

TIME DRIVEN ACTIVITY-BASED COSTIN IN HEALTH SECTOR

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Abstract

This study aims to determine the use of TDABC in formulating health costs and the effect of cost management using TDABC on the health sector. The results of the study are that cost determination with the ABC method is difficult to implement by many organizations because of the high costs that must be incurred for interviews and surveys, the use of subjective and expensive time allocations to validate, and the difficulty of maintaining and updating models. While TDABC only requires estimation of two parameters. Daycoaches can account for complex activities and processes and provide more accurate cost information using time constraints and cost drivers. Therefore, processes with high cost and high variability can be identified and improved. The study concluded that TDABC can provide an accurate assessment of resource consumption and identify potential areas to improve efficiency. TDABC can be used as a strategic decision-making tool regarding the design of more effective treatment lines and thus contribute to cost measurement. The research method used is systematic literature review using PRISMA approach.

Keywords: Time Driven Activity, Based Costing, Health Sector

1. Introduction

The health sector is an integral part of society, and operational efficiency in the provision of health services is crucial to ensure the availability of quality and affordable services. Costing is an important aspect of financial management of healthcare organizations, and traditional methods are no longer adequate enough to reflect the complexity of modern healthcare. Where the health sector is faced with a high level of complexity, both in terms of medical technology that continues to develop, the variety of services provided, and high specifications related to regulations and patient safety standards.

Although the Activity Based Cost t method has been used in the health sector, its complexity often makes it difficult to accurately measure the time spent by medical staff or nurses. This can cause distortions in cost allocation. TDABC came into existence as an evolution of ABC, introducing the concept of time as a key factor in determining costs by setting standard time prices for certain activities.

TDABC helps healthcare organizations to more accurately and transparently calculate the cost of care. With a better understanding of cost structure, healthcare organizations can make smarter decisions related to resource allocation, improved operational efficiency, and more competitive service pricing, helping healthcare organizations to identify cost-saving opportunities without sacrificing quality of service. This can help in nurturing patient engagement and satisfaction.

This article will explore the concept of TDABC and analyze how its application can change the financial landscape in healthcare. which is limited. manage costs more accurately. This article aims to provide an in-depth insight into the concept of TDABC and its relevance in improving cost management in the healthcare sector. By understanding this framework, it is hoped that readers can see the potential of TDABC implementation as a key step towards smarter and more sustainable resource management in health care delivery.

2. Theoretical Background

The healthcare environment is constantly changing with technological developments and government policies. TDABC provides greater flexibility in adjusting to such changes in costing. Through the application of TDABC in costing in the health sector, it is expected that health organizations can improve operational efficiency, optimize resource allocation, and provide quality health services at a more measurable and transparent cost.

It is very important for health organizations to carry out accurate cost calculations so that the rates set by the health sector are not too high which will burden patients or too low which will affect the profitability of the health sector. This is because the goal of the health sector is not only to provide health services but also to want profits so that they can thrive and the Time Driven Activity Based Costing (TDABC) Model is a more accurate approach compared to the ABC system. This model is easy to implement and change, and can handle large-scale enterprises because it requires only two estimation parameters. (Pramitasari 2021)

3. Method

The method used in this study is systematic literature review using the PRISMA approach can be done with the following steps:

- a) Formulation of research questions,
At this stage are formulated questions that are the purpose and focus of research
- b) Article search,
This stage begins with the formulation of inclusion and exclusion criteria, identifies sources of information and ends with the initial search process for articles.
- c) Article collection
At this stage, article selection is carried out based on predetermined inclusion and exclusion criteria.
- d) Data synthesis
At this stage, extracting relevant information from selected articles is carried out then compiling and organizing data to analyze and interpret the findings of each article and look for relationships between articles.

4. Results and Discussion

Based on the steps of systematic research of review literature with the PRISMA approach, the following results were obtained:

- a) Formulation of research questions
A research question is an explicit question about something that the researcher wants to know. In addition, this question determines the purpose of the study and the methods to be used. For this research question is formulated as follows:
RQ1: How is TDABC used in formulating healthcare costs?

