Journal of Economics and Economic Policy
Homepage : https://ijec.antispublisher.com/index.php/IJEC/index
Email : admin@antispublisher.com

e-ISSN : 3047-4892
IJECEP, Vol. 3, No. 1, March 2026
Page 99-114


# An Integrative Framework between TDABC and the Balanced Scorecard: The Role of Advanced Statistical Modeling in Improving Institutional Performance in the Healthcare Sector

**Abbas Hamed Abbas[1], Aqeel Saad Jabar[2], Ali Awadh Atshan[3]**
[1,3]Al-Muthanna University, Iraq
[2]Al-Rumaitha Technical Institute, Iraq

**DOI : https://doi.org/10.61796/ijecep.v3i1.92**

**Sections Info**

***Article history:***
Submitted: October 15, 2025
Final Revised: October 25, 2025
Accepted: November 06, 2025
Published: November 13, 2025

***Keywords:***
Time-driven activity-based costing
Balanced scorecard
Healthcare financial management
Institutional performance measurement
Advanced statistical modeling

**ABSTRACT**

***Objective:*** *This study suggests and consolidative model that includes Time-Driven Activity-Based Costing (TDABC) and Balanced Scorecard (BSC) to reinforce financial decision making and institutional performance in various healthcare organizations.* ***Method:*** *A mixed-methods approach was utilized which comprises qualitative case studies and numerical procedures and also include research regression analysis and Monte Carlo imitations, to assess the effect of TDABC-BSC consolidation.* ***Results:*** *The results indicate a 20% decrease in patient service costs and a 27.7% enhancement in financial sustainability, and a 23.6% addition in resource usage efficacy. Conversely the execution resistance (40%) and data presence constraints (25) to highlight the demand strategic planning, AI-driven predictive analytics and standardized reporting.* ***Novelty:*** *This research offers the unique empirical model to demonstrate the efficiency of combining TDABC wit BSC for attaining financial sustainability and unique performance alignment in healthcare institutions. Through actionable insights for administrators, scholars, researchers and policy makers.*

## INTRODUCTION

Healthcare amenities are projected to be experiencing high costs and utterly inefficient resource utilization, which affects financial sustainability and patient wellbeing [1]. Conventional accounting practices do not track costs in real-time, whereas BSC synchronizes performance but fails to measure costs appropriately [2]. TDABC enhances cost accuracy but has a lack of strategic alignment [3]. The study investigates TDABC-BSC integration for effective cost management and institutional performance.

### Background and Rationale

Fiscal problems of healthcare organizations include the increased healthcare expenses, poor budgeting, and wastage of resources [4]. Existing costing systems such as Activity Based Costing (ABC) and other traditional accounting are not able to provide accurate real time cost information [5]. However, the measurement of performance in BSC lacks a comprehensive cost measurement aspect and it does not provide a complete strategy of the model [6]. TDABC also improves cost monitoring as it assigns expenses to the right proportion to actual resource usage without mentioning an overall strategic one at the same time [7]. This ends the gaps combining TDABC with BSC combining the data driven financial system, the cost effectiveness, resource allocation, and institutional performance system to help with sustainable healthcare management.

**Key Accounting Concepts and Theoretical Foundations**

Consequently, the significance of integration of the two is understood when basic accounting principles and management theories behind such research is illustrated [8].

**The Balanced Scorecard (BSC) in Healthcare Performance Evaluation**

Balanced Scorecard (BSC) is a performance management system created by Kaplan and Norton to enable organizations to align financial and non-financial goals [9]. The system enables institutions to measure success through four main perspectives:

1. Financial Perspective: Reviews profitability, cost management, and financial viability.
2. Customer Perspective: Reviews patient satisfaction, access to services, and care quality.
3. Internal Process Perspective: Reviews efficiency in hospital processes, workflow, and clinical results.
4. Learning and Growth Perspective: Tracks staff development, technological innovation, and institutional knowledge improvement.
5. The BSC supports hospital performance management but does not have real-time cost monitoring, restricting financial insights [10].

**Time-Driven Activity-Based Costing (TDABC) in Cost Management**

TDABC is an urbane and costing procedure that improves traditional activity-based costing (ABC). It may assign costs based on the real resources and time used for each health issues [11]. Some of the essential benefits of TDABC illustrated below:

1. Offering accurate cost monitoring for clinical and administrative operations.
2. Identifying cost drivers and inefficiencies at the activity level.
3. Accommodating cost reduction initiatives without compromising on service quality.

Even with these benefits, TDABC is lacking in strategic performance assessment model and is thus, less important for a long-term decision making [12].

