Journal of Global Economics and Business **January 2024, Volume 5, Number 16, 1-15**
ISSN: Print 2735-9344, Online 2735-9352

THE ANALYSIS OF TIME-DRIVEN ACTIVITY-BASED COSTING APPLICATION AS A DYNAMIC VALUE ASSESSMENT AND MORE ACCURATE COSTING SYSTEM IN HEALTHCARE SECTOR

Rezhin Dhahir FATAH,
Department of Accounting, Collage of Administration and Economics, University of Sulaimani, Iraq
rezhin.fatah@univsul.edu.iq

Abstract

In the era of the considering development of technology at different aspects and its role in providing managers information and knowledge for decision making, it is important for managers to receive information in a timely manner. Healthcare policies are emphasizing value-based healthcare delivery and time-driven activity-based costing (TDABC) can be used to appraise healthcare interventions in healthcare sector. This study aims to critically several empirical studies conducted in respect of Time Driven Activity Based Costing to shed light on its importance and role as a dynamic assessment tool in accurate costing in healthcare industry. The result of the review showed that application of TDABC in healthcare sector will lead to more accurate costing and provides manager with proper information at appropriate time. Thus, Time-driven activity-based costing can dynamically model changes in our healthcare delivery as a result of process improvement interventions. It is an effective tool to continuously assess the impact of these interventions on the value of appendicitis care.

Keywords: *Time Driven Activity Based Costing, Accurate Costing System, Dynamic Value Assessment, Healthcare.*

DOI: 10.58934/jgeb.v5i16.229

1. INTRODUCTION

In the classroom, activity-based costing looks like a great way to manage a company's limited resources. But many managers who have tried to implement ABC in their organizations on any significant scale have abandoned the attempt in the face of rising costs and employee irritation (Mahmood & Sabir, 2023). They should try again, because the new approach we lay out in the following pages sidesteps the difficulties traditionally associated with large-scale ABC implementation by relying on informed managerial estimates rather than on employee surveys

(Rashid, 2023). It also provides managers with a far more flexible cost model to capture the complexity of their operations (Budur, 2020; Rashid, 2023).

The solution to the problems with ABC is not to abandon the concept. ABC after all has helped many companies identify important cost- and profit-enhancement opportunities through the repricing of unprofitable customer relationships, process improvements on the shop floor, lower-cost product designs, and rationalized product variety (Rashid, 2020; Khadr et al., 2023). Its potential on a larger scale represents a huge opportunity for companies. Fortunately, simplification is now possible through an approach that we call time-driven ABC, which has successfully helped many companies to allocate costs more accurately to cost objects. In the revised approach, managers directly estimate the resource demands imposed by each transaction, product, or customer rather than assign resource costs first to activities and then to products or customers (Budur et al., 2018). For each group of resources, estimates of only two parameters are required: the cost per time unit of supplying resource capacity and the unit times of consumption of resource capacity by products, services, and customers (Rashid, 2019; Jaf & Rashid, 2023). At the same time, the new approach provides more accurate cost-driver rates by allowing unit times to be estimated even for complex, specialized transactions (Kaplan & Anderson, 2003; Rashid & Sabir Jaf, 2023).

First described in health care by Professor Kaplan at the Harvard Business School, TDABC represents a method whereby organizations can understand the costs of generating a particular health outcome based off the resources used. TDABC allows for calculating costs of an activity, regardless of whether the service was performed on the inpatient or outpatient side. Performing TDABC requires knowing (1) the unit cost of supplying that resource; (2) understanding how much time is involved in delivering that resource. Although there has been some criticism of its use, TDABC provides a more granular look at costs in health care (Sharan & Schroeder, 2016; Rashid, 2018; Budur et al., 2023; Fatah & Jaf, 2023).

Transitioning to this new system will require providers to take a more longitudinal view of the activities they perform to determine if the various steps in a process contribute value to the patient. Performing a value chain analysis will be critical.1 By performing a deep analysis of the cost of each step, providers will be able to truly understand the aggregate costs for a particular episode of care. This will require taking into consideration not only labor and personnel costs, but also the costs of supplies, drugs, equipment, and space. In addition traditional cost accounting methods separate the costs of inpatient care versus outpatient care.

