenue was selected as the representative ratio for growth rate indicators.

5. Productivity Indicators: Value Added Ratio to Gross Revenue

Productivity indicators are related to the addition of value and investment efficiency. The value is evaluated based on the number of adjusted inpatients per day, the number of outpatients, the number of beds, and operating revenue over a period. These indicators show the efficiency of input capital, labor costs, and the efficiency of investment in medical equipment. The larger the amount of the indicators and the higher the proportion, the higher the productivity. Productivity indicators include value added per adjusted inpatients/day, value added to tangible noncurrent assets, value added ratio to gross revenue, and value added to total assets. In this study, the value added ratio to gross revenue was selected as the representative ratio of productivity indicators.

III. Methodology

A. Data Collection

The data used in this study was from *Statistics for Hospital Management* published in 2013-2016 by KHIDI but reedited for the purpose of this research. The characteristics of the hospitals that were analyzed for the comprehensive evaluation of hospital management are classified into the number of beds and ownership. In addition, financial indicators refer to total assets of liquidity; net profit to total assets performance

indicators; total assets turnover of turnover ratios; growth rates of inpatient, outpatient, and operating revenue of growth rate indicators; and value added ratio to gross revenue of productivity indicators, including the value added to personnel expenses, daily adjusted inpatient days per 100 beds, and number of doctors per 100 beds.

B. Classification

The forms of ownership are classified into the following two types: (1) Private hospitals and (2) public hospitals. In South Korea, national, public, and municipal hospitals; special corporate hospitals; and provincial hospitals are included in the public hospital category, whereas all other hospitals are considered private hospitals.

The classification criteria based on the size of beds include general hospitals, intensive care unit, special care unit, and incubator unit, and hospitals are further classified into general, mental, infectious, oriental, and dental hospitals. According to KHIDI, general hospitals include the following: tertiary general hospitals with more than 300 beds, general hospitals with more than 160 less than 300 beds, and general hospitals with less than 160 beds general hospitals. General hospital typically include more than nine medical specialty departments and an emergency room to treat urgent health problems, including those due to accidents and sudden illnesses. In its 2016 report, KHIDI assessed only the general hospitals level or higher; therefore, this study considered only the general hospitals.

IV. Results

Table 2 summarizes the hospital characteristics, ownership and the number of beds. One tertiary general hospital (33 private in 2015 and 11 private in 2016) and 10 general hospitals with more than 300 beds

were compared using data from years 2015 and 2016.

As shown in Table 3, in private hospitals, the value added to personnel expenses was slightly increased by the size of their beds in 2016 compared to 2015, whereas the number of general hospitals with more than 300 beds declined. The efficiency of the value added to personnel expenses increased slightly by ownership and size of beds during 2013-2016; however, it decreased in tertiary hospitals and hospitals with less than 160 beds in 2015.

Overall, the value added to personnel expenses was shown to be low in general hospitals with less than 160 beds; thus, the operational strategy for indicators concerning employees should be considered in increasing the efficiency of manpower management.

The number of adjusted patients is calculated by adding the number of outpatients to the total number of inpatient days based on the average daily care

expenses of patients. This approach is widely used in hospital management performance analysis due to its high reliability. As shown in Table 4, the value of daily adjusted inpatient days per 100 beds decreased significantly in both the type of ownership and the number of beds in 2016. This implies that a decrease in the number of patients has affected the deterioration of hospital management.

As shown in Table 5, the number of doctors per 100 beds in private and public hospitals during 2013-2016 is relatively stable, showing no major changes.