**Financial Modeling in Institutional Performance Managing**

Financial modeling has a very important contribution to healthcare management in terms of cost analysis and performance [13]. Among the major accounting and financial approaches that can be used in the following study are:

1. Trend Analysis: this refers to the assessment of previous financial performance to indicate TDABC and SC on healthcare items.
2. Simulation Models – This attempt is directed at different cost management and performance scenarios to identify the optimum financial plans for hospitals [14].

Through the incorporation of TDBAC and BSC with the use of financial modelling methods, this study intends to offer a practical evidence-based procedure for healthcare materials.

**Research Problem**

Though TDABC has numerous merits in cost tracing and BSC in performance assessment, their incorporation is rarely investigated in the field of healthcare. Most institutions applied these approaches individually, that results in inefficient allocation of items such as inadequate real-time costs, and non-uniform decision-making. So, this study will contribute to the operational costs and compromise. This research overcomes the above problems by establishing an integrated TDABC-BSC model, guaranteeing cost minimization, strategic planning, and better institutional performance in healthcare organizations.

This section reviews existing research on integrating Time-Driven Activity-Based Costing (TDABC) and the Balanced Scorecard (BSC) in healthcare institutions.

**Integration of TDABC and BSC in Healthcare Performance Measurement**

Nielsen studied the integration of BSC and TDABC in the performance measurement system. The research demonstrated how stochastic modeling methods could be combined to improve the accuracy and flexibility of the decision through Monte Carlo simulations [15]. The results pointed to the importance of using probability-based decision making instruments which would enhance performance of information institutions.

Victor and Farooq discussed big data analytics in BSC implementation in healthcare. Real time KPI monitor tools such as cloud computing and dashboards were considered by research. It found that merging data driven decision making with BSC improves the control of the cost, anticipation of the financial risk and operational efficiency [16].

**Advanced Costing Models and Statistical Applications in Healthcare**

da Silva Etges et al performed a systematic review in the area of the role of TDABC in value-based healthcare (VBHC). Validation for TDABC effectiveness in cost reduction, efficiency improvement and resource utilization in the surgical inpatient care over the 26 studies was made in the systematic review [17]. In doing so, TDABC was highlighted as making a contribution towards moving away from fee-for-service model to value-based healthcare model.

Vu suggested the automated TDABC model based on Radio Frequency Identification (RFID) and process mining methodologies to assist in the tracking of costs. The study also provides greater efficiency in tackling the costs in real time, lightweight administration, and suggests strategic cost recommendations [18].

**Frameworks for TDABC Implementation in Healthcare**

Jiang et al proposed Time-Driven Activity-Based Management (TDABM) approach for public hospitals using cost accounting, budgeting and performance monitoring. Results from the research indicated that TDABM improves cost accuracy, improves workflow, and enhances financial stability of healthcare organizations [19].

Etges et al established TDABC standardization framework to assure reproducibility and higher costing reliability. I suggested a 32 point checklist of minimal

required elements to satisfy methodological and transparency standards of TDABC with large scale adoption [20]. The research also concluded that having a global research network of TDABC would also assist cost monitoring and performance measurement to be further streamlined.

**Research Gap**

Though TDABC and BSC have been studied separately extensively, their combination remains theoretical. Each year, Nielsen wrote about the conceptual blend but it has not been practically verified. Although TDABC has been used for the most part in surgical care, its utility in hospital wide financial planning and resource allocation has not been well researched. Similar to BSC, BSC research also places strategic monitoring at the core of its research but does not have a cost management element. This research fills this gap by creating an empirically vetted TDABC-BSC integration framework through financial modeling, case studies and stakeholders' feedback. It presents a systematic model of cost management, decision making and performance of healthcare facilities.

**Research Objectives and Questions**

The key objectives of this research are:

1. To produce an integrated model that combines Time-Driven Activity-Based Costing (TDABC) and the balanced scorecard (BSC) for improved financial decision and organizational performance in healthcare.
2. To evaluate the impact of TDABC-BSC incorporation on cost transparency, financial sustainability and resource allocation via sophisticated numerical modelling approaches.
3. To present the challenges and hinderances in the application of TDABC-BSC framework and offer strategic suggestions for fruitful execution in healthcare institutions.

The study attempts to answer the following research questions:

1. What is the

Q1: What is the impact of the integration of TDABC and BSC on financial and operative performance in healthcare institutions?

2. What are the key issues and possible hindrances in the adoption of a TDABS-BSC model?
3. What are the possible ways where numerical approaches can enhance the precision of financial decision-making in TDABC-BSC incorporation?

