



Article

The Role of Throughput Accounting in Rationalizing Health Service Costs

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Abstract: The companies regardless of their activity, seek to improve their performance level in line with the changes occurring in the labor market, in order to achieve the optimal use of resources and develop operational performance by rationalizing the time and cost of achievement to achieve efficiency in use. The research problem is represented in the following question: How does Throughput accounting contribute to rationalizing the costs of health services? The research aims to demonstrate the importance of Throughput accounting, which is one of the management accounting tools in providing an effective information system that provides the company's management with the information it needs to improve its production processes and increase productivity, thus maximizing its profits. The research reached a set of conclusions, the most important of which is that Throughput accounting provides a number of indicators such as (accomplishment margin, achievement rate, and achievement time) that help in measuring performance and identifying the problems facing the economic unit and ways to address them. Therefore, the research recommends that the hospital should apply Throughput accounting instead of the traditional system in order to provide measures and indicators that help increase profitability and focus on increasing the achievement margin and reducing operating costs to the lowest level.

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1. Introduction

Economic units seek to apply many modern administrative techniques in order to benefit from the information they provide for the purpose of achieving their goals, increasing profitability and managing their resources in the right way. Throughput accounting is one of the administrative techniques that met the needs of management with the necessary information by providing a modern vision about the cost structure by focusing on the cost of direct materials and rationalizing the cost of labor, in addition to providing information that helps management in planning profitability. From this standpoint, the research was divided into three axes. The first axis included the research methodology, the second axis included the theoretical framework, and the third axis included the practical application of the research, in addition to the conclusions and recommendations reached by the research.

2. Materials and Methods

Research Problem

Most companies in general and service units in particular suffer from high costs as a result of using traditional costing methods and approaches in calculating costs that do not provide sufficient information about achievement. From this standpoint, the problem can be formulated according to the following question:

- How does Throughput accounting contribute to rationalizing health service costs?

Importance of the Research

Throughput accounting is one of the important topics in supporting the process of making rational administrative decisions by directing the available economic resources and exploiting them in the best way to achieve rational costs through the use of accounting measures and indicators for achievement.

Research Objectives

The research aims to achieve the following:

1. Provide a theoretical framework for the concepts of performance Throughput accounting and cost rationalization.
2. Shedding light on the application of performance Throughput accounting and evaluating its effectiveness in cost rationalization and providing appropriate information to assist management in improving cost systems.

Research Hypothesis

The research is based on the hypothesis that ((Throughput accounting has an effective role in rationalizing the costs of health services)).

Spatial and Temporal Limits of the Research

- Spatial limits: The Central Children's Teaching Hospital was chosen as the field of application of the research.
- Temporal limits: The year 2016.

The Theoretical Framework for Throughput Accounting and Cost Rationalization

Throughput Accounting

A. Definition of Throughput Accounting

Throughput accounting appeared in the late 1970s in the field of administrative sciences within the writings of Goldratt, and was developed by administrative investors (Galloway & Waldron) in an effort to solve problems that traditional accounting could not solve by providing information to management that helps in determining priorities and answering questions related to the amount of achievement during a specific period of time (Al-Ajlal, 2011: 24) (Abdeen, 2015: 17) Throughput accounting is defined as a simplified method of administrative accounting that provides support to management in the decision-making process for the purpose of increasing profitability by identifying factors that reduce the implementation of goals and then focusing on tools that enhance the achievement of strategic goals in a way that facilitates cost control and management instead of assigning the tasks of improving operations to workers (Lutylsky ,2018: 1384), which is a technique that measures the productive efficiency of businesses by managing restrictions in a good way (Kirli, 2016:82) It is one of the effective strategic cost management methods that provides management with the cost information necessary to

make the necessary decisions by focusing on managing the completion time and the speed of response to customer requirements (Ali & Ahmed, 2021:9).

Throughput Accounting assumes that the company has resources (capital, buildings, and labor) that it spends on purchasing materials, performing operations on them, and then selling them to generate money (Goubergen, 2012, 23). Therefore, cost accounting measures and rationalizes costs by classifying cost elements into two types: the first is the direct materials element and the second is the operating expenses element. Operating expenses are distributed based on the time of completion, weighting the quantity of units sold and the selling price (Murad et al., 2019: 12). Therefore, the only variable cost in the short term is the cost of direct materials, while the rest of the costs are fixed costs. Direct labor costs are treated as fixed costs, unlike traditional cost systems that consider them variable costs (Utku, et al., 2011: 317-331).