A. Liability to Total Assets

The liability to total assets refers to the ratio of debt to total assets. If the indicator has a higher

Table 2. Ownership and the number of beds

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	255	33	98	108	16
	Public	60	10	25	19	6
2014	Private	254	33	95	113	13
	Public	60	10	21	23	6
2015	Private	258	33	105	107	13
	Public	63	10	23	23	7
2016	Private	268	32	95	129	12
	Public	63	11	23	22	7

Table 3. Value added to personnel expenses

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	142.5	140	138	148	144
	Public	121.3	135	149	102	99
2014	Private	144.3	141	141	149	146
	Public	125.0	137	154	105	104
2015	Private	136.0	139	143	153	107
	Public	120.8	132	146	105	100
2016	Private	137.3	144.6	143.4	152.3	109.0
	Public	125.0	133.3	139.2	122.7	104.8

ratio, the financial structure of the hospital is weak; this further determines the efficiency of fund utilization.

In the index for standard ratios presented by KHIDI (2016), the liability to total assets is recommended to be less than 73.1%. As shown in Table 6, the

recommended rates were met in private hospitals, whereas public hospitals with more than 160 beds showed significantly higher levels for liability to total assets. Due to the characteristics of public hospitals, this is assessed as the result of temporarily injecting

Table 4. Daily adjusted inpatient days per 100 beds

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	123.5	138	127	129	100
	Public	150.5	147	169	139	147
2014	Private	138.8	134	136	140	145
	Public	158.0	141	202	139	150
2015	Private	176.3	191.8	189.4	149.5	174.3
	Public	186.0	201.6	216.1	149.5	176.8
2016	Private	91.6	84.6	88.1	102.8	90.7
	Public	107.3	98.7	117.7	111.0	101.7

Table 5. Number of doctors per 100 beds

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	25.2	46.9	22.5	11.2	20.2
	Public	23.6	42.5	23.3	12.8	15.9
2014	Private	24.2	47.8	21.9	12.2	14.9
	Public	25.0	53.0	20.5	10.9	15.6
2015	Private	24.3	47.7	21.5	11.5	16.4
	Public	24.8	50.9	21.2	12.1	14.8
2016	Private	24.8	47.8	24.2	12.0	15.0
	Public	24.5	46.7	24.0	12.2	15.1

Table 6. Liability to total assets

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	71.3	66.7	66.7	73.5	78.3
	Public	56.1	52.8	40.3	52.6	78.8
2014	Private	70.5	68.0	64.3	72.4	77.3
	Public	54.8	54.0	44.8	41.3	79.0
2015	Private	69.8	69.2	61.9	70.7	77.3
	Public	55.6	60.7	44.3	46.4	71.1
2016	Private	66.6	67.3	65.5	68.0	74.2
	Public	100.4	63.4	51.9	132.1	154.2

public funds for investment in medical devices and facilities. However, since the liability to total assets is very high, it is considered necessary to prepare an operational strategy for liquidity.

B. Net Profit to Total Assets

The profitability index as a performance indicator refers to the adequacy of the ratio of input to profit. Further, the net profit to total assets indicator represents the ratio of net profit to total assets. In the index for standard ratios presented by KHIDI (2016), the net profit to total assets is recommended to be more than -0.7%.

Although private and public hospitals have met the recommended rates by number of beds segmentation, private hospitals decreased their net profit to total assets in 2016 compared to 2015, as shown in Table 7. This implies a decrease in the current net profit, which is considered to have affected the deterioration of hospital performance. However, as shown Table 7, especially, profitability of public hospitals increased over time. Therefore, overall profitability should be improved by implementing effective strategies for increasing operating revenue and reducing medical costs.

C. Total Assets Turnover

The total assets turnover refers to the ratio of operating revenues to the assets entered. In other words, this indicator evaluates the ratio of the rotational speed of assets to the operating revenues. A higher ratio implies higher utilization. In the index for standard ratios presented by KHIDI (2016), the total assets turnover is recommended to be more than 1.44 times.

As shown in Table 8, private and public hospitals did not meet the recommended rates by number of beds segmentation in 2013-2016. Although there was no significant difference according to year, public hospitals with more than 160 beds were actively utilized in 2016.

D. Growth Rate of Inpatient, Outpatient, and Operating Revenue

The growth rate of inpatient, outpatient, and operating revenue is an indicator of how much the hospital revenue has increased currently over the previous term. The higher the rate of this indicator, the higher the performance of a hospital. In the index for standard ratios presented by KHIDI (2016), operating revenue is recommended to be more than 9.7%.