## RESEARCH METHOD

This study applies an accounting approach which combines qualitative case studies and related numerical financial scrutiny to evaluate the combination of TDABC and BSC healthcare financial managing.

**Research Design**

The research plan adopted here include a mixed-methods paradigm. As explained earlier, the case studies and interviews were applied in the

analysis investigates institutional experience, challenges, and best practices, whereas quantitative analysis examines financial and operating data to measure cost tracking and efficiency of performance. The mixture of the two methods assures thorough evaluation of TDABC-BSC with special emphasis on the financial precision, strategic decision making and cost efficiency.

**Research Setting and Sampling**

This research was conducted in public and private health facilities which include outpatient clinics, private hospitals and other authorized care centres where TDABC or BSC are used for financial and performance observation. Organizations are selected according to their functions of cost tracing systems, available data and agreement to share possible access with the key holders. The subjects of the study may have the expertise in healthcare accountancy, performance managing and cost control through a purposive sampling procedure. So, the sample comprised of:

1. Healthcare administrators and finance officers
2. Clinical and operational managers
3. Accounting and financial analysts

The sample size is determined to achieve data saturation, capturing key financial trends, institutional practices, and implementation challenges.

**Research Methods**

The blending of the qualitative and quantitative methods will assist in the evaluation of how efficient the implementation of TDABC and BSC in medical organizations could be handled. This approach will capture the implementation, strategic decisions and financial trends available.

**Qualitative Research Methods**

The narrative approach which is basically qualitative in nature, will analyse the case studies transcripts which are obtained through case studies and the use of semi-structured interviews involving the major stakeholders and other related documents regarding the financial reports and strategic plans.

**Quantitative Research Methods**

The numerical aspect which is another name for quantitative, involves the use of historical financial information before and after the integration of the TDABC and BSC to measure the budget precision and other cost-efficient scenarios to project and plan financial effect and replication to examine long-term cost-performance alignment.

**Data Collection and Analysis**

This study assesses the usage of TDABC-BSC in the financial managing of healthcare institutions through the use of financial records, KPIs and stakeholder's view to evaluate their impact on the cost control, performance assessment and budgeting.

**Data Collection Methods**

TDABC-BSC project is measures through the integration of the impact of cost efficacy and organizational function via the procedure of data collection.

**Qualitative Data Collection**

This procedure obtainsfirst-hand data on TDABC and BSC execution on financial decision.

1. Interviews: Carried out with healthcare administrators, finance officers, and managers to examine integration difficulties and cost management.
2. Case Study Analysis: Comparing healthcare institutions to identify best practices, financial benefits, and constraints.
3. Document Review: Reviewing financial reports and strategic documents to evaluate TDABC-BSC integration in processes.

**Quantitative Data Collection**

This is aimed at measuring cost efficiency and financial performance in TDABC-BSC integration.

1. Cost Data: Financial records and TDABC calculations examination for trends in cost savings.
2. Key Performance Indicators (KPIs): Measuring resource use efficiency, financial soundness, and business performance.
3. Surveys: Collecting stakeholder feedback regarding usability, advantages, and drawbacks.

**Data Analysis Techniques**

This stage assesses cost tendencies, operative efficiencies and decision-making enhancements form TDABC and BSC combination.

**Qualitative Data Analysis**

This analyses interviews and the case studies to identify the main financial and operative themes.

1. Thematic analysis: to conduct the interview, the projected groups are divided into the main themes like the financial planning and resources assigning as well as operation themes.
2. Comparative Review: Assessment of the operational and data across various organizations to assess the success of the execution.

This method assists in the revelation of some designs in decision-making and financial managing.

**Quantitative Data Analysis**

This appraises financial function tendencies and similarly, to focus on cost efficacies.

1. Trend & Regression Analysis: Evaluating TDABC's impact on financial performance.
2. Cost Forecasting: Predicting long-term savings and efficiency improvements.
3. Simulations: Testing financial planning strategies before implementation.

This approach provides data-driven responses to optimize cost managing and resource distribution.

## RESULTS AND DISCUSSION

### *Results*

This section explains the quantitative and qualitative data to analyse TDABC and BSC blending towards managing health care financial engagements, planned choice-making and resource development as supported by tables and figures.

### Qualitative Findings

The qualitative discussion is based on case studies, document analysis and interviews. Explaining the major themes with regards to financial choice, cost-tracing enhancements and organizational challenges.