B. The Importance of Throughput Accounting

The importance of Throughput Accounting can be summarized as follows: (Al-Moussawi & Al-Tamimi, 2021: 167) (Al-Anbari, 2018: 189).

1. Throughput Accounting focuses on identifying, measuring and managing restricted resources by increasing revenues (achievement), improving cash flow (investment) and providing capabilities (operating costs) to achieve efficient use of resources.
2. It helps management to prioritize decisions that achieve maximum efficiency by providing accounting information that is more consistent with management needs.
3. Throughput Accounting changes the orientation of management from focusing on cost management decisions and budgets to achieving maximum achievement and profitability and emphasizes improving the flow of resources in production processes and provides feedback on the financial impact of restricted resources, which prompts management to improve efficiency and ensure that all company resources are used in the most appropriate manner to maximize profits and achieve goals.
4. Throughput Accounting differs fundamentally from traditional cost accounting because it does not focus on Every machine or worker must work at its ideal efficiency, but the throughput focus on unrestricted resources leads to increased pressure and suffocation in the scarce resource and then to the accumulation of a quantity of excess stock.

Throughput Measurement Indicators

1. Throughput Margin

Horngren defines performance margin as revenue minus direct material costs for goods sold

$$\text{Production margin} = \text{Sales revenue} - \text{Direct material cost}$$

Based on the performance margin, operational processes can be judged, decisions can be made related to production, and the sales mix that achieves the highest profitability for the economic unit can be determined. (Horngren, 2018: 540)

2. Throughput Tate

It is a measure of the speed of money turnover in the companies or the amount of sales per unit of time (whether time adds value to the product or not). This measure helps in identifying activities that take longer and cost more instead of limiting itself to calculating actual operating rates that may hide the efficiency of utilizing total time as one

of the important resources in addition to the quality of performance in the production process (Al-Hassan, 2017: 8).

throughput rate = return per unit of time / cost per unit of time

The throughput rate is calculated as follows (Bakri & Al-Rubaie, 2021: 58)

Completion rate = number of good units sold / total manufacturing time.

3. Throughput Time

It is the time of the production process after issuing the production order. Completion time or manufacturing cycle time consists of (process time, cutting time, transportation time, and waiting time) (Nordmeyer, 2017: 1). It is necessary to classify completion time into value-adding time (operating time) and non-value-adding time (inspection, transit, waiting, and storage time). Therefore, all lost time must be rationalized to maximize achievement. Operating time includes actual operating time after deleting all lost time (non-value-adding time). Therefore, completion time is calculated according to the following equation: (Al-Ashmawy, 2011: 371)

throughput time = operating time (adds value) + lost time (does not add value)

Cost Rationalization

A. Definition of Cost Rationalization

The term rationalization appeared in early 1908 in philosophy as a rational characteristic given to every person capable of providing a logical and continuous argument for all his actions (Jones, 1908:161). The term rationalization was actually applied in the German economy after World War I due to the conflicts that the war left on the economy, which called for the development of the term rationalization to describe the process of reorganization and innovation, by gathering a large group of small businesses into large groups, and removing inefficient producers from the market in order to achieve a balance between supply and demand (Urwick, 1929:14). Thus, cost rationalization was defined as the process of controlling and controlling costs and reaching the lowest level of extravagance and waste by avoiding unnecessary costs, increasing production efficiency and making maximum use of available economic and human resources (Haddad, 2019:19). It is a methodology that aims to prevent the depletion of economic resource inputs by using modern techniques and methods (Moish, 2017 :33) (Jali,2020:5) Or it is the moderate use of costs away from extravagance and waste (Ali, 2015: 55), and because the goals of companies are different, rationalization seeks to achieve the economic and non-economic goals of society by providing public services in service units (Naima, 2015, 90), and Arafat (Abu Hashish) defined it as the process of controlling and directing the unit's resources well in order to provide goods and services at the lowest cost by monitoring costs and discovering deviations, then taking corrective measures in order to achieve a competitive advantage in the market (Abu Hashish, 2010: 27).