Many providers use different software for each component. As the health care system transitions to a bundled payment system, the costs of inpatient and outpatient care will need to be combined under one system (Rashid, 2017).

The new approach, which we call Time-Driven Activity-Based Costing (TDABC), gives companies an elegant and practical option for determining the cost and capacity utilization of their processes and the profitability of orders, products, and customers. TDABC enables companies to improve their cost management systems, not abandon them. Managers obtain accurate cost and profitability information to set priorities for process improvements, rationalize their product variety and mix, price customer orders, and manage customer relationships in ways that benefit both parties (Kaplan & Anderson, 2007; Rashid & Noori, 2017).

The objective of this paper is to review several articles conducted in respect of time driven Activity Based Costing and to shed light its effect on value creation during implementation, especially in healthcare sector (Noori & Rashid, 2017).

The remainder of this paper is structured as follows. Section two shows several relevant reviews of previous theoretical and empirical frameworks in the literature. Section three and the final chapter include a conclusion of this study and suggestions for future research.

2. LITERATURE REVIEW

Time-Driven Activity Based Costing (TDABC) is a variation of ABC which intends to be simpler and friendlier based on the execution times of the activities necessary to produce the product or provide the service (Dalci, Kosan & Tanis, 2009). A TDABC system is presented in the form of time equations which reflect the costs of different cost objects taking into account the particularities of activity consumption that characterize the production processes of each particular product. There are several case studies on the implementation of TDABC, having been observed its advantages, namely that it is a model of easy construction, easy integration with software management and a easy approach for obtaining information about the consumption of resources by cost objects (Pernot, Roodhooft & Abbeele, 2007). Through the TDABC, it is possible to study the effectiveness of the processes in terms of available capacity versus effective capacity utilization. The authors of this approach (Kaplan & Anderson, 2007) argue that the use of time equations result in a simpler and less costly computation model than the ABC method. Among other advantages, TDABC allows assessing the value added of each

activity, simulating the use of resources and testing processes of capacity rationalization considering the unused capacity. But some limitations were also noted in some case studies in which, for example, the fact that it may be required a huge amount of data for estimating time equations (Varila, Seppanem & Suomala, 2007).

Sharan et al (2016) in their study argued that transitioning to a value-based health care system will require providers to increasingly scrutinize their outcomes and costs. Although there has been a great deal of effort to understand outcomes, cost accounting in health care has been a greater challenge. Currently the cost accounting methods used by hospitals and providers are based off a fee-for-service system. As resources become increasingly scarce and the health care system attempts to understand which services provide the greatest value, it will be critically important to understand the true costs of delivering a service. An understanding of the true costs of a particular service will help providers make smarter decisions on how to allocate and utilize resources as well as determine which activities are nonvalue added. Achieving value will require providers to have a greater focus on accurate outcome data as well as better methods of cost accounting.

Hence, Tibor et al (2017) examined the improvement of efficiency by implementing Time Driven Activity Based Costing. The purpose of the study is to increase efficiency in MR enterography using a time-driven activity-based costing methodology. The study conducted on a multidisciplinary team that was formed to identify the personnel, equipment, space, and supply costs of providing outpatient MR enterography. The team mapped the current state, completed observations, performed timings, and calculated costs associated with each element of the process. The team used Pareto charts to understand the highest cost and most time-consuming activities, brainstormed opportunities, and assessed impact. Plan-do-study-act cycles were developed to test the changes, and run charts were used to monitor progress. The process changes consisted of revising the workflow associated with the preparation and administration of glucagon, with completed implementation in November 2015. The result of the study showed that the time-driven activity-based costing methodology allowed the radiology department to develop a process to more accurately identify the costs of providing MR enterography. The primary process modification was reassigning responsibility for the administration of glucagon from nurses to technologists. After implementation, the improvements demonstrated success by reducing non-value-added steps and cost by 13%, staff time by 16%, and patient process time by 17%. The saved process time was used to augment