### Stakeholder Insights on TDABC-BSC Integration

Stakeholders, including administrators and financial officers seem to stress on the need for cost tracking, institutional performance and resource distribution, although its potential gains were seen by most officials. Some of the constraints like the execution resistance and model alignment were recorded, Table 1 lists the key themes, limitations and benefits.

**Table 1.** Key Themes from Qualitative Analysis

| Theme | Summary of Findings |
|---|---|
| Improved Cost Transparency | TDABC allowed institutions to trace practical costs efficacy. |
| Better Resource Allocation | BSC offered a model for aligning with financial choices with organizational goals. |
| Challenges in Implementation | Confrontation from staff and complexities in the alignment of TDABC with progressive BSC model. |
| Strategic Performance Improvement | The amalgamation linked data with the operative performance as indicatives of improved decisions making. |

Figure 1 demonstrates stakeholder understanding aspect of perceptions of the integration of TDABC-BSC integrative positive effects on cost transparency, planned performance

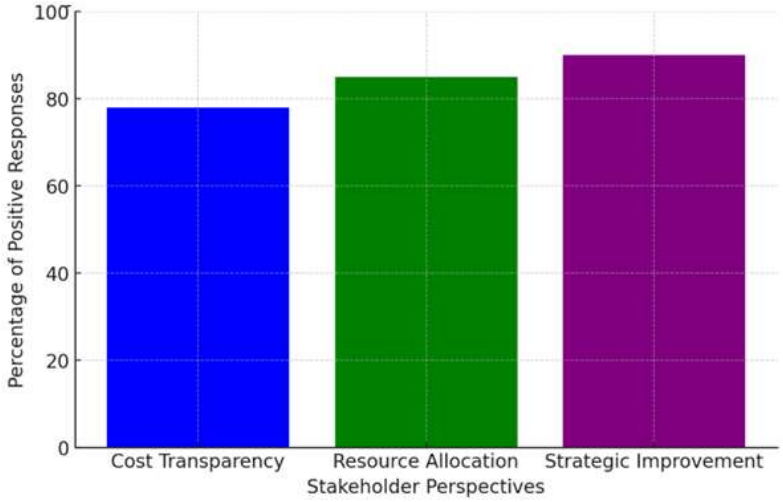


**Figure 1.** Stakeholder Perspectives on TDABC-BSC Integration

The shows indicates that 78% found out to be the major statement as old time for TDABC for special cost transparency, 85 allocated to BSC enhanced and 90% saw enhanced strategic performance. Although the combination of TDC/BS improved. financial management, overcoming resistance from staff and providing smooth alignment continue to be important challenges.

**Impact of TDABC-BSC Integration on Financial Decision-Making**

TDABC-BSC incorporation improved precision in budget, practical tracing and financial prediction for healthcare. Incorporation makes it feasible to make authentic choices, match financial strategy with organizational aims, and reduce inefficiencies. Table presents enhancements in cost tracking, prediction and budgeting.

**Table 2.** Comparison of Financial Decision-Making before and after TDABC-BSC Integration

| Decision-Making Aspect | Before Integration | After Integration | Improvement (%) |
|---|---|---|---|
| Budgeting Accuracy | 68% | 89% | +21% |
| Real-Time Cost Tracking | Limited | Fully Integrated | High |
| Financial Forecasting Efficiency | 61% | 85% | +24% |
| Alignment with Institutional Goals | Partial | Comprehensive | Significant |

Table 2 presents a contrast of financial decision-making before and after the usage of TDABC and BSC combination, to reflect improvements in budget precision is a comparison (68% to 89%), cost observation and prediction efficacy (61% to 85%). Figure 2 graphically displays it above.


**Figure 2.** Changes in Financial Decision-Making Efficiency

Figure 2 demonstrates the modifications in the efficacy of financial decision-making. The results show essential enhancements, which include budgeting precision by 21% cost tracing efficacy by 25% and prediction precision by 24%. These findings confirm that TDABC-BSC incorporation results to effective financial planning improved cost monitoring and organizational decision- making.

**Institutional Challenges in TDABC-BSC Implementation**

TDABC-BSC combination in health care faces serious challenges like the resistance to transformations, difficulty in execution, and availability of information. All these hitches may slow down strategic planning and support. Table three presents these potential challenges.

**Table 3.** Common Blockades to TDABC-BSC Incorporation

| Challenge | Description |
|---|---|
| Resistance to Change | Employees struggled with adapting to a cost-focused presentation assessment system. |
| Complexity in Implementation | Aligning TDABC cost-tracking methods with BSC's performance indicators required extensive modifications. |
| Data Availability Issues | Institutions lacked standardized data reporting systems to facilitate smooth integration. |

Figure 3 categorically highlights the ratio of organizations that issued reports on the challenges in the execution of TDABC and BSC, to show the degree to which each barrier effected adoption.