As shown in Table 9, private hospitals did not meet the recommended rates by number of beds segmentation in 2013-2016, whereas public hospitals

Table 7. Net profit to total assets

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	0.5	-0.4	-0.6	2.1	0.9
	Public	-4.6	-1.9	-3.2	-7.0	-6.1
2014	Private	2	0.6	1.1	3.5	2.8
	Public	-3.3	-1.5	-1.6	-4.7	-5.3
2015	Private	2.7	0.7	1.6	5.5	2.9
	Public	-0.9	-2.1	0.7	-2.3	0.3
2016	Private	1.9	0.6	1.3	4.5	1.3
	Public	1.7	-1.1	4.4	2.4	1.2

Table 8. Total assets turnover

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	1.1	1.4	1.0	1.0	0.9
	Public	0.7	0.8	0.8	0.6	0.6
2014	Private	1.1	1.4	1.0	1.0	0.9
	Public	0.8	0.8	1.1	0.5	0.7
2015	Private	1.1	1.4	1.0	1.0	0.9
	Public	0.7	0.7	1.0	0.6	0.6
2016	Private	1.1	1.4	1.0	1.0	0.9
	Public	1.5	0.8	1.3	2.0	1.7

Table 9. Growth rate of inpatient, outpatient, and operating revenue

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	3.8	3.8	3.5	4.1	3.7
	Public	7.2	4.7	7.2	7.1	9.8
2014	Private	7.3	4.8	6.3	14.6	3.6
	Public	6.1	5.9	5.9	2.9	9.6
2015	Private	5.6	4.0	4.1	7.3	7.0
	Public	8.6	6.1	6.3	9.4	12.7
2016	Private	6.9	10.3	9.6	8.0	-0.3
	Public	12.8	10.6	11.6	15.4	13.5

met them in 2016. Since the growth rate of inpatient, outpatient, and operating revenue is an indicator of hospital growth, there appear to be large differences in the growth rate depending on the size of beds for each year. Thus, it is necessary to implement measures to expand the volume of care service by increasing the number of patients.

E. Value Added Ratio to Gross Revenue

Value added productivity refers to measuring the effect of output on inputs by value addition. In particular, the concept of value added in hospitals refers to how the increased value is subtracted from operating revenue to material cost. The value added ratio to gross revenue is an indicator of how much of the operating revenue produced in hospitals is

the newly created value. A higher value of the ratio implies an increase in the productivity of the hospital.

As shown in Table 10, the value added ratio to gross revenue gradually decreased in private hospitals with less than 160 beds, and the indicator dropped from 66% to 63% in 2016 in private hospitals with more than 300 beds. The decrease in current net profit affected the deterioration of hospital performance; hence, it is necessary to strategize to increase productivity.

V. Discussion and Conclusions

Along with the development of smart devices, the introduction and application of digital devices enable the healthcare industry to respond quickly to changes

Table 10. Value added ratio to gross revenue

Years	Ownership	Number of beds of general hospitals				
		Average	Tertiary	More than 300	More than 160	Less than 160
2013	Private	64.8	60	60	69	70
	Public	66.0	60	65	69	70
2014	Private	66.0	60	64	70	70
	Public	67.5	61	67	71	71
2015	Private	65.5	60	66	71	65
	Public	66.5	59	67	69	71
2016	Private	64.0	61	63	71	61
	Public	68.3	60	69	71	73

in domestic and overseas business environments to ensure efficient hospital management. In addition, the social needs associated with the very mission and roles of hospitals are changing. Now it is imperative to strengthen the competitiveness for healthcare institutions to effectively accept new social needs. In response to both domestic and international environmental changes, hospital should strengthen their financial soundness. Therefore, it is necessary to examine operational strategies by assessing the financial growth indicators of medical institutions (Curtright et al., 2000).

