

Impact of Lean Accounting Information on the Financial performance of the Healthcare Institutions: A Case Study

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Abstract: This study examines the impact of lean accounting information on the financial performance of healthcare institutions. Specifically, it analyzes the impact of value stream costing as a lean accounting tool in improving the financial performance indicators of healthcare institutions based on a case study applied in a private hospital. A quantitative case study approach is carried out to assess the financial performance measures under the traditional costing system of the case hospital. The quantitative analysis is also used to identify how the implementing of value stream costing in the case hospital affects the financial performance measures. The findings show that implementing the value stream costing enables managers to distinguish between the value added activities and non value added activities and consequently eliminating the waste and saving the available resources for more effective using. Therefore, the healthcare managers can utilize the lean accounting information to determine the real cost of their services and then improve the financial performance indicators. The study also shows that the analysis of activities into value added and non value added activities allow the managers to improve the competitive advantage by utilizing the cost reduction gained by value stream costing to set a lower price for their services. This study fills up the gap in the literature on the financial performance of healthcare institutions, since, there is a little literature discussing the relationship between value stream costing and financial performance in the healthcare setting. It also provides the healthcare administrators the necessary information to improve both of competitive advantage and financial performance by revealing the real cost of the hospital's services.

Key words: Lean accounting, value stream costing, financial performance, healthcare institutions, cost reduction, competitive advantage

INTRODUCTION

Despite the great interest of healthcare institutions in patients safety and improving service quality as a basis for achieving competitive advantage, these institutions have recently increased their interest in improving financial performance. Healthcare institutions usually seek to improve patient safety and financial performance to ensure financial sustainability and survival in the healthcare market. The costing accounting system plays an important role in improving the financial performance by providing useful information for decision making regarding cost management, pricing and product mix. However, most traditional cost accounting systems do not cope with information requirements for modern enterprise management (Elsukova, 2015). The modern cost management requires detailed cost information on the specific element of the production system could include the capacity utilization, idle capacity cost, unnecessary operations or activities. Therefore, the selection of the suitable cost accounting system has been considered a

challenge in most enterprises because it has an effect on the financial performance. In order to deal with these challenges, manager tend to adopt the lean accounting approach that leads to elimination of waste (Monroy *et al.*, 2012). In this context, the implementation of lean accounting allows companies to reduce production costs and gives them the incentive to improve the financial performance by reducing the overall cost of activities (Aziz *et al.*, 2017). The focus of most prior studies has been on developing an accounting techniques to overcome the shortcomings of traditional costing system and revealing the determinants of financial performance in healthcare institutions, e.g., Tsai *et al.* (2015), McCue (2015, 2017), Grossmeier *et al.* (2016), and Nattinger *et al.* (2018).

Although, the positive impact of lean accounting practices on the financial performance has been demonstrated in the prior research, a little attention has been paid to the association between value stream costing and financial performance in healthcare settings. The lack of attention is documented in the recent literature

Table 1: Types of waste

Types	Description	Example
Overproduction	Unplanned development and production of products or services without specific customer	Producing a new product with big batches exceeds the customer demands
Waiting	Waiting time spent by equipment, people or products which will not add value to the customer	Using storage tanks as a product's buffer for production process waiting the processing in the next step
Transport	Moving product within the same location several times that lead to delay the processing	Packaging facility for customer use could be located outside the production site
Inventory	Keeping raw materials, WIP and products for extended periods	Large batches of intermediate products are kept in the warehouse for an extended period
Over-processing	Any step in the value chain process that does not add value to the customer	The duplication of quality checking or sampling processes
Motion	Unnecessary movement of people, data, product that cannot support the processing	Worker required to move WIP from and to the warehouse every day
Defects	The errors that may occur during the processing which need additional work	Raw materials are out of specification or it is with incomplete documentation

(Melton, 2005)

review carried by Barnes *et al.* (2018) which indicate that there are a limited research that emphasize financial performance and quality performance in the context of healthcare institutions. This study attempts to explore the impact of lean accounting information on the financial performance of healthcare institutions. A quantitative case study approach is adopted to examine the impact of value stream costing on the financial performance of healthcare institutions using the financial data of Iraqi private hospital for the year 2017. Through the comparison between the financial performance measures resulting from the traditional costing system and those calculated after implementing of value stream costing, this study attempts to demonstrate that lean accounting information can improve the financial performance of healthcare institutions.