RQ2: How does cost management using TDABC affect the healthcare sector?

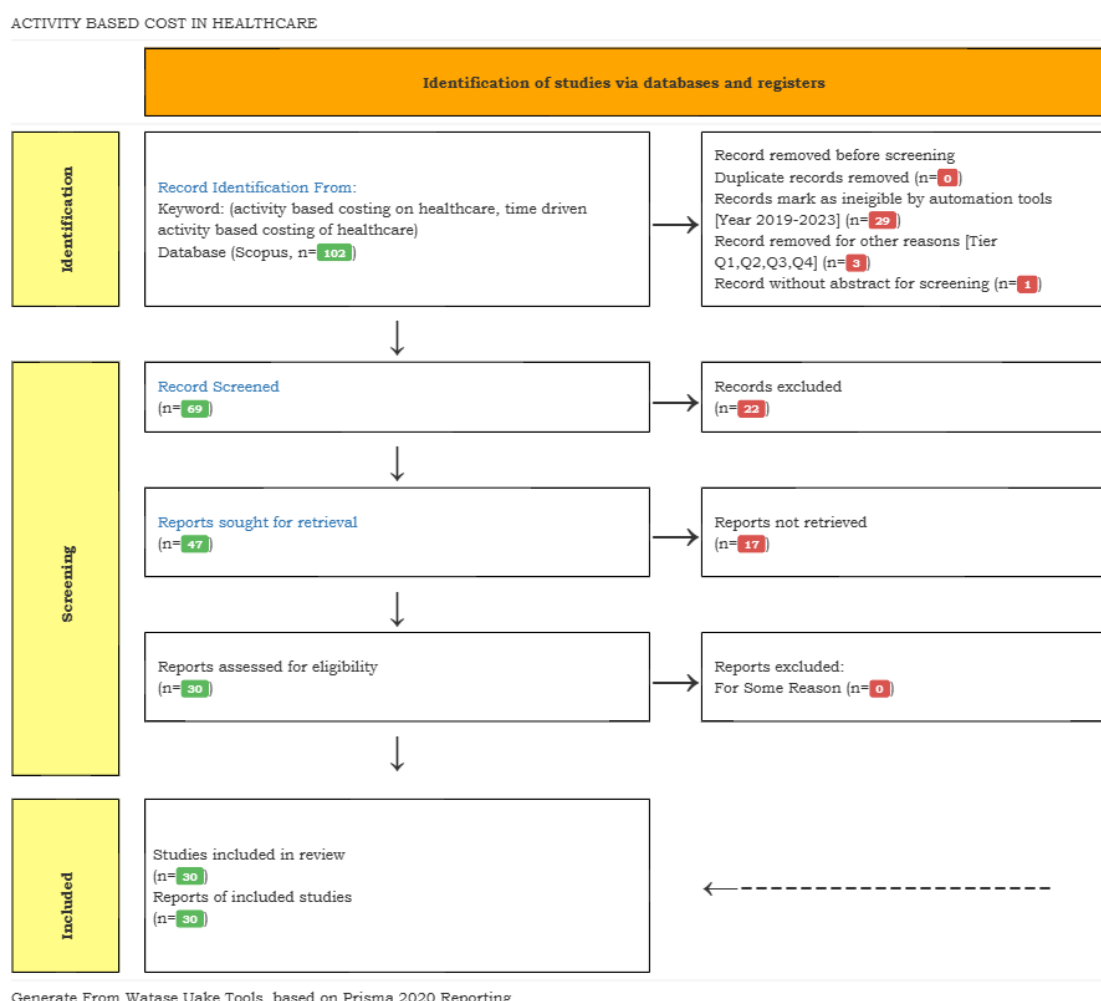
b) Article search

This literature search is focused on articles themed TDABC in the Health sector that uses English and was published in brackets for the last 5 years, namely between 2018-2023. In addition, articles that become literature in this article are articles indexed by Scopus Q1-Q4. This literature search is carried out by utilizing one of the features of the wattage application, namely *Systematic Literature Review* with PRISMA.