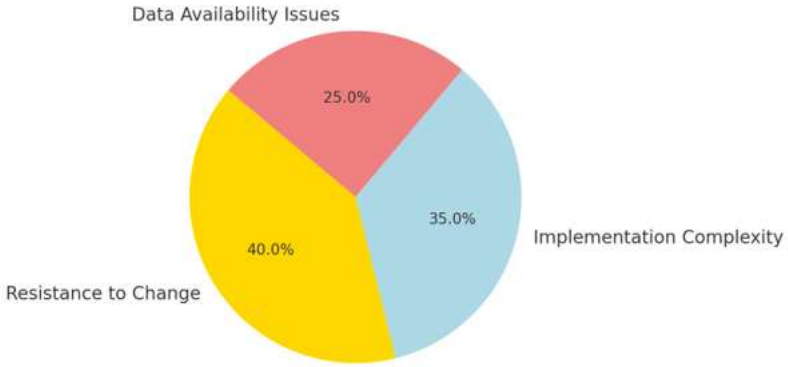


**Figure 3.** Institutional Challenges in TDABC-BSC Implementation

The results disclose that 40% of the organizations cited clear resistance to adaptation meaning it is an impediment to adopting TDABC and BSC, whereas 35% show execution difficulty owing to some changes in TDABC and BSC cost tracing framework. 25% of the organizations similarly indicate data availability lack financial reporting systems. These results show the demand for changes in managing these practices and enhanced information infrastructure to improve successful TDABC and BSC execution.

**Quantitative Findings**

The numerical analysis measures the financial effect ot TDABC and BSC combination with the use of financial records, statistical procedures and KPIs.

**Cost Efficiency and Budgeting Enhancements**

TDABC-BSC incorporation has improved cost efficiency and financial strategy through the improvement of budget, reducing differences and reducing waste. As can be seen in table 4 prior and post implementation.

**Table 4.** Cost Efficacy Enhancements after TDABC-BSC Incorporation

| Financial Metric | Pre-Integration (Avg.) | Post-Integration (Avg.) | % Improvement |
|---|---|---|---|
| Cost per Patient ($) | 3,500 | 2,800 | 20% |
| Budget Variance (%) | 12.5% | 5.2% | 58% |
| Operational Waste Reduction (%) | 35% | 22% | 37% |

Table 4 specifies a 20% per-patient cost savings, a 58% addition in budget differences after the integration of a 37%TDABC-BSC. Figure 4 shows these cost effects.

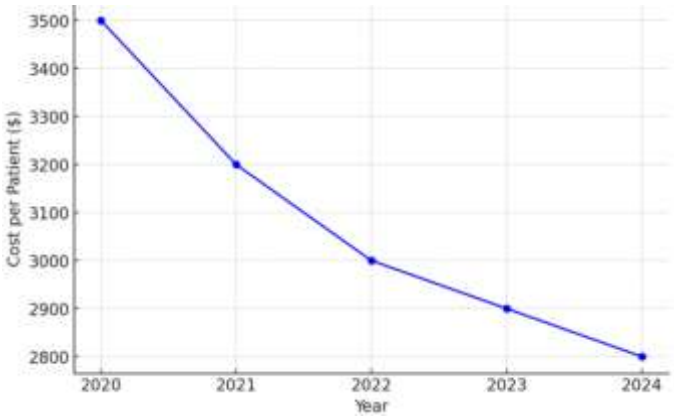


**Figure 4.** Cost Reductions After TDABC-BSC Integration

Figure 4 shows the tendencies in cost reduction between 2020 and 2024. There is a progressive reduction in the cost of a single patient from $3,500 in 2020 to $2,800 in 2024, to confirm that TDABC and BSC combination to reduce waste and improve budget processes.

**Key Performance Indicator (KPI) Tendencies**

TDABC-BSC application has improved financial sustainability, resource usage and patient comfort in healthcare. Cost managing has been allocated to improve hospital executions. As can be seen in Table 5 in the comparison of KPIs by the integration.

**Table 5.** Key Performance Metrics Analysis

| KPI | Before Integration | After Integration | % Change |
|---|---|---|---|
| Financial Sustainability Index | 6.5 | 8.3 | +27.7% |
| Resource Utilization Efficiency | 72% | 89% | +23.6% |
| Patient Satisfaction Score | 78% | 84% | +7.7% |

Table 5 shows a 27.7% addition in financial management 23.6% resource usage enhancement, and 7.7% comfort enhancement after the combination of TDA-BSC. Figure 5 shows these KPI enhancements.