existing examination time slots to more accurately accommodate the entire enterographic examination. Anecdotal comments were captured to validate improved staff satisfaction within the multidisciplinary team. Conclusions: This process provided a successful outcome to address daily workflow frustrations that could not previously be improved. A multidisciplinary team was necessary to achieve success, in addition to the use of a structured problem-solving approach. Additionally, Yu et al (2017) reached the same result with pediatric department in health care. They stated that healthcare reform policies are emphasizing value-based healthcare delivery. They hypothesize that time-driven activity-based costing (TDABC) can be used to appraise healthcare interventions in pediatric appendicitis. Triage-based standing delegation orders, surgical advanced practice providers, and a same-day discharge protocol were implemented to target deficiencies identified in their initial TDABC model. Post intervention process maps for a hospital episode were created using electronic time stamp data for simple appendicitis cases during February to March 2016. Total personnel and consumable costs were determined using TDABC methodology. The study also revealed that the post-intervention TDABC model featured 6 phases of care, 33 processes, and 19 personnel types. Their interventions reduced duration and costs in the emergency department (−41 min, −$23) and pre-operative floor (−57 min, −$18). While post-anesthesia care unit duration and costs increased (+224 min, +$41), the same-day discharge protocol eliminated post-operative floor costs (−$306). Our model incorporating all three interventions reduced total direct costs by 11% ($2753.39 to $2447.68) and duration of hospitalization by 51% (1984 min to 966 min). Conclusion: Time-driven activity-based costing can dynamically model changes in our healthcare delivery as a result of process improvement interventions. It is an effective tool to continuously assess the impact of these interventions on the value of appendicitis care

In linking the application of Time Driven Activity-Based Costing to performance, Al-Halabi & Al-Mnadheh (2017) conducted a research to find out the Impact of application of Time Driven Activity-Based Costing on Improving the Efficiency of Performance. The paper explored the impact of applying the time driven activity-based costing-TDABC- model (independent variables) on improving the efficiency of performance (dependent variables) in Jordanian industrial corporations. Based on a questionnaire form data from a sample of 73 participants at different managerial positions, from 30 industrial corporations listed in Amman stock exchange (ASE), were gathered and processed using the statistical package of social sciences. The main results showed that there are significant impacts of applying TDABC on improving the efficiency of performance in Jordanian industrial corporations. The main

conclusion indicated that TDABC has the ability to benefit from technological developments on the basis of the activities' charts and reflected on pricing decision making processes in industrial corporations. The research also concluded that senior management and cost accountants of the sample studied did not desire in the short run to change the current cost accounting system due to the additional costs of using the new cost accounting system. The study recommended the application of TDABC in corporations where their operations relied on TDABC's constituents as proved its impact on reducing costs of products and increasing corporation's profitability.

Most recently, in attempting to assess the time driven activity based costing Masthoff et al. (2020), conducted a research to evaluate time-driven activity-based costing (TDABC) in interventional radiology for image-guided vascular malformation treatment as an example. Retrospective analysis was performed on consecutive vascular malformation treatment cycles [67 venous malformations (VMs) and 11 arteriovenous malformations (AVMs)] in a university hospital in 2018. All activities were integrated with a process map, and spent resources were assigned accordingly. TDABC uses 2 parameters: (i) practical capacity cost rate, calculated as 80% of theoretical capacity, and (ii) time consumption of each resource determined by interviews (23 items). Thereby, the total costs were calculated. Treatment cycles were modified according to identified resource waste and TDABC-guided negotiations with health insurance. As a result, it revealed that the total personnel time required was higher for AVM (1,191 min) than for VM (637 min) treatment. The interventional procedure comprised the major part (46%) of personnel time required in AVM, whereas it comprised 19% in VM treatment. Materials represented the major cost type in AVM (75%) and VM (45%) treatments. TDABC-based treatment process modification led to a decrease in personnel time need of 16% and 30% and a cost reduction of 5.5% and 15.7% for AVM and VM treatments, respectively. TDABC-guided cost reduction and TDABC-informed negotiations improved profit from 56% to þ40% and from þ41% to þ69% for AVM and VM treatments, respectively. They conclude that TDABC facilitated the precise costing of interventional radiologic treatment cycles and optimized internal processes, cost reduction, and revenues. Hence, TDABC is a promising tool to determine the denominator of interventional radiology's value.