Literature review

Lean accounting in healthcare: Lean accounting is the philosophy of recognizing and eliminating the non value added activities within the lean production system in order to reduce the production costs (Monroy *et al.*, 2012). The lean thinking approach as a production system has been developed by the Toyota Corporation in 50 sec in order to improve the production processes and reduce costs by eliminating the wastes. Lean accounting is commonly described as a five principles approach that aims to reduce the operating cost by simplification of all production processes and waste removal (Gracanin *et al.*, 2014). In addition, the lean accounting has been developed to help companies to overcome the problems of the traditional costing accounting systems related to providing accounting information for decision making. It can provide different cost reports over value stream on the basis of separating the value added and non value added activities (Haskin, 2010). These reports can help managers identify the production costs that add value from customer conception as well as revealing the wastes

in manufacturing processes which should be removed. Melton (2005) indicates that there are seven waste categories that need to be removed from the value stream map are overproduction, waiting, transport, inventory, over-processing, motion and defects. Table 1 shows a description and an example for each type of waste.

The literature on lean accounting shows many successful applications of lean accounting tools in the manufacturing enterprises (Abuthakeer *et al.*, 2010; Mehta *et al.*, 2012; Azevedo and Sholihab, 2015). Several studies reveal that the implementing of lean accounting tools in service enterprises faces a problem related to the working environment and the variety of services. For instance, Seddon *et al.*, (2011) state that the service firms should modify their services streams to be a standard set in order to overcome the obstacles of lean accounting adoption related to lean failure to deal with the variety of services. However, the recent studies reveal that lean accounting tools are could be successfully applied in both of manufacturing and service enterprises such as D'Andreamatteo *et al.* (2015), Flounders *et al.* (2018) and Improta *et al.* (2018). The adoption of lean accounting is increasingly an important issue in healthcare institutions due to the economic and societal pressures to improve the quality of health services and reduce the their costs. Moreover, the increasing competitive pressures forcing healthcare institutions to adopt the production and accounting systems that provide more flexibility, high quality and ensure a reduction of service costs. Recently, healthcare institutions have begun to increase lean accounting practices and lean management in order to demonstrate that all business practices reflect the reality (Duke, 2017).

Womack and Jones (1996) are among the first studies to suggest lean accounting implementing in the healthcare institutions. They argue that the starting step to implement the lean accounting approach is developing the structure of healthcare processes to be built on the

patient's perspective through increasing the service value and decreasing the lead time. In this sense, the patient satisfaction is the basis for identifying the non value added activities and consequently eliminating waste from processes of healthcare rendering. The lean accounting includes three main tools for lean healthcare institutions are value stream management, visual management and continuous improvement (Maskell and Baggaley, 2004, 2006). This study builds on value stream costing as a lean accounting tool to examine the impact of lean accounting information on the healthcare financial performance. Value stream costing is a visualization tool to enable the managers to understand the flow of information through the value chain and accordingly enables to discover the waste sources (Lacerda *et al.*, 2016). Value stream costing play an important role in motivating the lean improvements and systematically providing relevant information to help managers to highlight the non-value added activities from the patient's perspective and facilitating the accounting process (Ruiz-de-Arbulo-Lopez *et al.*, 2013).

Unlike the traditional accounting systems that focus on the product or service, value stream costing focuses on analysis the processes and eliminate the wastes. Ideally, healthcare institutions start implementing of lean accounting with the mapping and analysis of patient's streams to identify the wastes which may include waiting time, delays, errors and inappropriate procedures (Poksinska, 2010). The value stream map is a basic diagram of a firm's activities in the information and material flows from the product order to delivery.

Figure 1 states the typical elements of value stream costing which is suitable for all manufacturing entities and could be modulated to healthcare institutions. The cost elements of value stream constitute the main resources utilized in the production process and represent the targets of cost reduction procedures that could be taken by management. The value stream analysis focuses on these cost elements in order to determine the waste sources and reduce their inherent costs as well as pricing the value streams within the main operation of the enterprise. In the accounting literature, several studies have been conducted to explain the implications of implementing of value stream costing in the healthcare setting (Shazali *et al.*, 2013; Gracanin *et al.*, 2014; Winkel *et al.*, 2015; Tortorella *et al.*, 2017; Stadnicka and Ratnayake, 2017; Van der Steen and Tillema, 2018). For example, Winkel *et al.* (2015) argue that value stream mapping in healthcare is a contributory tool offers an opportunity to integrate the ergonomics and enhanced performance. In the same context, Tortorella *et al.* (2017) indicate that using value stream

