

TDABC IMPLEMENTATION IN MANUFACTURING FIRMS AND SMES: A CONTINGENCY-BASED SYSTEMATIC LITERATURE REVIEW

Silvi Yanti^{1*}, Andry Arifian Rachman²

silvi.yanti@widyatama.ac.id*

Master of Accounting Program, Universitas Widyatama, West Java, Indonesia^{1,2}

Accepted:	Reviewed:	Published:
June 18, 2026	June 20, 2026	August 30, 2026

Abstract

This study examines the implementation and outcomes of Time-Driven Activity-Based Costing (TDABC) in manufacturing firms and small and medium-sized enterprises (SMEs) through a Systematic Literature Review (SLR). The study aims to analyze TDABC implementation practices, evaluate its effectiveness compared with alternative costing methods, identify implementation challenges and success factors, and explore its contribution to operational efficiency and organizational sustainability. Following the PRISMA guidelines, the review synthesized evidence from 97 peer-reviewed journal articles published between 2010 and 2025. The findings indicate that TDABC improves cost allocation accuracy by utilizing capacity cost rates and time equations, providing more reliable information for managerial decision-making. Compared with traditional costing systems and conventional Activity-Based Costing (ABC), TDABC offers greater flexibility and supports more effective resource allocation. The review further reveals that operational and production efficiency is the dominant outcome of TDABC implementation, reflected in improved resource utilization, waste reduction, and process optimization. In addition, TDABC implementation is influenced by contextual factors such as process complexity, digitalization, data quality, ERP integration, and managerial support. These findings support a contingency perspective of TDABC implementation and highlight its role as a strategic management tool that contributes to organizational performance and sustainability.

Keywords: TDABC, Cost Management, Operational Efficiency, Contingency Theory, SMEs

*Correspondence Author



By Authors

This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/).

1. Introduction

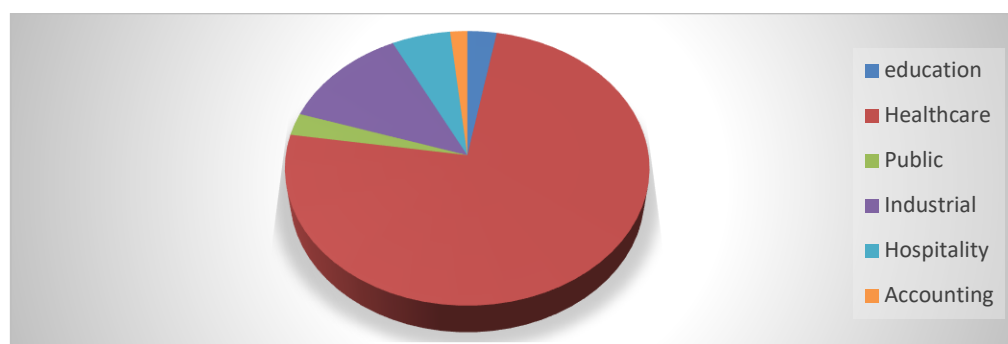
Accurate cost information is essential for managerial decision-making, pricing, profitability analysis, and resource allocation, particularly in manufacturing firms and small and medium-sized enterprises (SMEs) operating in increasingly competitive environments. Reliable costing systems support operational efficiency, cost control, and long-term organizational performance (Garrison et al., 2021; Horngren et al., 2021).

However, traditional costing systems often generate cost distortions because overhead costs are allocated using volume-based measures that fail to reflect actual resource consumption in complex production environments characterized by product diversity, automation, and indirect activities (Basti & Boyar, 2021; Vedernikova et al., 2020). To address these limitations, Activity-Based Costing (ABC) was developed to allocate costs based on activities. Despite improving costing accuracy, ABC often requires extensive data collection, complex activity identification, and substantial maintenance efforts, limiting its applicability in resource-constrained organizations such as manufacturing firms and SMEs (Baig et al., 2021).

To overcome these challenges, Kaplan and Anderson (2007) introduced Time-Driven Activity-Based Costing (TDABC), which allocates costs using capacity cost rates and time equations. Compared with conventional ABC, TDABC offers a simpler, more flexible, and cost-efficient approach while maintaining high costing accuracy (Everaert et al., 2008; Kaplan & Anderson, 2007). Consequently, TDABC has evolved from a costing technique into a strategic management tool that supports operational efficiency, process improvement, and organizational performance.

The growing adoption of TDABC is reflected in its application across healthcare, manufacturing, logistics, hospitality, public services, and SMEs. Based on a bibliometric mapping of 421 Scopus-indexed publications published between 2010 and 2025, Figure 1 presents the distribution of TDABC applications across sectors.