c) Article collection

The collection of articles was carried out using the watase uake application with the keyword Time Driven Activity Based Cost in Healthcare obtained 102 articles. In the first stage, 69 articles were filtered, and 33 articles were eliminated of which 29 articles were published before 2018, 3 articles were not indexed by Scopus Q1-Q4 and there was 1 article that did not have an abstract. In the next screening stage, 47 articles were obtained, of which 22 articles were excluded based on the title and abstract of articles that were considered irrelevant to the research theme. At the last stage obtained 30 articles

Where the other 17 articles cannot be obtained. Briefly can be seen in the following prism diagram:



d) Data synthesis

Based on the results of the screening of articles identified thirty articles that are the object of research, it can be seen in table 1.

Table 1. Research article identification

No	Writer	Heading	Journal
1	(Simmonds et al. 2018)	Comparing the real and perceived cost of adenotonsillectomy using time-driven activity-based costing	The Laryngoscope
2	(Etges et. al)	An 8-step framework for implementing time-driven activity-based costing in healthcare studies	The European Journal of Health Economics
3	(Allin, Urman, and Bader 2020)	Using Time-Driven Activity-Based Costing to Demonstrate Value in Perioperative Care Recommendations and Review from the Society for Perioperative Assessment and Quality Improvement (SPAQI)	Journal of Medical Systems
4	(Rognoni et al. 2023) (D 2022)	Editorial Commentary Saving Cost in Orthopedics While Preserving Patient Experience and Outcomes We Can Have It All	Arthroscopy
5	(Mulherkar et al. 2022) .	A primer on time-driven activity-based costing in brachytherapy	Brachytherapy
6	(Callese et al. 2023)	Cost drivers in endovascular pulmonary embolism interventions	Clinical Radiology
7	(Goense et al. 2023)	Cost analysis of robot-assisted versus open transthoracic esophagectomy for resectable esophageal cancer. Results of the ROBOT randomized clinical trial	European Journal of Surgical Oncology
8	(Basto, Chahal, and Riedel 2019)	Time-driven activity-based costing to model the utility of parallel induction redesign in high-turnover operating lists	Healthcare
9	(Ostadi, Mokhtarian, and Mehdi 2019)	A combined modelling of fuzzy logic and Time-Driven Activity-based Costing (TDABC) for hospital services costing under uncertainty	Journal of Biomedical Informatics
10	(Bodar et al. 2020)	Time-Driven activity-based costing identifies opportunities for process efficiency and cost optimization for robot-assisted laparoscopic pyeloplasty	Journal of Pediatric Urology
11	(Defourny et al. 2019)	National costs and resource requirements of external beam radiotherapy A time-driven activity-based costing model from the ESTRO-HERO project	Radiotherapy and Oncology
12	(Kukreja et al. 2021)	Utilizing time-driven activity-based costing to determine open radical cystectomy and ileal conduit surgical episode cost drivers	Urologic Oncology: Seminars and Original Investigations