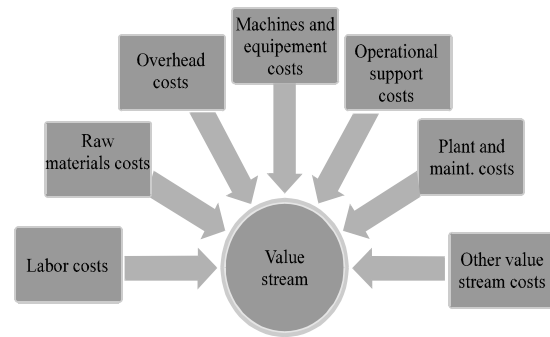


Fig. 1: Elements of value stream costing

mapping for analysis of healthcare activities, systematically leads to decrease the level of inventory, waste and lead time of production. On the other hand, Van der Steen and Tillema (2018) argue that value stream costing can be perceived as an instrument to control the production quality and efficiency measures as well as enhancing the continuous improvement processes. However, the utility and applicability of the value stream costing in healthcare still unclear and some interesting questions and relevant problems need to be addressed despite the growing adoption of lean accounting tools in healthcare institutions.

Financial performance of healthcare institutions: First due to the increasing pressures to enhance service quality and patient satisfaction, the healthcare institutions have become compelled to improve the quality of healthcare services and patient safety in conjunction with improving financial performance. Recently, many healthcare institutions have embarked a quality improvement strategy utilized lean production approach to improve patient safety and financial performance. This is mainly because the prior studies in other industries have documented the effectiveness of lean accounting tools in cost reduction, capacity utilization, enhanced service quality and enhanced financial performance. Specifically, adoption lean accounting tools directly affect the operating performance through the elimination of the non-value added activities and giving a special attention to the value added processes which consequently, enable the production processes to be faster, more efficient and less costly. In this context, Fullerton *et al.* (2014) state that lean accounting provides a core financial control over production processes and integrates with and improve the operations in order to achieve the desired results. In addition, implementation of lean accounting tools in hospital operational activities provides cost information that enables the management to determine the real cost of their services. This enables accurate decisions to be made and profitability to be improved across the entire value

stream by providing financial information that is understandable to everyone involved in the value stream.

In the last decade, several studies have been devoted to study the financial performance in healthcare setting considering the factors affecting the hospital's financial performance. The recent study by Ibrahim (2017) shows that the financial performance of healthcare institutions positively associates to the quality of internal controls. Another study by Dobrzykowski *et al.* (2016) developed a structural equation model to examine the relationships among financial performance, lean orientation, patient safety and internal integration. They show that the comprehensive lean healthcare orientation has a positive direct impact on the patient's safety and indirectly affects the hospital's financial performance. In the same context, (Maskell and Katko, 2012.) indicate that adoption lean accounting help to provide a suitable information for decision making that lead to increase income and profitability by reducing efforts, time and wastes inherent with unnecessary processes. Conversely, Poksinska *et al.* (2017) investigate the relationship between lean healthcare and patient satisfaction. They reveal that implementing of lean accounting in healthcare institutions has a limited effect on patient satisfaction improvement. This result implies that the implementing of lean accounting approach should consider the integration between patient satisfaction and healthcare financial performance. In spite of the fact that there are a large number of studies have investigated the financial performance of healthcare institutions, it is noted that there is a lack of attention among accounting researchers regarding the association between lean accounting information and financial performance. Most previous researches have only focused on the patient safety and healthcare quality and failed to address the relationship between financial performance and various costing systems and especially the lean accounting approach.

To measure the financial performance of healthcare institutions, previous research defined seven measurement dimensions (Barnes *et al.*, 2018). These dimensions include; revenue, profitability, cost, capital structure or leverage, liquidity, activity and utilization. Table 2 summarizes the most frequent financial performance measures in the healthcare setting. As indicated in Table 2, the financial performance indicators of hospitals can be defined under seven performance dimensions are as follows.

Revenue: It refers to the amount or a mix of different types of revenues such as net service revenue, net patient revenue, patient revenue per bed and admission revenue Item.