Figure 1. Distribution of TDABC Applications Across Sectors Based on 421 Scopus-Indexed Articles (2010–2025)



Source: Based on 421 Scopus-Indexed Articles (2010–2025)

Figure 1 illustrates the growing application of TDABC across various sectors between 2010 and 2025. Healthcare remains the dominant research area because of its complex resource utilization, whereas manufacturing firms and SMEs receive comparatively less attention. This imbalance indicates substantial opportunities for future research in industrial settings (Vedernikova et al., 2020).

It should be noted that the bibliometric analysis and the systematic literature review served complementary but distinct purposes. While 421 Scopus-indexed publications were used to map the broader TDABC research landscape, the review synthesis was restricted to 97 studies that met the predefined inclusion criteria for manufacturing firms and SMEs. The bibliometric analysis provided a macro-level overview of publication trends, sectoral distribution, and research characteristics, whereas the systematic literature review synthesized empirical evidence from the selected studies to address the research questions through thematic analysis. Together, these complementary approaches provide both a comprehensive understanding of the evolution of TDABC research and a rigorous evidence-based synthesis of its implementation in manufacturing firms and SMEs (Paul et al., 2021; Snyder, 2019).

Despite the growing body of TDABC research, theoretical integration explaining how contextual factors influence implementation outcomes remains limited. Existing studies are predominantly case-based, restricting the generalizability of findings across organizational settings (Ganorkar et al., 2019; Reynolds et al., 2018). Moreover, prior research has focused primarily on technical and operational aspects of TDABC while paying limited attention to

organizational conditions influencing implementation effectiveness (Chenhall, 2003). The relationships among TDABC implementation, operational efficiency, and organizational sustainability also remain underexplored, particularly in manufacturing firms and SMEs (Hidalgo & Taype, 2023; Waleed et al., 2023). These limitations highlight the need for a systematic synthesis integrating contextual factors and organizational outcomes.

Table 1. Research Gaps and Contributions of the Present Study

Previous Studies	Focus	Limitation	Research Gap	Study Contribution
(Kaplan & Anderson, 2007)	Developed the TDABC model.	Limited empirical evidence.	Contextual factors affecting TDABC remain unclear.	Develops a contingency-based framework for TDABC.
(Reynolds et al., 2018)	TDABC implementation in SMEs	Single-country context	Limited generalizability	Multi-context synthesis
(Vedernikova et al., 2020)	Manufacturing application	Case-study approach	Context-specific findings	Cross-study integration
(Basti & Boyar, 2021)	Mold manufacturing industry	Single industry	Contingency factors unexplored	Examines contextual determinants
(Pinheiro et al., 2023)	TDABC in SMEs	Technical emphasis	Limited theoretical perspective	Integrates Contingency Theory
(Waleed et al., 2023)	Cost leadership strategy	Focus on efficiency	Sustainability underexplored	Links TDABC to sustainability
(Ahmadi et al., 2025)	ERP and predictive analytics	Digital context only	Broader organizational effects unclear	Develops contingency-based framework
(Baig et al., 2021)	TDABC literature review	Limited theoretical integration	Contingency factors remain unexplored	Integrates Contingency Theory into TDABC research

Source: Based on 421 Scopus-Indexed Articles (2010–2025)

Table 1 demonstrates that previous studies have primarily focused on specific organizational contexts and technical aspects of TDABC implementation. Existing research remains fragmented and provides limited theoretical integration, particularly regarding the role of contingency factors and sustainability outcomes. Therefore, this study addresses these gaps by

conducting a systematic literature review of TDABC implementation in manufacturing firms and SMEs using Contingency Theory as an analytical lens.

This study adopts Contingency Theory, which argues that management accounting systems are effective only when aligned with organizational conditions. Accordingly, TDABC implementation is expected to vary according to contextual factors such as process complexity, digitalization, ERP integration, data quality, and managerial support (Basti & Boyar, 2021; Chenhall, 2003; Hidalgo & Taype, 2023, Otley, 1980, Reynolds et al., 2018).

Unlike previous TDABC review studies, particularly Baig et al. (2021), which primarily synthesized the technical characteristics, implementation procedures, and operational applications of TDABC, the present review adopts Contingency Theory as an overarching analytical perspective to explain why TDABC implementation produces different outcomes across organizational contexts. By focusing specifically on manufacturing firms and SMEs, this review moves beyond a descriptive synthesis to provide a theoretically grounded interpretation of how contextual factors influence TDABC implementation and organizational outcomes.