13	(Reveco et al. 2019)	Determining the Operating Costs of a Medical Surveillance Program for Copper Miners Exposed to High Altitude-Induced Chronic Intermittent Hypoxia in Chile Using a Combination of Microcosting and Time-Driven Activity-Based Costing	Value in Health Regional Issues
14	(Alves et al. 2021)	The cost of metastatic prostate cancer using time-driven activity-based costing	International Journal of Technology Assessment in Health Care
15	(Ali et al. 2023)	Prospective Evaluation of the Cost of Performing Breast Imaging Examinations Using a Time-Driven Activity-Based Costing Method A Single-Center Study	Journal of Breast Imaging
16	(Keel et al. 2020)	Time-driven activity-based costing for patients with multiple chronic conditions a mixed-method study to cost care in a multidisciplinary and integrated care delivery centre at a university-affiliated tertiary teaching hospital in Stockholm, Sweden	BMJ Open
17	(Roman et al. 2020)	Variability in hospital treatment costs a time-driven activity-based costing approach for early-stage invasive breast cancer patients	BMJ Open
18	(Ostadi, Mokhtarian, and Mehdi 2019)	A New Scenario-Based Simulation Model for Cost Management of Healthcare Services through Improving the Efficiency of the Health Centers	Journal of Healthcare Engineering
19	(Blaschke et al. 2020)	Time-Driven Activity-Based Costing A Better Way to Understand the Cost of Caring for Hip Fractures	Geriatric Orthopaedic Surgery & Rehabilitation
20	(Paula et al. 2020)	A standardized framework to evaluate the quality of studies using TDABC in healthcare the TDABC in Healthcare Consortium Consensus Statement	BMC Health Services Research
21	(Wamuti et al. 2022)	Cost of integrating assisted partner services in HIV testing services in Kisumu and Homa Bay counties, Kenya a microcosting study	BMC Health Services Research
22	(Ortet, Seringa, and Santana 2023)	Application of the time-driven activity-based costing methodology to a complex patient case management program in Portugal	BMC Health Services Research

23	(Nguemeleu et al. 2021)	A pre-pandemic COVID-19 assessment of the costs of prevention and control interventions for healthcare associated infections in medical and surgical wards in Qu bec	Antimicrobial Resistance &; Infection Control
24	(Pachito 1871)	Micro-Costing of a Remotely Operated Referral Management System to Secondary Care in the Unified Health System in Brazil	Cincia &; Sade Coletiva
25	(Paula, Etges, and Polanczyk 2022)	Cost standard set program moving forward to standardization of cost assessment based on clinical condition	Journal of Comparative Effectiveness Research
26	(Sethi et al. 2022)	Combining time-driven activity-based costing and lean methodology an initial study of single-level lumbar fusion surgery to assess value-based healthcare in patients undergoing spine surgery	Journal of Neurosurgery: Spine
27	(Chen et al. 2023)	Costs of Newly Funded Proton Therapy Using Time-Driven Activity-Based Costing in The Netherlands	Cancers
28	(Fang et al. 2021)	Episode-of-Care Costs for Revision Total Joint Arthroplasties by Decadal Age Groups	Geriatrics
29	(Rognoni et al. 2023)	Time-Driven Activity-Based Costing for Capturing the Complexity of Healthcare Processes The Case of Deep Vein Thrombosis and Leg Ulcers	International Journal of Environmental Research and Public Health
30	(Fidanza et al. 2022)	What Is the Inpatient Cost of Hip Replacement A Time-Driven Activity Based Costing Pilot Study in an Italian Public Hospital	Journal of Clinical Medicine

Based on the year of publication, in figure 1 it can be seen that in the vulnerable time from 2018 to 2023, in the last two years, namely 2022 and 2023, the most articles discussing TDABC in the health sector were published at 7 articles each. This indicates that the application of TDABC in cost management in the health sector has been in great demand in the last two years.

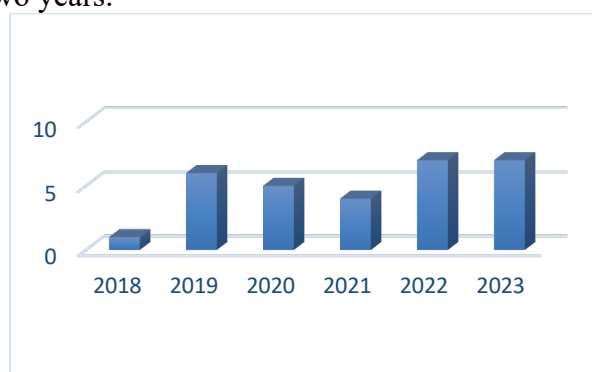


Figure 1. Article Diagram by Year Published

To ensure the quality of this research, all articles used in this study come from journals indexed by Scopus. Based on the ranking, the article can be classified as shown in figure 2. Of the 30 articles, 60% are indexed by Scopus Q1 and the rest are indexed by Scopus Q3 and Q4, respectively 30% and 10%.