Table 2: Dimensions of healthcare financial performance

Dimension	Performance indicator
Revenue	Net patient revenue/Operating revenue
	Net patient revenue per adjusted-discharge
	Total revenue
	Average net revenue
Cost	Average revenue
	Operating expenses
	Cost per discharge
	Total operating costs per adjusted-discharge
	Average costs
Liquidity	Labor cost/service
	Days cash on hand
	Net days revenues in accounts receivable
Profitability	Net patient/ days in accounts receivable
	Operating income
	Total income
	Return on assets
Utilization	Cash flow income
	Cash flow
	Occupancy rate
	Charge per medicare case
	FTE per census
Capital structure	Total Full-Time-Equivalent (FTE) staffing
	Average Length of Stay (ALOS)
	Debt to service coverage
Activity	Equity financing
	Total assets turnover
	Fixed assets turnover

Prepared by researchers based on Nurettin (2016)

Profitability: It indicates the hospital's ability to generate returns for instance return on assets, operating margin and total margin.

Cost: It measures the amount of a mix of different kinds of costs such as total expenses per bed, operating expenses and labor costs.

Utilization: It indicates the usage of fixed assets such as average length of stay, occupancy rate and charge per medicare case

Liquidity: It refers to a hospital's ability to meet its financial obligations in a systematic manner such indicators include net day revenue, net patient day revenues and days cash on hand

Capital structure: It indicates the degree of hospital's dependence on debt and equity as a financing methods, such as equity financing and debt service coverage.

Activity: It measures the hospital's ability to convert different assets or liabilities into sales or cash such as fixed asset turnover and total asset turnover.

According to the systematic review by Nurettin (2016) the profitability, cost, revenue performance dimensions have been frequently used in the previous studies. Other financial dimensions such as liquidity,

capital structure, utilization and activity have received less attention by the researchers. Due to its potential impact on cost elements only, the current study uses two dimensions of financial performance are the profitability and cost. In addition, the case study hospital is a for profit organization which implies that profitability improvement and cost reduction are an important goal within the hospital's continuous improvement strategy in conjunction with ensuring the patient safety and satisfaction.

MATERIALS AND METHODS

Similar to Tortorella *et al.* (2017), Matthias and Brown (2016), Lacerda *et al.* (2016) this study applies the case study approach. Alameer Private Hospital (APH) was chosen as the setting for the study as it holds a good share of the Iraqi healthcare market and thus is influenced by the increasing pressures to improve the service quality and financial performance measures to ensure the survival in a high competition environment. Al-Ameer Private Hospital is a private hospital established in 2003 and it is located in the Center of the Najaf Governorate. The number of surgical operations amounted to 2,674 (Najaf Health Department in 2017). The hospital consists of a 5 centers, namely surgery operations center, X rays center, blood bank center and Orthopedics center. All these centers are independent in terms of calculating their revenues and carrying the costs related to the implementation of their activities. For purposes of this study, the Center of Orthopedics is considered as the unit that create the value stream information from the private hospital and all tests and comparisons are done with this value stream unit. The main source of data is the interviews and APH documents as well as the database of the hospital for the financial year 2017. A semi structured interview was developed and comprises four main areas are lean accounting techniques, pricing strategies, lean accounting information and cost reports. The participants in these interviews include executive directors, managers of clinical centers and managerial departments. In addition, the document review involved the activity reports, strategic plans, performance reports, financial reports and operations plans. The quantitative approach is used to measure the financial performance of the case hospital within two measurement dimensions are profitability and cost, each of them comprises 3 different sub-dimensions (indicators). The financial performance indicators used in the current study are briefly presented below.

Profitability indicators: Profitability indicators include the following:

Profit per outpatient visit: It measures the amount of income earned by each outpatient visit, this indicator can be computed by the following Eq. 1:

$$PPV = \frac{\text{Outpatient revenues} - \text{Inpatient operating costs}}{\text{Outpatient visits}} \quad (1)$$

Profit per inpatient discharge: Inpatient discharge is the point at which the patient leaves the hospital either goes home or goes to another medical department and every 24 h represent a single discharge. It measures the amount of income earned by each inpatient discharge, this indicator can be computed by the following Eq. 2:

$$PPD = \frac{\text{Inpatient revenues} - \text{Inpatient operating costs}}{\text{Total discharges}} \quad (2)$$