This review contributes by extending Contingency Theory to explain variations in TDABC implementation, synthesizing empirical evidence from manufacturing firms and SMEs, identifying key contingency factors, and proposing an integrative framework linking implementation and organizational outcomes.

Building on this research gap, the present study systematically reviews the implementation of TDABC in manufacturing firms and SMEs to synthesize evidence on its implementation practices, effectiveness compared with alternative costing methods, implementation challenges and success factors, and contribution to operational efficiency and organizational sustainability. Guided by Contingency Theory, the review aims to explain how organizational and contextual factors shape TDABC implementation and influence organizational outcomes. To achieve these objectives, the following research questions are addressed:

RQ1: How is TDABC implemented in manufacturing firms and SMEs?

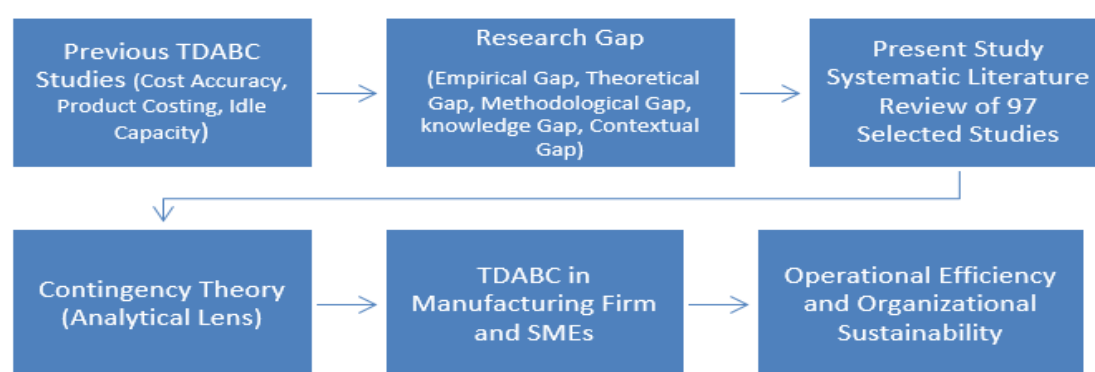
RQ2: How effective is TDABC compared with alternative costing methods?

RQ3: What contingency factors influence TDABC implementation and effectiveness?

RQ4: How does TDABC contribute to operational efficiency and organizational sustainability?

To address these research questions, this study employs Contingency Theory as the guiding analytical perspective for synthesizing the reviewed literature. Rather than treating TDABC solely as a costing technique, the review examines how organizational and contextual factors shape its implementation and influence organizational outcomes.

Figure 2. Research Gap Framework and Analytical Positioning of the Present Study



Source: Developed by the authors based on literature synthesis

Figure 2 illustrates the analytical framework of this study, linking the identified research gap, Contingency Theory, TDABC implementation, contingency factors, and organizational outcomes.

2. Research Method

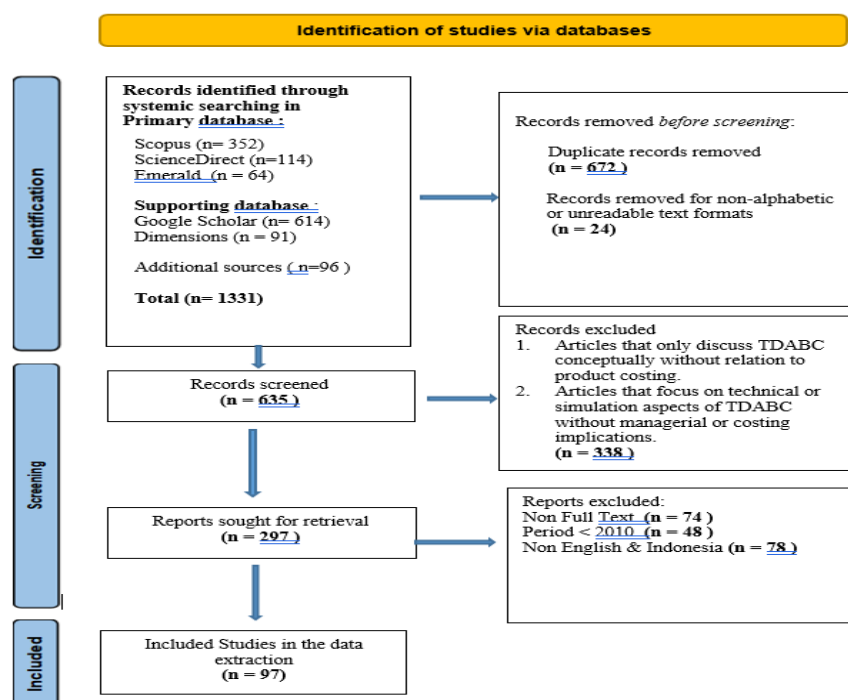
This study employed a Systematic Literature Review (SLR) following the PRISMA 2020 guidelines to systematically identify, evaluate, and synthesize evidence on TDABC implementation in manufacturing firms and SMEs. Compared with narrative reviews, the SLR approach provides greater methodological rigor, transparency, and reproducibility (Page et al., 2021; Kitchenham, 2004; Snyder, 2019).