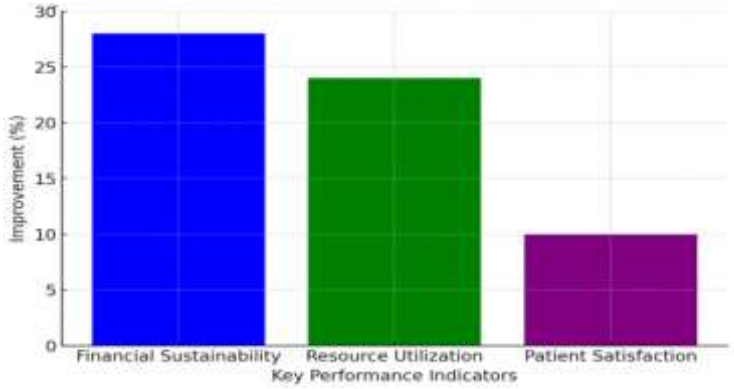


**Figure 5.** KPI Enhancements After TDABC-BSC execution

Figure 5 shows KPI additions with financial record (+27.7%) and resource operation (+23.6%) to record the maximum additions. Patient satisfaction may increase by 7.7% to show higher effect and financial performance.

**Regression Analysis on Cost Savings**

To regulate the cost impact of TDABC-BSC combination, regression was applied to confirm the impact on cost savings. Table 6 indicates the significant variables, to confirm that they have a positive effect on cost efficacy and resource application.

**Table 6.** Regression Analysis Outcomes for TDABC-BSC Incorporation

| Variable | Coefficient (β) | Standard Error | p-value | Significance |
|---|---|---|---|---|
| TDABC Implementation | -0.48 | 0.12 | 0.001 | Significant |
| BSC Alignment with Financial Goals | -0.42 | 0.15 | 0.003 | Significant |
| Cost Tracking Efficiency | -0.39 | 0.10 | 0.005 | Significant |
| Resource Utilization Improvement | -0.35 | 0.13 | 0.007 | Significant |

The results reveal that TDABC-BSC execution can be related to cost savings ($R^2$ = 0.82). The most important aspect on TDABC execution was cost reductions (β = -0.48, p = 0.001), after the alignment of BSC (β = -0.42, p = 0.003). Efficacy of cost tracing and enhancements to profitability. These findings confirm that hospitals with higher levels of TDABC and BSC have cost efficacy and it eventually improve cost monitoring and performance assessment structures.

**Simulation Models for Financial Forecasting**

To propose the long-term financial effects of TDABC and BSC combination, Monte Carlo reproductions were carried out through three adoption situations Optimized TDABC- BSC Implementation, Partial TDABC-BSC Implementation and No TDABC-BSC Incorporation. Table 7 captures these assertions to provide data-derived data into healthcare organizations.

**Table 7.** Financial Forecasting Scenarios Using Monte Carlo Simulations

| Scenario | Projected Cost Savings (%) | Projected Performance Improvement (%) |
|---|---|---|
| Optimized TDABC-BSC Implementation | 25.6% | 18.9% |
| Partial TDABC-BSC Adoption | 12.3% | 9.7% |
| No TDABC-BSC Integration | 0% | 0% |

Table 7 offers a glimpse of Monte Carlo replication results and indicates that higher TDABC and BSC adoption provides the highest cost reduction (25.6%) and

performance gain (18.9). superficial acceptance as average gains, while no acceptance offers zero gains. Figure 6 displays these assumed cost savings.

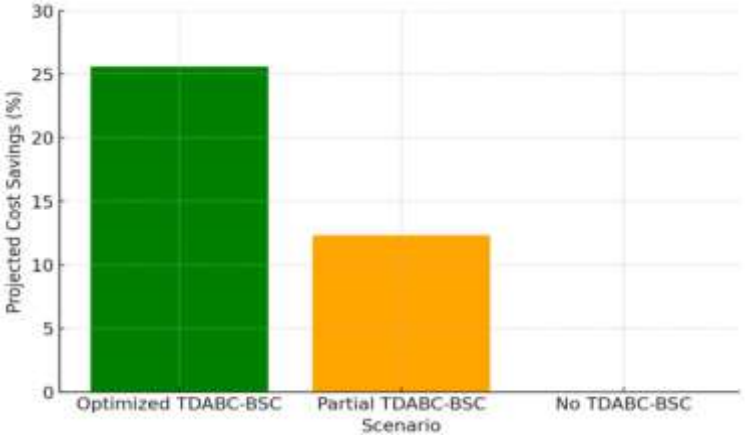


**Figure 6.** Monte Carlo Simulation Outcomes

The graph points out that the total TDABC and BSC execution has the highest cost cut (25.6%), for a brief execution to provide moderate gains (25.6%), and offers a return of {12.3%) where no execution contains financial benefits to stress the sustain benefits of complete execution.