Return on assets: It measures the amount of income produced by total assets, this indicator can be computed by the following Eq 3:

$$ROA = \frac{\text{Net income}}{\text{Total assets}} \quad (3)$$

Cost indicators: Cost indicators include the following:

Cost per outpatient visit: It measures the average cost of outpatient visits, this indicator can be computed by the following Eq. 4:

$$CPV = \frac{\text{Outpatient operating costs}}{\text{Patient visits}} \quad (4)$$

Cost per inpatient discharge: It measures the average cost of inpatient discharge, this indicator can be computed by the following Eq. 5:

$$CPD = \frac{\text{Inpatient operating costs}}{\text{Total discharges}} \quad (5)$$

Supply cost per inpatient discharge: It measures the supply costs of inpatient discharge, this indicator can be computed by the following Eq. 6:

$$SPD = \frac{\text{Inpatient supply costs}}{\text{Total discharges}} \quad (6)$$

RESULTS AND DISCUSSION

The study focuses on how the lean accounting information can improve the hospital financial performance by comparing the financial performance indicators before and after implementation the value stream costing in the case hospital. Therefore, the subsequent paragraphs will include three steps are assessment of the current costing system in the case hospital, implementation of value stream analysis and analysis of financial performance indicators.

Current costing system in APH: Alameer Private Hospital (APH) where the case study was conducted has 5 medical centers, Orthopedics Center is considered as the unit that create the value stream information and all tests and comparisons will be done with this value stream unit. The inpatient discharge and outpatient visits performed in Orthopedics Center are the cost objects in the hospital. APH uses a Traditional Costing System (TCS) whereby all indirect costs of Orthopedics Center are assigned to the cost objects based on inpatient discharge and outpatient visits number. Accordingly, the costs assigned to both of inpatient discharge and outpatient visit don't reflect the real service cost, this is because the TCS arbitrary allocate the indirect costs and doesn't consider the idle capacity costs in the computation of service costs. In order to assess the current state of costing system in APH two types of data sources were used, the APH' financial reports for the year 2017 and the interviews with the hospital management.

The total costs incurred in Orthopedics Center (2017) have constituted 316, 943, 157 (Iraqi Dinar), these costs comprise the following:

Inpatient supplies costs: Consist of the amounts related to the inpatient's feeding, medications and other medical materials consumed by the center.

Outpatient supplies costs: Consist of the amounts related to the outpatient medications and other materials consumed by the center.

Labor costs: Consist of all labor efforts consumed by Orthopedics Center and involve all the wages and salaries paid for the medical staff.

Depreciation costs: Consist of the depreciations of all medical devices, equipment and computers utilized by the Orthopedics Center.

Table 3: Operating information on Orthopedics Center

Item	Amount
Inpatient supplies and medications cost	51,200,000
Outpatient supplies and medications cost	12,980,000
Total supplies and medications cost	64,180,000
Labor costs	184,800,000
Depreciation of medical equipment	12,933,000
Maintenance of computers and medical equipment	9,607,000
Medical operation support	13,733,000
Total operating costs	285,253,000
Inpatient discharges	2,729
Outpatient visits	6,854
Total assets (for hospital as a whole)	72,455,000
Inpatient revenues	327,765,000
Outpatient revenues	72,455,000
Total revenues	327,765,000
Administrative support	31,690,000
Net operating profits	10,822,000

Table 4: Financial performance indicators under TCS

Performance dimension/Performance indicator	IRD (%)
Profitability	
Profit per patient visit	6.114
Profit per patient discharge	26.772
Return on assets	0.15
Cost	
Cost per patient visit	4.457
Cost per patient discharge	93.332
Supply per patient discharge	7.470

Maintenance costs: Consist all amounts paid for repairing the medical devices, equipment and computers utilized by the Orthopedics Center.

Medical operation support: Consist of the amounts paid for supporting services such as wages of assisting medical staff, patient nursing, etc.

Administrative support: Consist of total costs of cleaning, lighting, heating, cafeteria, etc. Table 3 shows the operating information on the Orthopedic Center for both of inpatient discharges and outpatient visits related operations during the financial year 2017.

This table states that total revenues of Orthopedics Center earned by inpatient discharges and outpatient visits in the financial year 2017 was 327,765,000. The total costs of services sold excluding the operating expenses were 285,253,000 and the net operating profit of this center was 10,822,000 under Traditional Costing System (TCS). After gathering a sufficient observation on the current costing system of APH, the financial performance indicators were calculated. Table 4 summarized the key findings of performance measurement under TCS for each profitability/cost dimensions.