The literature search was conducted between January and March 2025 using multiple scientific databases to ensure broad coverage of relevant studies. Scopus, ScienceDirect, and Emerald were employed as primary databases due to their extensive coverage of peer-reviewed journals in accounting, management, and industrial engineering. Additionally, Google Scholar and Dimensions were used as supplementary databases to broaden literature coverage and reduce publication bias. The use of multiple databases is recommended in systematic reviews to improve comprehensiveness and minimize database-specific limitations (Paul et al., 2021).

Search strings combined "Time-Driven Activity-Based Costing" OR "TDABC" with manufacturing-, SME-, costing-, and sustainability-related keywords using Boolean operators. Additional keyword variations were used where necessary to improve search coverage across databases. The search was limited to peer-reviewed journal articles and conference proceedings published between 2010 and 2025, written in English or Indonesian, and available in full text.

The study selection process followed the four stages of the PRISMA framework: identification, screening, eligibility assessment, and inclusion (Page et al., 2021). A multi-database search initially identified 1,331 TDABC-related records, while 421 Scopus-indexed publications were used separately for bibliometric mapping. After removing 672 duplicate records and 24 records with incomplete bibliographic information, 635 articles remained for title and abstract screening. Of these, 338 articles were excluded because they lacked conceptual equivalence with TDABC, omitted core TDABC components, fell outside manufacturing and SME contexts, or failed to satisfy the predefined inclusion criteria, leaving 297 articles for full-text assessment.

During the eligibility assessment, 74 articles were excluded because full texts were unavailable, 78 because they were published in languages other than English or Indonesian, and 48 because they were published before 2010. Consequently, 97 peer-reviewed journal articles met all inclusion criteria and were retained for thematic synthesis. This rigorous selection process enhances the transparency, reliability, and replicability of the review findings.

Figure 3. PRISMA Flow Diagram of the Study Selection Process


Source: Developed by the authors based on literature synthesis

To ensure methodological rigor, all selected studies underwent quality assessment based on criteria adapted from Kitchenham (2004).

Table 2. Quality Assessment Criteria for Included Studies

No	Assessment Criteria	Evaluation Indicators	Score (1-3)
1	Research Design Clarity	The study clearly describes its research objectives, design, and methodology	
2	Data Source Transparency	The study adequately reports data sources, research objects, or case contexts.	
3	TDABC Implementation Description	The study adequately describes TDABC implementation, including capacity cost rates and/or time equations where applicable.	
4	Findings and Discussion Quality	The study presents findings clearly and provides adequate discussion of theoretical and practical implications.	
5	Methodological Rigor	The study employs appropriate research methods and adequately reports methodological procedures and limitations.	
6	Relevance to Research Questions	The study is relevant to the objectives and research questions of the present review.	

Source: Developed by the authors based on literature synthesis

Maximum Score : 18

Quality Threshold: $\geq 70\%$ (score ≥ 13): Included in the final review; $< 70\%$ (score < 13): Excluded from the review

Scoring Scheme : 1 = Criterion not met; 2 = Criterion partially met; 3 = Criterion fully met

Quality assessment followed Kitchenham (2004) and Snyder (2019) using six criteria with a three-point scoring scale (maximum score = 18). Studies scoring below 13 (70%) were excluded. All included studies met the minimum threshold. To enhance rigor and reduce bias, the assessment was conducted independently by both authors. Any discrepancies were resolved through discussion and consensus, and articles were re-examined when necessary to ensure consistency and reliability. This consensus-based validation procedure was used to ensure consistent interpretation of the predefined quality assessment criteria across all included studies.