3. DISCUSSIONS

It can be argued that the Time Driven Activity Based Costing has been examined in other industries. For example, Simsek (2016) attempted to find the effect of TDABC in banking

sector. He pointed out that with the increasing complexity and the quantity of business transactions, organizations are seeking for new solutions for the decision making processes continuously. Management Accounting is a process of combining the financial and non-financial data to create a knowledge-based decision making environment. Technological improvements stimulate the innovations in Managerial Science as well as in Management Accounting. Innovations in the design of Cost Structure, as an important component of the business model, contribute granularity, simplicity and visibility to organizations' profitability analysis and decision making processes. Cost allocation methodologies have emerged from the necessity of an accurate cost calculation for the products or services in order to estimate the profitability properly after the traditional costing, and it has increased a substantial attention in the academic environment. Nevertheless, the application has fallen behind the estimations because of the challenges and difficulties in the applications of the methodologies in practice. The result showed that a picture of the activities and the capacity usage of Corporate Banking unit in "A Bank", which can be used for improvement decisions, on the other hand, the study also provides an ability to allocate operational labor cost to each transaction based on the nature and distinctive features of each transaction, which can be used for profitability analysis. It is important to see the effects and implications of TDABC after completing the application to all customers of "A Bank", and then the management can decide on the usage area of the results of the applied methodology

Hadi, & Alubaidy (2019) also conducted a research in the General State of Hydraulic Industries. They argued that the interest of many companies has become dealing with the tools and methods that reduce the costs as one of the most important factors of successful companies, and became the subject of the attention of many economic units because of the impact on the profits of company, and since the nineties of the last century the researchers and writers gave great attention to this subject, especially in light of the large competition and rapid developments in cost management techniques, as well as the wide and significant change in production methods that have been directed towards achieving customer satisfaction, all this and more driven by economic units in all sectors whether it is service or productivity to find methods that would reduce the costs and thereby increase the profits. As well as achieving a market share compared to economic units operating in the same sector. This study seeks to apply the method of reducing the manufacturing factory overhead costs through the use of time-driven activity-based costing. The aim of the research is to use this technique and to determine the effect of this method in measuring the profit persistence of the company. The traditional

method used in the company the research sample to determine the indirect costs and the extent of its impact on the measurement of the profit persistence, the definition of the concepts and characteristics of the method of cost-based activity and the cost method based on time-driven activity and justifications applied to companies, so, the research problem was that the traditional method used by the company the research sample in determining manufacturing factory overhead costs is not fair and objective as it builds the actual basis for determining manufacturing factory overhead costs at the level of the factory as a whole. Consequently, it does not represent cost-effective information that reflects the cost-effectiveness of the plant in the sample of the research and in a manner that affects the profitability of the company the research sample and thus in measuring the profit persistence.

Moreover, Ostadi et al. (2019) combined modelling of fuzzy logic and Time-Driven Activity-based Costing (TDABC) for hospital in their research. They stated that hospital traditional cost accounting systems have inherent limitations that restrict their usefulness for measuring the exact cost of healthcare services. In this regard, new approaches such as Time Driven-Activity based Costing (TDABC) provide appropriate information on the activities needed to provide a quality service. However, TDABC is not flawless. This system is designed for conditions of relatively accurate information that can accurately estimate the cost of services provided to patients. In this study, the fuzzy logic in the TDABC model is used to resolve the inherent ambiguity and uncertainty and determine the best possible values for cost, capacity, and time parameters to provide accurate information on the costs of the healthcare services. This approach has not yet been tested and used in determining the costs of services of a healthcare setting. Therefore, the aim of this study is to present a new Fuzzy Logic-TDABC (FL-TDABC) model for estimating healthcare service costs based on uncertainty conditions in hospitals. The proposed model is implemented in a sample of the hospital laboratory section and the results are compared with the TDABC system. The TDABC model, by allocating the activity costs including fixed costs and not considering the uncertainty regarding the cost, capacity, and time required for each patient, often estimates the unused capacity and costs with a higher margin of error. The results show that the maximum difference in the prescribed costs was 4.75%, 3.72%, and 2.85% in blood bank, microbiology, and hematology tests, respectively, mostly due to uncertainty in the costs of consumables, equipment and manpower (on average 4.54%, 3.8%, and 3.59%, respectively). Also, The TDABC system, in comparison with the proposed system, estimates the unused capacity of the resource with more error. Cost of unused capacity derived using FLTDABC were 80% of costs derived using TDABC.