The results as indicated in Table 4 show the results of 6 performance indicators considering the current costs and revenues. These results, based on 2017 data reveal that the profit per patient visit is 6,114 which implies that each patient visit increase the profit of the hospital by

6,114 IRD and consequently this information must be considered in pricing decisions. Besides, the profit per patient discharge represents the profit earned by each inpatient stay in the hospital, APH earned 26,772 from each inpatient discharge and discharged 2,729 patients. The last profitability indicator is return on assets, this indicator was calculated using the earnings of sample unit and the total assets of the whole hospital. Therefore, the return on assets in this case measures the contribution of the sample unit in the hospital's ROA and then the partial ROA was 15% as shown the above table. Table 4 also presents the cost performance indicators at the sample unit for 2017. The cost per patient visit represents the total resources consumed on each patient visit. Such resources may include medical materials and supplies, staff wages, facilities and the allocated part of administrative expenses. The average cost of each patient visit was 4,457 and the total patient visits during 2017 was 6,854 patients. Whereas, the cost per patient discharge measures the average cost of resources consumed on each patient discharge because of the operating costs of the total inpatient discharges during 2017 was 254,703,000, its cost per patient discharge was 93,332. Finally, the supply cost per patient discharge measures the average costs of the medical supplies expended on each inpatient discharge, the total costs of inpatient operating costs during 2017 was 51,200,000 and then the supply cost per patient discharge was 7,470.

Value stream analysis in APH: In order to assess the overall impact of the lean accounting approach on the financial performance of case hospital value stream analysis has been implemented. Value stream analysis starts with the mapping of processes and determining the main activities of Orthopedics Center. Value stream mapping at Orthopedics Center reveals that there are 4 medical units are considered as the processes to create the value stream within the value stream mapping. These processes are:

Value stream, A

Patient data unit: This activity is related to the patient's data in terms of giving guidance to the nurses regarding the information contained in the data or documentation of the patient information.

Value stream, B

Medical inspection unit: This activity includes the providing a medical services performed by doctors in the hospital, either when the patient enters the center for surgeries or periodic inspection.

Table 5: Cost information on patient data unit

Items	Amount
Materials	1,280,000
Labors	26,400,000
Depreciation	6,700,000
Maintenance	1,450,000
Other costs	3,215,000
Total	39,045,000

Value stream, C

Patient nursing unit: This activity provides all the services provided by doctor assistants in the living rooms of patients for emergency or periodic inspection.

Value stream, D

Medical support unit: This activity provides medical support services such as the daily cleaning of patient's living rooms, feeding and other medical support activities. Typically, when we map the value streams in the sample hospital and especially in our target department (Orthopedics Center), we have to find out the waste aspects in the above activities. The value stream analysis of the main processes in the target center will assess the potential waste in time, labor, materials and other resources and consequently enable the management to eliminate the waste in each of above streams. Many interviews with the officials in APH have been performed by the researchers to determine and eliminate the non value added activities within each value stream. Accordingly, following analysis aims to identify the real requirement of the value stream after eliminating the unnecessary wasted efforts and resources.

Table 5 shows the cost information on the patient data unit (Value stream A), after eliminating all waste and idle capacity costs.

The results in Table 5 reveal total reduced costs of A value stream is 39,045,000, most reduced costs were related to waiting time for data registration and extra computer machines used for this activity. All these activities are non-value added from the patient's perspective. Then, the value stream analysis provides relevant cost information for decision makers to reveal non value added operations and removing the wastes resulting from these operations. Table 6 summarizes the cost information of the second value stream (Medical Inspection Unit).

The data in the above table indicate that the total reduced costs of the B value stream is 74,479,000. The value stream analysis uncovers non value added activities including unnecessary medical staff, unused medical devices and extra medical materials and supplies. All non-value added activities are not valued from the perspective of a patient because they don't affect the quality of the services requested by the patients. The

costs related to these activities were removed from above cost summary in order to determine the real costs of the hospital services. The information on cost elements of C value stream (Patient Nursing Unit) are summarized in Table 7.