Table 3. Quality Assessment Results of Included Studies (n = 97)

Quality Score	Interpretation	Frequency	Percentage (%)
13-14	Acceptable Quality	24	24.7
15-16	Good Quality	46	47.4
17-18	High Quality	27	27.9
TOTAL		97	100

Source: Developed by the authors based on literature synthesis

Table 3 indicates that all included studies exceeded the minimum quality threshold, with most demonstrating good to high methodological quality. This suggests a relatively low risk of evidence bias and provides a reliable basis for the subsequent thematic synthesis.

Data extraction was conducted using predefined coding categories covering publication characteristics, country of origin, industrial sector, research method, implementation context, contingency factors, and organizational outcomes. The review process was supported by Publish or Perish for bibliometric retrieval, Mendeley Desktop for reference management, Microsoft Excel and Google Sheets for data organization, and SciSpace for literature exploration. The extracted data were analyzed through thematic synthesis involving line-by-line coding, the development of descriptive themes, and the generation of analytical themes to identify recurring patterns and relationships across the included studies (Snyder, 2019).

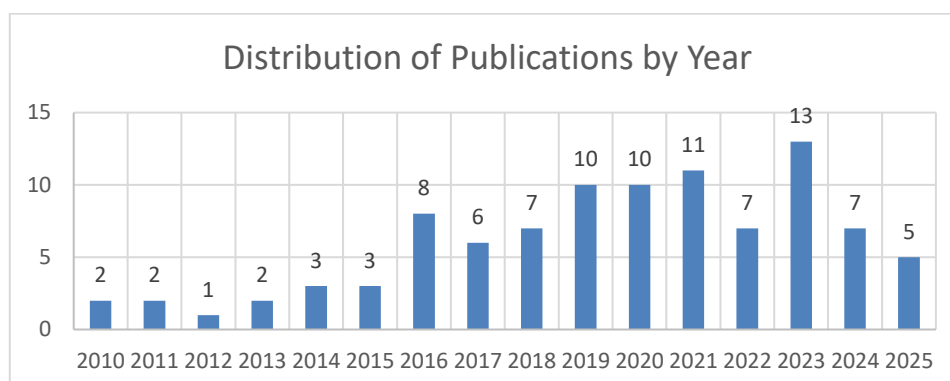
To enhance methodological rigor and minimize reviewer bias, article screening, data extraction, and thematic coding were conducted independently by both authors using the predefined coding framework. Discrepancies in study selection or thematic categorization were resolved through iterative discussion, consensus, and re-examination of the original articles when necessary. This procedure ensured coding consistency, methodological transparency, and the credibility of the thematic synthesis throughout the review process (Kitchenham, 2004; Paul et al., 2021; Snyder, 2019). The same procedure was consistently applied throughout the screening, quality assessment, and thematic coding stages to ensure methodological consistency across the review process.

The identified themes were interpreted through the lens of Contingency Theory, which argues that the effectiveness of management accounting systems depends on their alignment with organizational and environmental conditions (Chenhall, 2003; Page et al., 2021). Accordingly, factors such as firm size, process complexity, product variety, digitalization, ERP integration, data quality, and managerial support were analyzed as contingency factors influencing TDABC implementation and organizational outcomes. This theoretical perspective strengthens the interpretation of the relationships among TDABC implementation, contextual factors, and organizational performance.

3. Results and Discussion

Characteristics of Included Studies

A total of 97 articles published between 2010 and 2025 met the inclusion criteria and were included in the final review. The selected studies were analyzed to identify publication trends, geographical distribution, methodological approaches, and sectoral focus.

Figure 4. Distribution of Publications by Year (2010–2025)


Source: Developed by the authors based on literature synthesis

Figure 4 shows a clear increase in TDABC publications after 2016, with research output peaking in 2023. This trend reflects the growing academic and practical interest in TDABC as a strategic management accounting approach for improving cost management and operational performance (Baig et al., 2021; Reynolds et al., 2018).

Table 4. Characteristics of Included Studies (n = 97)

Category	Subcategory	Frequency	Percentage (%)
Region	Africa	3	3.1
	Americas	7	7.2
	Oceania	2	2.1
	Europe	32	33.0
	East Asia	4	4.1
	South Asia	7	7.2
	Southeast Asia	32	33.0
	Middle East	10	10.3
	Total	97	100.0
Research Method	Case Study	61	62.9
	Conceptual/ Review	19	19.6
	Survey	3	3.1
	Quantitative/Mixed	5	5.2
	Others	9	9.3
	Total	97	100.0
Primary Sector Focus	Manufacturing	74	76.3
	SMEs	18	18.6
	Other Contexts	5	5.1
	Total	97	100.0

Source: Based on the systematic literature review

Table 4 summarizes the characteristics of the reviewed studies. Case studies dominate the literature, while manufacturing firms constitute the

primary research setting, indicating that TDABC research remains strongly practice-oriented and focused on addressing operational and cost management challenges (Basti & Boyar, 2021; Reynolds et al., 2018; Vedernikova et al., 2020). Geographically, Europe and Southeast Asia account for the largest share of publications, suggesting that these regions have been the main contributors to the empirical development and application of TDABC in manufacturing firms and SMEs.