Koolmees & Makhni (2020) compared the TDABC with traditional ABC in orthopedic surgery. They attempted to analyze the implementation and benefits of Time Driven Activity-Based Costing (TDABC) in the field of orthopaedic surgery. They performed a search of PubMed, Google Scholar, and Em base in March 2020, using the following terms: "Time-Driven Activity-Based Costing" "TDABC" "Orthopaedic Surgery" "Cost." Then they selected the studies that used the TDABC methodology to generate costs for a 38 particular aspect of orthopaedic surgery. The included studies were divided into the following 5 main categories for ease of analysis: joint arthroplasty, trauma, hand, EMR implementation, and pediatric. The study analyzed the overall ability of TDABC in the field of orthopaedic surgery, compared to the standard costing methods. They included a total of 19 studies that implemented the TDABC methodology to generate a cost, which was compared to traditional accounting methods. The orthopaedic subspecialty with the most amount of TDABC implementation has been the field of joint arthroplasty. The result showed that TDABC has provided a more granular breakdown of the costs, and it has calculated a lower cost when compared to traditional accounting methods. Thus, TDABC is a powerful cost analysis method that has demonstrated benefit over the ABC approach in determining a lower and more accurate cost of orthopaedic procedures.

Furthermore, Heaton et al. (2019) tried to apply time-driven activity-based costing (TDABC) methodology to determine emergency medicine physician documentation costs with and without scribes. The study method was a prospective observation cohort study in a large academic emergency department. Two research assistants with experience in physicianescribe interactions and ED workflow shadowed attending physicians for a total of 64 hours in the adult emergency department. A tablet-based time recorded was used to obtain estimates for physician documentation time on both control (no scribe) and intervention (scribe) shifts. The result showed that Control shifts yielded approximately 3 hours of documentation time per 8 hours of clinical time (2 hours during the shift, 1 hour following the shift). When paired with a scribe, attending physician documentation decreased to 1 hour and 45 minutes during a shift and 15 minutes of post shift documentation. The physician cost estimate for documentation without and with a scribe is 644 and 488 dollars, respectively. They concluded that when one looks at the time saved by the provider, scribes appear to be a financially sound decision. TDABC methodology demonstrated that scribes afford a cost-effective solution to ED clinical documentation and serves as a tool to develop an accurate costing system, based on actual resources and processes, and allowed for understanding of resource use at a more granular level.

Into the bargain to develop a proper model for establishing TDABC, Mazrae, & Chamani (2016) conducted a study to link the information technology with TDABC. They Rgued that in today's development of information technology and communication networks at different aspects and its role in providing knowledge for managers' decision making, it is possible to provide necessary information at appropriate time. In the case of finding methods for costing and cost classification in terms of developing computer software, it can be provided financial and accounting reports simply at given periods of time or by referring to standard and elaborative accounts can be considered components in every financial account separately. In the case of costing methods and total costs in service and production units it has already proposed and used several methods that costing system based on time-oriented is one of these methods. In this study, in addition to providing proper plan for establishing at Tabriz health care science, we investigate the case study in international health care branch in Tabriz (Aras)and relation of determining end price and costing based on time-oriented and traditional method in budgeting process over university, evaluating performance of different units over university and privacy sector participation in education task. At the results, after collecting data, summarizing and analyzing information, it is verified the association of determining ended prices and costing based on time-oriented activity and traditional method in budgeting process over university, evaluating performance of different units over university and privacy sector participation in education task.

In summary, it can be argued that Time-driven activity-based costing is a costing methodology that provides a granular view of costs which directly reflect resource use and duration, thus providing actionable cost data to improve the healthcare delivery process. Recently, studies have implemented various costing methodologies at large centers to complete healthcare services for simple appendicitis to identify inefficiencies. These studies assessed the impact on duration and costs of interventions designed to target these inefficiencies using a time-driven activity-based costing methodology. The value of creating detailed process maps, which is at the core of this methodology, is the ability to continuously adjust the process maps to resemble current patient workflows. This allows for dynamic, early assessment of the impact of changes to patient workflows as a result of quality improvement endeavors. The findings from above studies suggest that the interventions shifted the cost and time contributions of different phases of care but ultimately led to a lower total cost for the hospitals to manage simple appendicitis. It means that, the application of TDABC in healthcare sector can lower the cost and improve a more accurate costing system.