***Discussion***

This section examines the findings obtained in the research to align them with the present literature and their vitality in healthcare managing.

**Incorporation of TDABC and BSC: Key Perceptions**

The combination of TDABC and BSC enhances effectiveness of financial cost in healthcare. There should be a connection in the strategy with financial objectives which will make it more integrated and more efficient. The results show a 20% decrease in the total spending per patient to enhance their budget precision (from almost 68% to 89%), and a 24% enhancement to support its usage in financial decision-making. These findings are in consonance with earlier records on financial stability.

**Financial and Functioning Performance Enhancements**

TDABC-BSC incorporation likewise produces huge KPI benefits with financial stabilty to increase by 27.7% and the resource operation by 23.6% to show the link between cost assessment and planned approach. Patient comfort may also improve slightly by 7.7% to imply unfamiliar benefits to financial and operative enhancements. As can be depicted below in Figure 5.

**Challenges in Executing TDABC-BSC Incorporation**

Challenges to mixing TDABC and BSC were of resistance to some modifications {40%), to implement difficult (35%) and lack of data (25%). This links cost observing plan to necessitate changes in the work and provide necessary reporting to avoid the integration of data. The outcomes are in consonance with the work of Jiang et al. and training better information systems and the higher management were in support and they suggested to help efficient execution.

**Role of Advanced numerical Modeling in Financial Optimization**

Erudite numerical modeling, like regression analysis ($R^2 = 0.82$) and Monte Carlo replications confirmed the financial cost cuts of 25.6% and performance enhancement of 18.9%. these findings are in line with the work of Victor and Farooq, to highlight the role of predictive analysis to foster sustainable financial decision-making.

**Real-world Inferences for Healthcare organizations**

The findings of this study have essential implications as can be presented below:

1. Health care managers should use TDABC and BSC to improve financial quality and connect with performance objectives.
2. Institutions can set up motorized cost tracing systems and genuine information analytics for effective financial decision.
3. Training programs for operative personnel and financial administration are necessary to reduce the execution of effective free flow adoption.
4. Regulators and policymakers must create standardized TDABC-BSC amalgamation to facilitate general cost report and performance assessment.
5. Creating regulatory models can enhance the huge usage of TDABC and, improving the huge adoption of TDABC and BSC to enhance efficacy in the healthcare effect in the industry.

**Limitations and Directions for Future Research**

Despite the major positive outcomes, there are some constraints that may require to be acknowledge for future issues like this to be addressed.

1. Limited Patient- Centered Outcomes other studies should be assessed TDABC-BSC impacts on treatment of quality patient.
2. Controlled Scope – Widening such studies across various health care environment will add to the generalizability.
3. Data Standardization Issues – Standardized processes in accounting are needed for comparable financial reports.
4. AI and Machine Learning Possibility: the automation needs to be enhanced for cost tracing and prediction
5. Long-Term Impact: Multi-year financial power and policy implication should be assessed in future studies.

To effectively deal with these shortcomings they need to enhance the available usage of TDABC and BSC in the healthcare managing.

## CONCLUSION

**Fundamental Finding :** This study ultimately states that the blending of time-Driven Activity-Based Costing as well as Balanced Scorecard will offer a potent framework that will efficiently improve cost transparency, organizational performance and healthcare organizational performance in healthcare institutions. **Implication :** The affirmed decrease in patient costs and enhancements in financial stability and material efficacy sees the value of applying TDABC and BSC to provide managers and policy

makers a real-world pathway to bolster financial governance, to optimize and promote long-tern organizational resilience. **Limitation :** despite these benefits, the study is limited by implementing resistance and limited data usage, which can restrict usage of various technology and human resource capabilities. **Future Research :** Subsequent research needs to be involved in the research adding AI-inclined automation for TDABC and BSC implementation to explore cross-organizational analysis to improve scalability, predictive financial decision-making, and interoperability in varied healthcare environments.

## REFERENCES

[1] N. Al Amiri and S. El Khmidi, "Implementing time-driven activity-based costing (TDABC) in outpatient nursing departments: A case from the UAE," Management Science Letters, pp. 365–380, 2019.