The results above indicate that the total reduced costs of the B value stream is 69,299,000, the non-value added activities in this value stream consist of 3 elements are waiting time, extra medical staff and empty beds. All these activities are non-value added from the perspective of the patient. The total value stream medical materials, labors and other costs have been reduced to reflect the real costs of the hospital's medical services. The 4th value stream (D value stream) is summarized in Table 8.

This table reveals that the total reduced costs of the D value stream is 63,929,000, the reduced costs were related to waste of waiting time, extra staff and empty beds. All these activities are non-value added from the patient perspective. Then, the value stream analysis provides relevant cost information for decision makers to reveal non value added operations and removing the wastes resulting from these activities. In the value stream costing system, the above-mentioned amounts of costs

can be used to determine the profit or loss to occur in value streams at the end of the period. In this sense, it is possible to arrange the income table which can be formed by considering the value streams. The overall results of value stream analysis are shown in Table 9.

It is apparent from the summarized data shown in Table 9 that the net revenues from both of traditional and value stream income statements were found to be 327,765,000 IRD. In the value stream income table, the costs of services sold was found to be 246,752,000 and the rest amount was 81,013,000. This amount constitutes the gross profit of the value streams in the income table belonging to the value stream costing. The total costs of cleaning, lighting, heating, cafeteria, etc. belonging to all value streams in the hospital are 31,690,000 IRD. Since, these costs cannot be directly attributed to any value stream, the mentioned costs are taken into account as general administrative expenses. Then, the net operating value stream profit is 49,323,000 IRD. Based on the above results, it is can be concluded that the implementation of lean accounting practices will lead to improve the operational performance of the Iraqi healthcare institutions through eliminating sources of waste and consequent reduction of the operation costs. In addition, the value stream based information such as profit and loss report serves as the primary tool to provide useful information for decision making. In addition, it improves the hospital's performance by supporting the operational performance of the hospital in terms of patient satisfaction, quality, cost reduction and rendering of services.

Analysis of financial performance: The implementing of value stream mapping was essential to reach the real costs of APH services and consequently to improve the hospital's financial performance. Since, the implementation of the lean accounting tool VSC in the hospital has led to eliminate the waste and thus, increase the efficiency and quality of healthcare processes. In addition, the resulted information has helped the hospital's management to evaluate the current state of

Table 6: Cost information on medical inspection unit

Items	Amount
Medical materials and supplies	12,380,000
Labors and doctor's wages	54,000,000
Depreciation	3,800,000
Maintenance	3,178,000
Other costs	1,121,000
Total	74,479,000

Table 7: Cost information on patient nursing unit

Items	Amount
Medical materials	8,055,000
Labors and wages (Doctor assistants)	60,000,000
Other costs	1,244,000
Total	69,299,000

Table 8: Cost information on medical support unit

Items	Amount
Materials and foods	39,100,000
Labors and wages	24,000,000
Other costs	829,000
Total	63,929,000

Table 9: Partial value streams income statement

Item	Value stream A	Value stream B	Value stream C	Value stream D	Sub-total	Total
Net revenues	-	-	-	-	-	327,765,000
Medical materials and supplies	1,280,000	12,380,000	8,055,000	39,100,000	60,815,000	-
Labors and wages	26,400,000	54,000,000	60,000,000	24,000,000	164,400,000	-
Depreciation	6,700,000	3,800,000	-	-	10,500,000	-
Maintenance	1,450,000	3,178,000	-	-	4,628,000	-
Other costs	3,215,000	1,121,000	1,244,000	829,000	6,409,000	-
Costs of service sold	-	-	-	-	-	246,752,000
Gross profit	-	-	-	-	-	81,013,000
Administrative expenses	-	-	-	-	-	31,690,000
Operating profit	-	-	-	-	-	49,323,000

Table 10: Comparative indicators of the financial performance

Performance dimension/Performance indicator	Traditional costing system	Value stream costing	Difference
Profitability			
Profit per patient visit	6.114	6.716	602
Profit per patient discharge	26.772	39.370	12.598
Return on assets	0.150	0.680	0.53
Cost			
Cost per patient visit	4.457	3.856	(601)
Cost per patient discharge	93.332	80.735	(12.597)
Supply per patient discharge	7.470	7.078	(392)

operations as well as identifying the critical processes in order to make the corrective actions. The analysis of financial performance indicators has also performed under the VSM information which point out the expected financial results of the proposed costing system. Similar to Dobrzykowski *et al.* (2016) this study demonstrates that the lean accounting information can improve the financial performance of healthcare institutions. The comparison between the two results indicate that the implementing of value stream costing has influenced both of profitability and cost dimensions of financial performance in the case hospital. The following table indicates the impact of VSM on the financial performance measures in Al-ameer Private Hospital.