4. CONCLUSION

Value-based health care delivery offers a transformational opportunity to deliver improved patient outcomes with accurate total costs. TDABC allows a much more accurate determination of the true cost of providing care. When one looks at the time saved by the provider, the elimination of dictation expenses, with accurate documentation and throughput, the employment of TDABC is a financially and clinically sound decision. The TDABC scribe project served as a tool to develop an accurate costing system based on actual resources and processes and allowed for understanding of use of resources at a more granular level.

In conclusion, time-driven activity-based costing is a useful tool to optimize the delivery of value-based care. The detailed process maps generated with this methodology can be dynamically modified to reflect current patient workflows and healthcare delivery. These modifications allow for the continuous assessment and reassessment of value generating interventions. It has been showed that interventions identified using a TDABC methodology can result in significant decreases in duration of phases of care as well as provide more accurate costs, which are revealed through the reapplication of a TDABC methodology. Additionally, impact on costs may not be commensurate with the impact on phase of care durations. Further studies are warranted to explore the value of newly generated capacity through improved healthcare delivery by applying this TDABC methodology to other medical conditions that occur in parallel and share the same phases of care with simple appendicitis.

REFERENCES

Al-Halabi, N. B., & Al-Mnadheh, Y. M. (2017). The Impact of Applying Time Driven Activity-Based Costing on Improving the Efficiency of Performance in Jordanian Industrial Corporations: A Survey Study. *International Journal of Economics and Finance*, *9*(12), 24-31.

Budur, T., Abdullah, H., Rashid, C. A., & Demirer, H. (2023). Connection Between Knowledge Management Processes and Sustainability at the Higher Education Institutions.

Budur, T., Demirer, H., & Rashid, C. A. (2023). The effects of knowledge sharing on innovative behaviours of academicians; mediating effect of innovative organization culture and quality of work life. *Journal of Applied Research in Higher Education*.

Budur, T. (2020). The role of online teaching tools on the perception of the students during the lockdown of Covid-19. *International Journal of Social Sciences & Educational Studies*, *7*(3), 178-190.

Budur, T., Abdullah Rashid, C., & Poturak, M. (2018). Students perceptions on university selection, decision making process: A case study in Kurdistan Region of Iraq. *International Journal of Social Sciences & Educational Studies*, *5*(1), 133-144.

Dalci, I.; Tanis, V. & Kosan, L. (2010). "Customer profitability analysis with time-driven activity-based costing: a case study in a hotel", International Journal of Contemporary Hospitality Management, Vol. 22 (5), pp.609 – 637

Fatah, R. D., & jaf, r. A. S. (2023). Green concepts and material flow cost accounting applications for manufacturing company: approach for company sustainability. *Russian Law Journal*, *11*(9s).

Hadi, R. E., & Alubaidy, S. B. (2019). The Reflection of the application TD-ABC approach on profits persistence Applied study in the General State of Hydraulic Industries Factory of Plastic. *journal of Economics And Administrative Sciences*, *25*(116), 226-261.- Simsek, Cigdem. (2016). TIME-DRIVEN ABC IN "A BANK" Using Business Intelligence Capabilities to Allocate the Operational Labor Cost by Time-Driven Activity-Based Costing. University paper. University Van Amsterdam

Heaton, H. A., Nestler, D. M., Barry, W. J., Helmers, R. A., Sir, M. Y., Goyal, D. G., ... & Sadosty, A. T. (2019). A time-driven activity-based costing analysis of emergency department scribes. *Mayo Clinic Proceedings: Innovations, Quality & Outcomes*, *3*(1), 30-34.

Jaf, R. A. S., & Rashid, C. A. (2023). The Role of Accounting Measurement and Disclosure of Social Capital in Improving Financial Performance. *Academic Journal of Nawroz University*, *12*(4), 469-477.

Kaplan, R. S., & Anderson, S. R. (2003). Time-driven activity-based costing. *Available at SSRN 485443*.

Kaplan, R. S., & Anderson, S. R. (2007). *Time-driven activity-based costing: a simpler and more powerful path to higher profits*. Harvard business press.

Khadr, H. A., Rashid, C. A & ,.Saber, R. A (2023). أثر الرافعة المالية في ظل حجم ومعدل النمو على ربحية المصارف. *Polytechnic Journal of Humanities and Social Sciences*.670-662 ,(2)*4* ,

Koolmees, D., Bernstein, D. N., & Makhni, E. C. (2020). Time-Driven Activity-Based Costing Provides a Lower and More Accurate Assessment of Costs in the Field of Orthopaedic Surgery as Compared to Traditional Accounting Methods. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*.