B. Benefits of Cost Rationalization

Cost rationalization achieves many benefits, including the following: (Qasim, 2022: 50).

1. Optimal consumption of resources Due to the scarcity of material and financial resources, it is necessary to consume resources appropriately by consuming only the necessary quantity and keeping the remaining resources for the future.
2. Reducing costs and maximizing revenues Cost rationalization helps enhance the concept of strategic cost reduction and thus maximize profits by investing in modern manufacturing technologies.

3. Enhances the use of modern technologies and systems that improve the skills and experiences of employees, thus achieving increased productivity and improving the internal work environment.
4. Improving governance by applying modern technologies and methods that contribute to the exchange of information and communication with management instantly through the dashboard, which reduces the occurrence of malfunctions and accelerates their discovery.
5. Unifying procedures and operations to achieve increased efficiency and effectiveness, enhance productivity, reduce costs and increase profits.

C. Cost rationalization methods

The companies follows one or more cost rationalization methods according to the work activities and their priorities in order to improve the value of the product from the customer's point of view and improve the production process in a way that achieves benefit at the lowest possible cost (Westgaard & Winkel, 2011, p265). From this standpoint, the methods followed by the companies are classified into traditional methods represented by the cost method (total and variable) and standard cost, while modern methods are represented by costing based on activities (ABC), activity-based management (ABM), continuous improvement and development costs, target costing, quality costs (QC), balanced scorecard, benchmarking, value engineering, product life cycle costs, value chain analysis, theory of constraints, achievement accounting, just-in-time purchasing and production system, modern manufacturing systems (CAD-CAM), and total quality management (TQM) (Moish, 2017: 35).

3. Results and Discussion

The Practical Aspect: Throughput Accounting and Its Role in Rationalizing Costs

3.1 An Introductory Overview of the Hospital

The Central Children's Teaching Hospital for Children is one of the most famous major hospitals in Iraq, specializing in treating children exclusively from the age of one day to 15 years. This hospital was established in 1986, with an area of (1) km², and its building includes five floors, each floor has three halls, and according to the necessary diagnosis in each hall, at a rate of (400) beds. It provides its medical and health services to all children from all Iraqi governorates in addition to displaced and immigrant children. The hospital contains a building (the consulting, the doctors' house building, medicine stores, doctors' apartments, the Cambro Center for kidney dialysis, several new departments were added to the hospital, such as the kidney and blood dialysis department for kidney diseases, and the intensive care department. The consulting clinic building, attached to the hospital, was opened at the end of 2012. The hospital also contains a special wing department that provides its services of operations, examination and inspection for patients.

The research will focus on the private section in the hospital because it represents the highest percentage of revenues in the hospital, as the revenues of the private section reach 67% of the total revenues of the hospital, as shown in Table (1).

Table 1. Central Children's Hospital Revenues for the year 2016

Details	Central Children's Hospital	Private Section
Revenues	710,380,137	475,868,932
Revenue Percentage	%100	%67

Source: Prepared by the researcher based on hospital data .

3.2 Calculating The Revenues and Costs of the Private Section

A. Revenues of the Private Section

The private section in the hospital obtains its revenues from the operations performed in the section, which are of five types of operations (special - super-major - major - medium - minor) in addition to the revenues obtained from diagnostic services represented by (laboratory tests - x-rays - echo - sonar - CT - MRI) and Table (2) shows the numbers and amounts of operations performed in the section during the year 2016 in addition to diagnostic services.

Table 2. Sales revenue for the private section (thousand dinars)

No	Product (process)	Quantity	Price	Cost
1	Private	5	725000	3625000
2	Super Large	42	365000	15330000
3	Major	529	290000	153410000
4	Medium	367	215000	78905000
5	Small	24	125000	3000000
	Net Sales*	967		254,270,000
6	Diagnostic Services Sales*			221,598,932
	Total Sales			475,868,932

B. Costs of the Private Section

Table (3) includes the costs of direct materials in the private section for the year 2016, extracted from the records of the cost accounting department in the hospital, as follows:

Table 3. Direct Materials

Material	Quantity	Price	Cost
Gloves	7056	39.6	279418
Cosmetic	14160	867.22	12279835
Pack	5052	223	1126596
Shelf	1704	25	42600
Betadine 100s	136400	2500	341,000,000
Plaster 1m	1764	1581.2	2789237
Cotton 1/4	444	5950	2641800
Syringe	132	390	51480
Foli	132	326	43032
Urine bag	168	150	25200
Angie tube	1800	205	369000
Just tube	12	3172	38064
Mask	4056	5589	22668984
Cup	7056	28.548	201435

Coat	7056	1652	11656512
Bandage	20	6331.38	126628
Wire	1664	13700	22796800
Vicryl	4488	2500	11220000
Nylon	180	750	135000
Total			429,491,620

As for the direct labor costs, indirect manufacturing costs, marketing and administrative costs of the hospital and the private department, they are explained in Table (4).

Table 4. Cost elements for the year 2016

Details	Central Children's Hospital	Private Section
Labor cost	11,438,812,919	327,676,920
FOH	795,673,518	238,702,055
Marketing costs	278,154,857	83,446,457
Administrative costs	920,000	276,000

It is clear to us from Table (4) that the costs of the private section constitute approximately 30% of the total hospital costs, which indicates the high costs for the hospital compared to the revenues achieved. Table (5) shows the income statement for the Central Children's Hospital and the private section according to the traditional method and according to throughput accounting.

Table 5. Income Statement

Details	Central Children's Hospital	Private Section	Throughput accounting
Sales	710,380,137	475,868,932	475,868,932
Direct material	858,983,240	429,491,620	429,491,620
Labor cost	11,438,812,919	327,676,920	-
FOH	795,673,518	238,702,055	-
net profit (loss)	(12,383,089,540)	(520,001,663)	46,377,312
Marketing costs	278,154,857	83,446,457	-
Administrative costs	920,000	276,000	-
Operation cost	-	-	650,101,432
Total profit (loss)	12,662,164,397	603,724,120	603,724,120

From Table (5) above, it is clear to us that:

- The hospital achieves a net loss of 12,662,164,397, while the private department achieves a loss of 603,724,120.
- The method of Throughput accounting considers direct materials as the only variable element within the cost of production (service), while the remaining costs are considered periodic (fixed) costs.
- Under the implementation of Throughput accounting, the Throughput margin equals 46,377,312. On the contrary, the hospital incurs a loss of 520,001,663 when applying the traditional method. Accordingly, the Throughput margin ratio under the implementation of Throughput accounting is according to the following equation:

$$\text{Throughput margin ratio} = \text{Total Throughput margin} / \text{Total costs}$$

$$= 46377312 / 1,079,593,052 = 0.042$$

It is clear from the equation above that the Throughput margin ratio for the hospital is 0.042, which is less than (1) an integer, indicating that the hospital does not achieve profits from its work, which requires consideration of the level of achievement.

$$\begin{aligned} - \text{Total productivity ratio} &= \text{Total Throughput margin} / \text{Total operating costs} \\ &= 46377312 / 650101432 = 0.071 \end{aligned}$$

This is also a weak ratio, which requires working to reduce operating costs by getting rid of additional costs.

The Throughput rate is calculated according to the following equation:

$$\text{Throughput rate} = \text{Number of sales units} / \text{Total production time}$$

Total production time = Number of working days during the month (The official working hours in the private section were adopted as the production time for performing the service, and the reason is that operations and diagnostic services are performed during the official morning working hours, while the watch and evening hours are only inspection and examination time) 22 days (30-8 Fridays and Saturdays) x 12 Number of months in the year = 264 days

$$264 \times 8 \text{ Number of actual working hours} = 2112 \text{ hours during the year.}$$

Throughput rate = $967/2112 = 0.45$, which is a percentage less than (1) integer, which indicates that the hospital does not utilize time appropriately.

$$\begin{aligned} \text{As for work efficiency} &= \text{Throughput margin} / \text{cost of labor wages} \\ &= 46377312 / 327,676,920 = 0.14 \end{aligned}$$

This ratio shows the weakness of management in exploiting the labor resource and their expertise in achieving the hospital's goals.

And the efficiency of direct materials = Throughput margin / cost of direct materials = $46377312 / 429,491,620 = 0.1$ This ratio indicates the weak efficiency of using direct materials by the hospital.

It is clear to us from the above that the hospital suffers from high operating costs and weak performance, which requires efforts to rationalize its costs and improve operational performance to achieve future goals.