The observed publication patterns indicate that TDABC research has progressively shifted from methodological development toward empirical implementation, with increasing emphasis on organizational performance, operational efficiency, and strategic decision support across manufacturing and SME contexts.

Thematic Findings

The thematic synthesis identified five major themes: TDABC implementation, effectiveness compared with alternative costing methods, operational efficiency, implementation challenges and success factors, and managerial decision support (Table 5). These themes form the basis of the subsequent discussion.

Table 5. Summary of Thematic Findings

Theme	Key Concepts Identified	Main Findings
TDABC Implementation	Capacity Cost Rate, Time Equation, Practical Capacity, Resource Consumption	TDABC implementation relies primarily on capacity cost rates and time equations to improve the accuracy of cost allocation.
Effectiveness Compared with Alternative Costing Methods	Cost Allocation, Product Costing, Cost Accuracy, Overhead Allocation	TDABC generally provides greater costing accuracy and flexibility than traditional costing systems and conventional ABC.
Operational and Production Efficiency	Operational Efficiency, Capacity Utilization, Idle Capacity, Resource Allocation,	Operational efficiency emerged as the most dominant outcome of TDABC implementation across manufacturing firms and SMEs.

Theme	Key Concepts Identified	Main Findings
	Process Improvement	
Implementation Challenges and Success Factors	Data Quality, ERP Integration, Digitalization, Time Estimation, Management Support	Successful implementation depends on organizational readiness, information quality, and managerial commitment.
Managerial Decision Support	Pricing Decisions, Profitability Analysis, Strategic Decisions, Cost Leadership	TDABC provides decision-relevant cost information that supports managerial and strategic decision-making.

Source: Based on the systematic literature review

The identified themes provide a comprehensive overview of how TDABC has evolved from a product costing technique into a broader management tool supporting operational improvement and strategic decision-making. The following sections discuss each theme in greater detail.

TDABC Implementation

The thematic synthesis indicates that TDABC implementation is fundamentally based on two core components: capacity cost rates and time equations, which enable organizations to assign costs according to actual resource consumption and activity duration (Everaert et al., 2008; Kaplan & Anderson, 2007; Vedernikova et al., 2020). Across the reviewed studies, implementation generally followed four sequential stages: identifying activities, estimating practical capacity, calculating capacity cost rates, and developing time equations to capture operational variability.

Compared with conventional Activity-Based Costing (ABC), TDABC simplifies the costing process by reducing the need for multiple cost drivers and extensive activity mapping while maintaining costing accuracy (Everaert et al., 2008; Kaplan & Anderson, 2007). The reviewed studies further suggest that successful implementation requires reliable operational data and accurate estimation of activity times to ensure that the costing model adequately reflects organizational processes. These implementation characteristics make

TDABC particularly suitable for manufacturing firms and SMEs with diverse products and complex production activities (Reynolds et al., 2018; Vedernikova et al., 2020).

Effectiveness Compared with Alternative Costing Methods

The reviewed literature consistently indicates that TDABC provides greater costing accuracy than traditional volume-based costing systems by allocating costs according to actual resource consumption and activity duration. This approach reduces cost distortions and produces more reliable product costing information, particularly in organizations characterized by complex production processes, diverse product portfolios, and high indirect costs (Areena & Abu, 2019; Kaplan & Anderson, 2007; Vedernikova et al., 2020).

Compared with conventional Activity-Based Costing (ABC), TDABC is generally regarded as a simpler and more flexible approach because it relies on capacity cost rates and time equations rather than multiple cost drivers and extensive activity mapping. Consequently, TDABC reduces implementation complexity while maintaining reliable costing information for managerial decision-making (Everaert et al., 2008; Kamil et al., 2021; Safeiee et al., 2019).

More accurate cost information enables organizations to improve pricing, profitability analysis, budgeting, performance evaluation, and resource allocation, thereby strengthening overall cost management practices (Musov, 2017; Pinheiro et al., 2023).