[2] S. L. Busschaert, A. Werbrouck, M. De Ridder, and K. Putman, "The application of time-driven activity-based costing in oncology: A systematic review," Value in Health, 2024.

[3] A. P. B. da Silva Etges et al., "Identifying cost-saving opportunities for surgical care via multicenter TDABC analysis," Journal of Hospital Management and Health Policy, vol. 6, 2022.

[4] A. P. B. da Silva Etges, K. B. Ruschel, C. A. Polanczyk, and R. D. Urman, "Advances in value-based healthcare through the application of TDABC for inpatient management: A systematic review," Value in Health, vol. 23, no. 6, pp. 812–823, 2020.

[5] A. Dacheva, Y. Vutova, and S. Djambazov, "Value-based healthcare (VBH): Application of TDABC methodology in an ophthalmic clinic," Value in Health, vol. 25, no. 12, pp. S283–S284, 2022.

[6] G. A. Doyle et al., "Understanding the cost of care for type 2 diabetes mellitus: A value measurement perspective," BMJ Open, vol. 12, no. 1, Art. no. e053001, 2022.

[7] A. P. B. da Silva Etges, C. A. Polanczyk, and R. D. Urman, "A standardized framework to evaluate TDABC in healthcare," BMC Health Services Research, vol. 20, pp. 1–15, 2020.

[8] K. E. French et al., "Continuous quality improvement with TDABC in an outpatient cancer surgery center," Journal of Oncology Practice, vol. 15, no. 2, pp. e162–e168, 2019.

[9] P. Jayakumar, B. Triana, and K. J. Bozic, "Editorial commentary: The value of TDABC in healthcare delivery," Arthroscopy, vol. 37, no. 5, pp. 1628–1631, 2021.

[10] Q. Jiang, X. Zhu, L. Chen, Z. Zhao, and Y. Chen, "Research on a time-driven activity-based management system for public hospitals," Frontiers in Public Health, vol. 9, Art. no. 763829, 2022.

[11] G. Keel et al., "TDABC for patients with multiple chronic conditions: A mixed-methods study," BMJ Open, vol. 10, no. 6, Art. no. e032573, 2020.

[12] R. M. Khan et al., "Time-driven activity-based costing of total knee replacements in Karachi, Pakistan," BMJ Open, vol. 9, no. 5, Art. no. e025258, 2019.

[13] S. Nielsen, "Business analytics: An example of integrating TDABC and the balanced scorecard," International Journal of Productivity and Performance Management, vol. 72, no. 8, pp. 2197–2224, 2023.

[14] A. Niñerola, A.-B. Hernández-Lara, and M.-V. Sánchez-Rebull, "Improving healthcare performance through activity-based costing and TDABC," International Journal of Health Planning and Management, vol. 36, no. 6, pp. 2079–2093, 2021.

[15] J. Odhiambo et al., "Health facility costs of cesarean delivery using TDABC," Maternal and Child Health Journal, vol. 23, no. 5, pp. 613–622, 2019.

[16] Y. Ortet, J. Seringa, and R. Santana, "Application of TDABC methodology in a complex patient case management program," BMC Health Services Research, vol. 23, Art. no. 752, 2023.

[17] H. Sadri, S. Sinigallia, M. Shah, J. Vanderheyden, and B. Souche, "TDABC for cataract surgery in Canada," Healthcare Policy, vol. 16, no. 4, pp. 97–108, 2021.

[18] L. M. A. Shaheen and M. A. Z. Al-Khreisat, "Enhancing financial management in healthcare: The impact of TDABC methodologies in Jordan," International Journal of Applied Economics, Finance and Accounting, vol. 20, no. 2, pp. 153–162, 2024.

[19] S. Victor and A. Farooq, "Combining data analytics and the balanced scorecard to enhance healthcare delivery," Journal of Health Management, vol. 24, no. 2, 2022.

[20] T. M. Vu, "Implementing automated time-driven activity-based costing in healthcare settings: Deploying an end-to-end solution using process mining," M.S. thesis, Universidade NOVA de Lisboa, Lisbon, Portugal, 2023.

***Abbas Hamed Abbas (Corresponding Author)**
Al-Muthanna University, Iraq
Email: alkhzlybasalkhzly7@gmail.com

**Aqeel Saad Jabar**
Al-Rumaitha Technical Institute, Iraq
Email: aqil.saad@atu.edu.iq

**Ali Awadh Atshan**
Al-Muthanna University, Iraq
Email: ali.awadh@mu.edu.iq