Mahmood, S., & Sabir, R. A. (2023). The Impact of time driven activity based costing on Competitive Advantage in the Kurdistan Region of Iraq Economic Unit. *Central European Management Journal*, *31*(2), 674-690.

Masthoff, M., Schneider, K. N., Schindler, P., Heindel, W., Köhler, M., Schlüchtermann, J., & Wildgruber, M. (2020). Value Improvement by Assessing IR Care via Time-Driven Activity-Based Costing. *Journal of Vascular and Interventional Radiology*.

Mazrae, Y. A., & Chamani, A. (2016). Developing a Proper Model for Establishing TDABC. *International Journal of Management Sciences*, *7*(1), 21-29.

Noori, T. M., & Rashid, C. A. (2017). EXTERNAL AUDITOR'S RESPONSIBILITY REGARDYING TO GOING CONCERN ASSUMPTION IN HIS/HERS REPORT: CASE OF KURDISTAN REGION/IRAQ. *International Journal of Research-Granthaalayah*, *5*(5), 138-152.

Ostadi, B., Daloie, R. M., & Sepehri, M. M. (2019). A combined modelling of fuzzy logic and Time-Driven Activity-based Costing (TDABC) for hospital services costing under uncertainty. *Journal of Biomedical Informatics*, *89*, 11-28.

Pernot, E., Roodhooft, F., & Van den Abbeele, A. (2007). Time-driven activity-based costing for inter-library services: a case study in a university. *The journal of academic librarianship*, *33*(5), 551-560.

Rashid, C. A. (2023). Social capital accounting and financial performance improvement: the role of financial information reliability as a mediator. *Journal of Islamic Accounting and Business Research*.

Rashid, C. A. (2018). Efficiency of financial ratios analysis for evaluating companies' liquidity. *International Journal of Social Sciences & Educational Studies*, *4*(4), 110.

Rashid, C. A. (2019). Pricing policy and its impact on the profitability. *International Journal of Finance & Banking Studies*, *8*(3), 101-108.

Rashid, C. A. (2017). The Importance of Audit Procedure in Collecting Audit Evidence/Case of Kurdistan Region/Iraq. *International Journal of Social Sciences & Educational Studies*, *4*(2), 15.

RASHID, C. A. (2020). Balanced Score Card and Benchmarking as an Accounting Tool to Evaluate Morrison's Performance. *Journal of Global Economics and Business*, *1*(3), 59-72.

Rashid, C. A., & Sabir Jaf, R. A. (2023). The Role of Accounting Measurement and Disclosure of Social Capital in Improving Quality of Accounting Information. *Iranian Journal of Management Studies*.

Rashid, C. A. (2023). A requirement for fraud investigation professionals. *Journal of Global Economics and Business*, *4*(12), 75-89.

Rashid, C. A., & Noori, T. M. The Importance of Consultancy Project and How Can It Will Be Adopted in Kurdistan Universities as an Alternative to Replace the Summer Training (2016)/Sulaimani Polytechnic University & Cihan University/Sulaimaniya.

Sharan, A. D., Schroeder, G. D., West, M. E., & Vaccaro, A. R. (2016). Understanding time-driven activity-based costing. *Clinical Spine Surgery*, *29*(2), 62-65.

Tibor, L. C., Schultz, S. R., Menaker, R., Weber, B. D., Ness, J., Smith, P., & Young, P. M. (2017). Improving efficiency using time-driven activity-based costing methodology. *Journal of the American College of Radiology*, *14*(3), 353-358.

Varila, M.; Seppanem, M. & Suomala, (2007). Detailed cost modeling: a case study in warehouse logistics. International Journal of Physical Distribution & Logistics Management. v. 37. pp.184 – 200

Yangyang, R. Y., Abbas, P. I., Smith, C. M., Carberry, K. E., Ren, H., Patel, B., ... & Lopez, M. E. (2017). Time-driven activity-based costing: A dynamic value assessment model in pediatric appendicitis. *Journal of pediatric surgery*, *52*(6), 1045-1049.