This study analyzed the financial indicators of general hospitals in South Korea during 2013-2016 to evaluate their performance. The financial indicators were classified into total assets of liquidity; net profit to total assets of performance indicators; total assets turnover of turnover ratios; growth rate of inpatient, outpatient, and operating revenue of growth rate indicators; and value added ratio to gross revenue of productivity indicators, including value added to personnel expenses, daily adjusted inpatient days per 100 beds, and the number of doctors per 100 beds by ownership and number of beds. The results of the study offer new insights into how hospitals should secure their financial stability through effective management, which would help enhance their competitiveness in today's highly turbulent healthcare environment.

The study results confirmed the following: First, a comparison of financial indicators revealed that liability to total assets was generally declining, whereas

net profit to total assets was declining in all segments of beds in 2016; however, the growth rate of inpatient, outpatient, and operating revenue was below the standard in 2015. Second, for public hospitals, the total assets turnover was assessed to be actively utilized in hospitals with more than 160 beds in 2016. This implies that the growth rate of inpatient, outpatient, and operating revenue of public hospitals was improving. Third, in private hospitals, the total assets turnover did not meet in the recommended ratios. However, the overall improvement of value added to personnel expenses appeared to improve the efficiency of hospitals. Fourth, the net profit to total assets of performance indicators was positive in private hospitals, whereas the tertiary public hospitals, in particular, had a negative value, suggesting that the profitability structure appeared to be inadequate. Finally, the number of doctors per 100 beds did not change significantly, whereas the value added to personnel expenses was found to increase. However, since the daily adjusted inpatient days per 100 beds decreased significantly in 2016, the factors affecting the number of patients should be explored in greater detail to develop strategies for greater care services.

The continuous success of hospitals depends on how effectively they adapt to dynamic environmental changes while removing financial obstacles. The results of this study have significant theoretical and practical implications for operational efficiency of hospital management.

First, As shown Table 7, the average profitability

of public hospitals is gradually increasing. It is thought that the increase of the number of patients may be cause to the improvement of quality of care services based on customer's perspective, such as improving care services, better treatment outcomes, safety, behavioral intention, and process efficiency. Since these perspective as care quality service in healthcare can be intangible assets, the value of intangible assets is very important in the market (Ji, 2018). Therefore, CEO and/or managers should make various efforts to improve the quality of care services.

Second, the analysis of financial indicators, growth rate indicators, the utilization of patient care, and labor indicators can be implemented by administrators of private and public hospitals to develop practical strategies depending on the specific characteristics of each hospital. Third, since the study analyzed interrelationships among the indicators to ensure the financial soundness of hospitals, we proposed an example that can logically connect the index results by evaluating multiple indicators, rather than a single indicator, to improve organizational performance. Finally, our study indicated that even when labor costs are efficiently managed, the profitability may not improve. While financial unsoundness is a necessary factor for strengthening hospital operations, reducing the number of employees for this purpose may create an obstacle for the overall hospital performance.

Although hospitals serving special purposes (Cancer and Rehabilitation Center, etc.) were excluded, this study has some limitations, which should be considered in the generalization of its findings. First, the study used the data collected and analyzed by KHID. KHID is a well-known and credible public institution. However, it can analyzes only the information submitted by hospitals pertaining to their accounting and management activities. Second, healthcare services are generally provided through a variety of care departments, thus it is difficult to interpret the overall analysis of South Korean hospitals. Third, for management performance, although various indicators should be evaluated comprehensively, this study selected and analyzed only the representative ratios of each financial indicator; therefore, the results

of this study are difficult to generalize.

Future research should consider the limitations and suggestions mentioned above, including longitudinal studies of financial indicators. To determine whether there are systematic differences among financial indicators across hospitals over time or across hospital type, statistical techniques will be employed, such as chi-square or ANOVA. In addition, an analysis of accounting data should be based on the same accounting standards to improve the reliability of evaluation results. Furthermore, the data should be compared in terms of many classifications, in addition to the type of hospitals and the number of beds.

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