When analyzing the operating costs in the hospital, it was found that:

- The high cost of work (the amount of salaries and wages) resulted from the private department charging the salaries of many workers without considering the actual number of workers in the private department. When reviewing the records of the private department and the monthly work orders in the department, it was found that the amount of salaries amounted to 296,423,442.
- Regarding indirect industrial costs, when reviewing the records, it was found that there were amounts spent that did not belong to the private wing department classified under the account (maintenance - materials and supplies - patient equipment) in addition to spending amounts for furniture, machines and equipment that did not add value in the amount of 68,150,841.
- Marketing costs were borne in high amounts that did not add value, while the actual amount spent on marketing services equaled 30,830,557

Table (6) shows the costs after rationalization for the private department.

Table 6. Costs of the Private Wing Section

Details	Before rationalization	After rationalization	Difference
Salaries and wages	327,676,920	296,423,442	31,253,478
FOH	238,702,055	170,551,214	68,150,841
Marketing costs	83,446,457	30,830,557	52,615,900

Table (7) shows the income statement after applying Throughput accounting and rationalizing costs.

Table 7. Income statement after applying Throughput accounting and rationalizing costs

Details	Private Section	Throughput accounting before rationalization	Throughput accounting after rationalization
Sales	475,868,932	475,868,932	475,868,932
Direct material	429,491,620	429,491,620	429,491,620
Liber cost	327,676,920	-	-
FOH	238,702,055	-	-
net profit (loss)	(520,001,663)	46,377,312	46,377,312
Marketing costs	83,446,457	-	-
Administrative costs	276,000	-	-
Operation cost	-	650,101,432	498,081,213
Total profit (loss)	603,724,120	603,724,120	451,703,901

According to Table (7), the Throughput accounting indicators can be calculated after rationalization as follows:

$$\begin{aligned}\text{Throughput margin ratio} &= \text{Total Throughput margin} / \text{Total costs} \\ &= 46377312 / 927,572,833 = 0.05\end{aligned}$$

It is clear from the equation above that the Throughput margin ratio for the hospital increased from 0.042 to 0.05.

$$\begin{aligned}\text{- Total Throughput ratio} &= \text{Total Throughput margin} / \text{Total operating costs} \\ &= 46377312 / 498,081,213 = 0.09\end{aligned}$$

$$\begin{aligned}\text{Work efficiency} &= \text{Throughput margin} / \text{Labor cost} \\ &= 46377312 / 296,423,442 = 0.16\end{aligned}$$

From what we mentioned above, it is clear that Throughput accounting contributes clearly to rationalizing the costs of the private department and improving the achievement, productivity and work efficiency of the private department in the hospital.

4. Conclusion

1. There is a fundamental difference between the net profit calculated according to the traditional method followed by the hospital and the net profit calculated according to the Throughput accounting.
2. Under Throughput accounting, we note that the cost of direct materials is the only variable element in the industrial cost structure, while the rest of the costs, such as wages and others, are considered fixed costs, and the cost of direct materials is reduced from sales revenues to reach the company's production margin.
3. The Throughput accounting method focuses on the hospital's primary goal, which is to maximize the profitability resulting from the actual service sales price in the hospital, not just calculating expenses.

5. Recommendation

1. The hospital administration must pay attention to implementing cost management systems, including the Throughput accounting method, which adopts advanced tools that seek to rationalize costs and maximize achievement in the long term.
2. Increase awareness and culture among hospital employees and management of the importance of Throughput accounting and the extent of its contribution to adding value to the hospital and improving profitability in it.