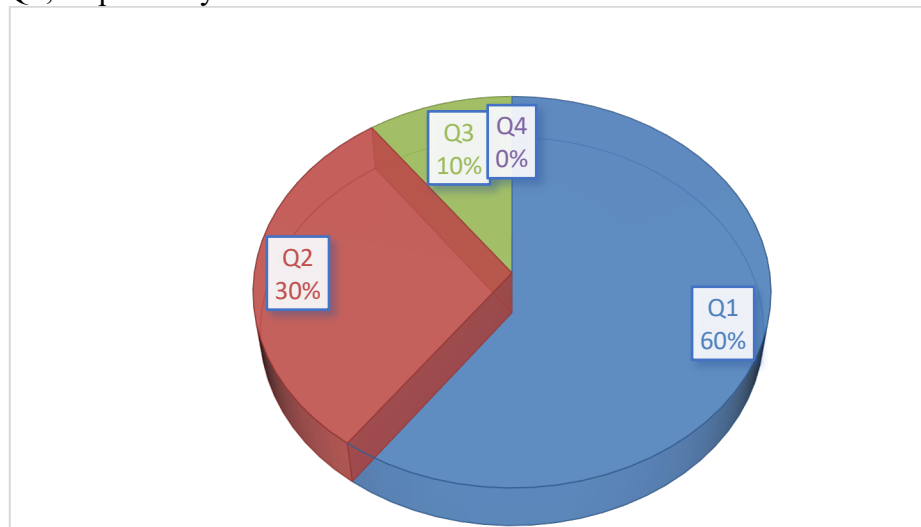


Figure 2. Article based on Scopus Index

Of the 30 articles in table 1, 27 of them discuss the implementation of TDABC in the calculation of medical or treatment costs, whose graph is presented in figure 3.

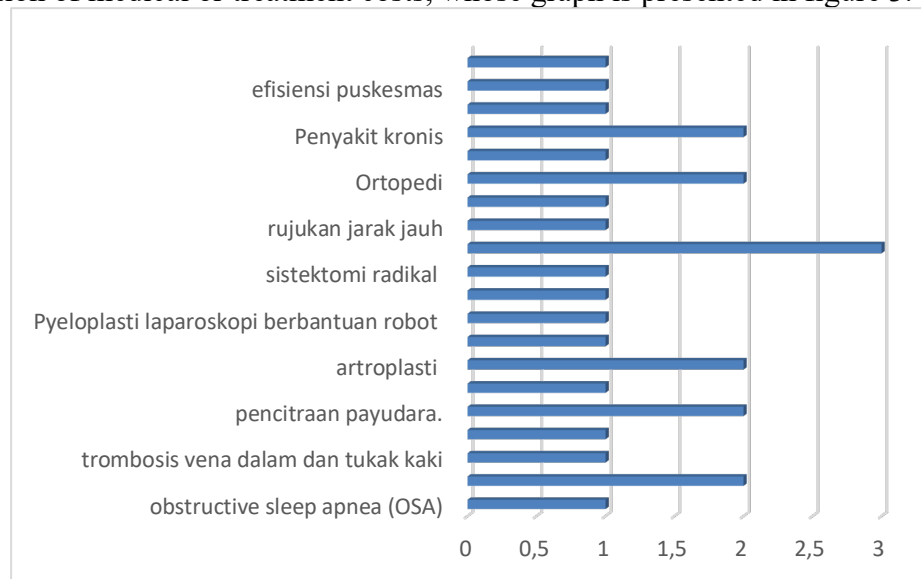


Figure 3. TDABC implementation in health cost calculation

4.1 Discussion

Time driven activity based costing (TDABC) is a costing procedure developed from activity based costing (ABC). (Kaplan and Anderson 2003) state that costing by the ABC method is difficult for many organizations to implement due to the high costs involved in interviews and surveys, the subjective and expensive use of time allocation to validate, and the difficulty of maintaining and updating models. While TDABC only requires an estimate of two parameters: (1) the unit cost to supply capacity and (2) the time required to perform the transaction or activity.