The results shown in Table 10 states that the lean accounting information resulted from value stream costing has improved the financial performance measures in both profitability and cost dimensions. Our important result of this study was the reduction of the total operating costs from 285, 253, 000-246, 752, 000 as a result to value stream analysis. Decreasing the operating costs made it possible to increase the profitability indicators and decrease the cost indicators while maintaining the total operating revenue level at 327, 765, 000. The detailed analysis of the financial performance indicators has revealed that all profitability indicators were improved because the operating costs were lowered at all value stream levels and lower costs were distributed on a constant patient number hence increases the profitability per patient.

The comparison analysis between the current and perspective costing system found that the average profit per patient visit has decreased by 602 per visit which confirms that the hospital will gain additional income equals 602 for each outpatient visit in the case of VSC adoption. Profit per patient discharge has also increased by 12,598 per inpatient discharge, so, the implementation of VSC will result in a profit per inpatient discharge increase. In addition, the return on assets has extremely shifted from 15% under TCS to be 68% under VSC which confirms that adoption VSC will generate an annual ROA increase by 53%. This upward slope in earnings would be expected if the cost reduction level is relatively constant across all hospital's centers because the slack in the implementation of VSC will push down the profit increase

collectively. Table 10 also indicates that the implementation of VSC has improved the cost measures of financial performance by reducing all cost indicators. To illustrate, the cost per patient visit has declined by 601 per outpatient, so, the hospital's profit will upward slope, a decline in the cost per outpatient visit leads to an increase in the profitability of outpatients. As is apparent from Table 10, cost per patient discharge has also decreased significantly from 93, 332-80, 735, so, this cost decline will lead to increase the patient discharge profitability by 12, 597. On the average, supply per patient discharge has declined by 392 which mean that implementation of VSC will achieve a saving of medical supplies consumed by each inpatient equals to 392.

Eventually, the information provided in this case study could be helpful to managers of healthcare institutions in general and the sample hospital. The performance improvements resulting from implementation of value stream costing reveal that adopting the lean accounting show the real cost of services and lead to provide a solution for those activities that do not add value from the patient's perspective. In this context, considering the amount and the rate of profit or loss that may occur, managers will be able to prevent wasted costs in their value streams.

CONCLUSION

This study attempts to answer a question regarding whether or not the lean accounting information improves the financial performance of the hospitals. To this end, it analyzes the impact of value stream costing as a lean accounting tool in improving the financial performance measures of healthcare institutions based on a case study applied in a Al-Ameer Private Hospital. The study focuses on how the lean accounting information can improve the hospital's financial performance by comparing the financial performance indicators before and after implementing the value stream costing in the case hospital using a data extracted from the interviews and the hospital's financial of the financial year 2017. A semi structured interview was developed and comprises four main areas are lean baccounting techniques, pricing strategies, lean accounting information and cost reports. The participants

in these interviews include executive directors, managers of clinical centers and managerial departments. In addition, the document review involved the activity reports, handling reports, strategic plans, performance reports, financial reports and operations plans.

IMPLIMENTATIONS

The study has clearly shown that implementation of the lean accounting system has led to increase profitability indicators; profit per outpatient visit, profit per inpatient discharge and return on total assets. It also the hospital rate on sales, hospital rate on assets, reduce patient's costs and increase patient/day profit. It has also found the value stream costing improve the cost indicators by reducing cost per outpatient visit, cost per inpatient discharge and supply per inpatient discharge. The improvements in performance indicators across the value stream analysis support the decision makers by providing suitable information regarding cost management in the hospital. The financial performance analysis in this study indicates how decisions are made over the value stream in the hospital using lean accounting while decisions under the traditional costing system are taken at the product level and then the managers can reveal how lean accounting tools simultaneously cover both of process and product levels. The findings also indicate that if the hospitals implement lean production system, the cost of activities could be reduced and the hospital can serve a large number of customers. Accordingly, the financial performance measures will be improved by cost reduction decisions taken by the managers. The study was concerned with a specific Iraqi private hospital, however, the findings could be applicable to the private hospitals in Iraq and other developing countries to improve their competitive advantage internationally.

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