REFERENCES

- Abdeen, M. H. (2015). *The approach to achievement accounting to develop cost systems in light of modern trends in management accounting: An applied study on Palestinian industrial facilities* (Master's thesis, Islamic University, Gaza, Faculty of Commerce).
- Abu Hashish, K. A. (2010). *Management accounting to rationalize planning decisions* (2nd ed.). Wael Publishing House.
- Al-Ajla, A. A. (2011). *The extent of the possibility of applying the approach to achievement accounting in light of the developments of the modern manufacturing environment* (Master's thesis, Islamic University, Gaza, Faculty of Commerce).
- Al-Anbari, O. A. B. (2018). *Integration of achievement accounting and total quality management and its impact on improving performance: An applied study in Baghdad Soft Drinks Company* (Certification, Higher Institute of Accounting and Financial Studies, University of Baghdad).
- Al-Ashmawi, M. A. (2011). *Cost accounting: Traditional and modern perspectives* (1st ed.). Dar Al-Yazouri Scientific Publishing and Distribution.
- Al-Hassan, K. H., & Others. (2017). *Accounting for achievement*. King Abdulaziz University, College of Administration and Economics.
- Ali, A. B. A., & Ahmed, S. E. M. (2021). The importance of performance accounting and its role in supporting competitive advantage in Sudanese industrial companies. *Journal of Economic, Administrative and Legal Sciences*, 5(25).
- Ali, J. (2015). *Using cost accounting to rationalize production costs in the economic institution: A case study of the Gypsum and Derivatives Unit - Awlad Jalal* (Master's thesis, Mohamed Khaider University, College of Economics and Commerce).
- Al-Moussawi, S. A., & Al-Tamimi, A. M. S. (2021). Employing performance accounting to improve cost systems and its reflection on performance evaluation. *Iraqi Journal of Economic Sciences*, 70.
- Bakri, A. G., & Al-Rubaie, S. M. (2021). The role of accounting technology for achievement in performance evaluation: An applied study in the General Company for Textile and Leather Industries. *Journal of the College of Baghdad for Economic Sciences University*, 65.
- Goubergen, D. V. (2012). Value stream costing in process industries: "Accounting to see". *Van Goubergen P&M*.
- Haddad, H. A. N. (2019). *Strategic cost management between rationalization and reduction to achieve the advantage of cost leadership: An applied study in the General Company for Leather and Textile Industries* (Master's thesis, Al-Mustansiriya University, College of Administration and Economics).
- Jali, Z. F. (2020). *The possibility of applying the QFD quality function deployment tool by computer and its role in reducing costs: An applied study in the General Company for Textile and Leather Industries - Leather Factory* (Certification, Higher Institute of Accounting and Financial Studies, University of Baghdad).
- Jones, E. (1908). Rationalization in everyday life. *Journal of Abnormal Psychology*.
- Kirli, M. (2016). Throughput accounting in strategic cost management: An application. *Annals of Dunarea de Jos University of Galati Fascicle I: Economics and Applied Informatics*.
- Lutitsky, I. D., Liović, D., & Marković, M. (2018). Throughput accounting: Profit-focused cost accounting method. *International Conference Interdisciplinary Management Research XIV*, 18(20), 1382-1395.
- Moish, S. K. (2017). *Rationalizing costs and improving seed quality in light of the application of biotechnology: An applied study in the Ministry of Agriculture, Seed Inspection and Evaluation Department* (Certification, Higher Institute of Accounting and Financial Studies, University of Baghdad).

- Murad, H., Ayoub, M., & Hamina, H. L. (2019). The contribution of performance accounting in rationalizing administrative decisions: A case study in Daliba Plastic Pipes Manufacturing Company. (Master's thesis, Hama Lakhdar University, Faculty of Economics, Commerce and Management Sciences, Department of Financial and Accounting Sciences).
- Naima, Z. (2015). *Optimal methods for rationalizing the costs of public services: A case study of the Algerian Telecommunications Corporation - Biskra Agency* (Doctoral dissertation, University of Kasdi Merbah, College of Economics and Management Sciences).
- Nordmeyer, B. (2017). What is the difference between manufacturing lead time and throughput time? *Small Business Chronicle*.
- Qasim, A. M. (2022). *Rationalizing costs in light of the open-source enterprise resource planning system Odoo: An applied study in Ishtar Hotels Company* (Certification, Higher Institute of Accounting and Financial Studies, University of Baghdad).
- Urwick, L. (1929). *The meaning of rationalization*. Nisbet & Co.
- Utku, B. D., Cengiz, E., & Ersoy, E. (2011). Comparison of the theory of constraints with the traditional cost accounting methods in respect to product mix decisions. *Dogus Üniversitesi Dergisi*.
- Westgaard, R. H., & Winkel, J. (2011). Occupational musculoskeletal and mental health: Significance of rationalization and opportunities to create sustainable production systems. *Applied Ergonomics*, 42(2), 276-283.