In the health sector, cost determination using the TDABC method is carried out in 7 steps, namely: (1) selecting medical conditions and / or patient populations to be examined; (2) define the service value chain; (3) create a process map of each activity in patient care delivery and identify the resources involved as well as the supplies used to patients at each step of the process; (4) obtain time estimates for each step of the process; (5) estimate the cost of providing each patient care resource; (6) estimate the practical capacity of each resource provided and calculate the level of capacity cost; and (7) calculate the total cost for each patient service cycle (Kaplan and Porter 2011)

Health cases vary from patient to patient, resulting in variations in the costs that must be incurred. TDABC models, using time equations and cost triggers, can account for complex activities and processes and provide more accurate cost information. The system can also identify unused resources and unused capacity, thus providing better resource management (Ostadi, Mokhtarian, and Mehdi 2019). Thus, processes with high cost/high variability can be identified for process improvement and the Study concludes that TDABC provides an accurate assessment of resource use and can identify potential areas for improvement in efficiency. TDABC can also align efforts to coordinate care between departments (Allin, Urman, and Bader 2020) (Fidanza et al. 2022). TDABC can contribute to measuring costs because it can be used as a strategic tool to make decisions regarding the design of more effective treatment pathways (Paula, Etges, and Polanczyk 2022).

As an effort for cost efficiency, many options can be made, including optimizing the role of support staff, as well as implementing a shorter fractionation schedule clinically (Mulherkar et al. 2022), increasing robot utilization, decreasing operating room lap times, and optimizing pre-operative waiting times (Goense et al. 2023) (Bodar et al. 2020) (Kumar et al. 2022), besides that cost-effectiveness can also be done by improve the efficiency of operating rooms and perioperative settings, reduce hospitalization costs, as well as rehospitalization costs, for example by promoting more efficient recovery programs. (Kukreja et al. 2021) (D 2022)

Although some studies reveal that TDABC is more accurate in costing, (Blaschke et al. 2020) consider that unlike traditional methods, cost allocation in health care considers all equipment, personnel, and operational costs as part of total costs. TDABC does not include substantive indirect overhead costs. (Ostadi, Mokhtarian, and Mehdi 2019) also stated that estimating the cost and time required for most hospital activities is subjective and uncertain. Because many decisions and costing processes in a hospital environment are conducted under uncertainty, the use of TDABC methods often does not produce satisfactory results.

In order to make the use of TDBAC models more accurate, several studies combine it with other methods including The combination of TDABC and Lean methodologies can help allocate costs appropriately, optimize value-based care pathways, and improve patient care (Sethi et al. 2022). The improvement of the TDABC method is also marked by the emergence of the TDABC Fuzzy Logic Method (FL-TDABC) which estimates the cost of health services based on uncertain conditions in hospitals. (Ostadi, Mokhtarian, and Mehdi 2019) (Ostadi, Daloie, and Sepehri 2023)

5. Conclusion

Time driven activity based costing (TDABC) is a costing procedure developed from activity-based costing. states that costing by the ABC method is difficult for many organizations to implement due to the high costs that must be incurred for interviews and

surveys, the use of subjective and expensive time allocations to validate, and the difficulty of maintaining and updating models.

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5.1 Limitations

- a) Time and Resource Limitations:
- b) SLRs take significant time and resources to get right. The process involves a careful literature search and evaluation of hundreds or even thousands of articles.
- c) Dependence on the Quality of Available Literature:
- d) The quality of SLR results largely depends on the quality of the available literature. If there is no adequate literature or if the existing literature is not of high quality, then the SLR results may not be representative.
- e) Potential Literature Selection Bias:
- f) The literature selection process in SLR can be prone to bias, especially if not done carefully. This can lead to a neglect of literature that may be relevant or a tendency to choose literature that supports a particular view.

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