However, the reviewed evidence also indicates that TDABC is not universally superior. Its benefits are less evident in organizations with relatively simple production processes, limited product diversity, or inadequate time-related data, where traditional costing systems or conventional ABC may provide sufficiently reliable results at lower implementation costs (Basti & Boyar, 2021; Devina & Faliany, 2018; Koolmees et al., 2021).

Overall, the findings suggest that although TDABC generally outperforms traditional costing systems and conventional ABC in terms of costing accuracy, flexibility, and managerial usefulness, its effectiveness ultimately depends on organizational characteristics and the availability of reliable operational information.

Operational and Production Efficiency

Operational and production efficiency emerged as the most frequently reported outcome of TDABC implementation across the reviewed studies. Beyond improving product costing accuracy, TDABC enables organizations to identify idle capacity, process bottlenecks, and non-value-added activities, thereby supporting process redesign, capacity optimization, and more efficient resource allocation (Basti & Boyar, 2021; Pinheiro et al., 2023; Reynolds et al., 2018; Vedernikova et al., 2020).

As shown in Table 4, most reviewed studies were conducted in manufacturing firms (76.3%) using case study designs (62.9%), reflecting the implementation-oriented nature of TDABC research. Consequently, operational efficiency emerged as the dominant organizational outcome because previous studies primarily examined production improvement, capacity utilization, and cost management (Baig et al., 2021; Reynolds et al., 2018; Vedernikova et al., 2020). Therefore, the predominance of operational efficiency should be interpreted as a characteristic of the current evidence base rather than as an inevitable consequence of every TDABC implementation.

From a contingency perspective, the reviewed evidence indicates that TDABC generates greater operational benefits when implemented in organizations with complex production processes, diverse product portfolios, reliable operational data, and adequate technological and managerial capabilities (Anderson & Merwe, 2021; Basti & Boyar, 2021; Pinheiro et al., 2023; Reynolds et al., 2018; Vedernikova et al., 2020; Otley, 1980). Conversely, organizations with simpler operations or limited time-related information often reported more modest outcomes because the additional effort required to develop TDABC models may outweigh the expected benefits (Devina & Faliany, 2018; Koolmees et al., 2021; Sri Nur Areena Mohd Zaini et al., 2023).

Overall, these findings suggest that TDABC has evolved beyond a product costing technique into a strategic management accounting tool capable of supporting operational excellence when aligned with organizational and contextual characteristics, reinforcing the central proposition of Contingency Theory that management accounting systems achieve superior performance only when they fit organizational conditions (Chenhall, 2003; Otley, 1980).

Implementation Challenges and Success Factors

The reviewed literature identified several challenges associated with TDABC implementation in manufacturing firms and SMEs. One of the most frequently reported challenges involves collecting accurate time-related data required to estimate capacity cost rates and develop time equations. In many organizations, operational data are incomplete, inconsistent, or unavailable, making it difficult to accurately represent resource consumption and activity duration (Devina & Faliany, 2018; Koolmees et al., 2021; Zaini' & Abu, 2020).

Another major challenge concerns organizational complexity. Firms with diverse products, multiple production stages, and highly variable activities often require considerable effort to develop reliable time equations and maintain accurate costing information. Several studies also reported resistance to organizational change when TDABC implementation required modifications to existing accounting systems, operational procedures, and employee responsibilities (Basti & Boyar, 2021; Rifandi et al., 2019; Stonciuvienne et al., 2020).

Despite these challenges, the literature consistently identifies strong top management support, employee involvement, reliable operational data, digitalization, and ERP integration as critical success factors (Anderson & Merwe, 2021; Pinheiro et al., 2023). Together, these findings indicate that successful TDABC implementation depends not only on technical system design but also on organizational readiness, adequate technological infrastructure, and managerial commitment.

Managerial Decision Support

The reviewed literature indicates that TDABC supports managerial decision-making by providing more accurate, transparent, and decision-relevant cost information than traditional costing systems. By linking costs directly to resource consumption and operational activities, TDABC improves planning, budgeting, pricing, profitability analysis, and resource allocation, enabling managers to make more informed operational and strategic decisions (Duran et al., 2023; Musov, 2017; Pinheiro et al., 2023).

Beyond supporting routine operational decisions, TDABC facilitates capacity planning, product portfolio evaluation, and investment analysis by providing clearer insights into cost behavior and resource requirements (Durán et al., 2020; Zhuang & Chang, 2017). These capabilities enable

manufacturing firms and SMEs to prioritize resources, evaluate strategic alternatives, and improve long-term organizational performance. Overall, the findings suggest that TDABC has evolved from a costing method into a managerial decision-support system that enhances organizational effectiveness through more reliable cost information.

Contradictory Findings Across Studies

Although most studies reported positive outcomes associated with TDABC implementation, several inconsistencies were identified. Some studies found substantial improvements in cost accuracy and operational performance Baig et al. (2021); Pinheiro et al. (2023); Vedernikova et al. (2020), whereas others reported limited benefits due to simple production structures, insufficient operational data, or high implementation costs (Devina & Faliany, 2018; Koolmees et al., 2021; Zaini' & Abu, 2020). These contradictory findings suggest that TDABC effectiveness is not universal. Consistent with Contingency Theory, implementation outcomes appear to depend on organizational conditions such as process complexity, technological capability, data quality, and managerial support (Chenhall, 2003; Otley, 1980). Consequently, the reviewed evidence indicates that TDABC should not be viewed as a universally superior costing system but rather as a context-dependent management accounting approach whose effectiveness varies across organizational environments (Chenhall, 2003; Reynolds et al., 2018).

Contingency Theory Synthesis

The thematic findings collectively reinforce the central proposition of Contingency Theory that no single management accounting system is universally effective across all organizational settings (Chenhall, 2003; Otley, 1980). \Process complexity, digitalization, ERP integration, data quality, and managerial support consistently emerged as contingency factors influencing TDABC implementation and organizational outcomes. Organizations characterized by complex production processes, advanced information systems, and strong managerial commitment were more likely to achieve improvements in cost accuracy, operational efficiency, and strategic decision-making. Conversely, organizations with limited technological capability, poor-quality operational data, or relatively simple production structures frequently reported more limited implementation benefits.

These findings extend the application of Contingency Theory by demonstrating that TDABC effectiveness depends not solely on the technical characteristics of the costing system but on the alignment between organizational capabilities, operational environments, and management accounting practices (Chenhall, 2003; Otley, 1980; Anderson & Merwe, 2021). Rather than supporting a universally superior costing approach, the evidence indicates that TDABC generates greater organizational value when implemented under conditions that fit the organization's operational complexity, technological readiness, and managerial capabilities. This reinforces the contingency perspective that management accounting systems achieve superior performance only when aligned with contextual organizational factors (Otley, 1980; Reynolds et al., 2018).

Theoretical and Practical Implications

The findings extend the TDABC literature by demonstrating that its contribution extends beyond product costing accuracy to encompass operational efficiency, resource optimization, managerial decision support, and organizational performance (Basti & Boyar, 2021; Pinheiro et al., 2023; Vedernikova et al., 2020). More importantly, this review provides a contingency-based interpretation of TDABC by showing that its effectiveness depends not only on technical design but also on organizational and environmental conditions. Process complexity, digitalization, ERP integration, data quality, and managerial support consistently emerged as key determinants of successful implementation, reinforcing the contingency perspective that management accounting systems achieve superior outcomes when aligned with organizational context (Anderson & Merwe, 2021; Chenhall, 2003; Otley, 1980; Pinheiro et al., 2023).

From a practical perspective, the synthesized evidence suggests that successful TDABC implementation requires organizational readiness rather than merely adopting a new costing technique. Manufacturing firms and SMEs should first assess their process complexity, product diversity, indirect cost structure, and information system capability to determine the feasibility of TDABC implementation (Basti & Boyar, 2021; Reynolds et al., 2018; Vedernikova et al., 2020). Subsequently, organizations should establish reliable operational data, strengthen digital infrastructure through ERP integration where appropriate, and ensure top management commitment, employee training, and effective change management to facilitate successful

implementation (Anderson & Merwe, 2021; Pinheiro et al., 2023; Stonciuviene et al., 2020).

The review further suggests that managers should use TDABC as a strategic management accounting tool rather than solely as a costing system. The information generated by TDABC supports pricing, profitability analysis, capacity planning, process improvement, and resource allocation, enabling organizations to improve operational performance and long-term competitiveness (Duran et al., 2023; Musov, 2017; Pinheiro et al., 2023; Zhuang & Chang, 2017). These recommendations, derived from the synthesized evidence, reinforce that sustainable benefits from TDABC are achieved when its implementation is aligned with organizational capabilities and strategic objectives, consistent with Contingency Theory (Anderson & Merwe, 2021; Chenhall, 2003; Otley, 1980; Pinheiro et al., 2023).

Limitations and Future Research

This review has several limitations. First, the study included only publications written in English and Indonesian, which may have excluded relevant evidence published in other languages. Second, the review focused exclusively on manufacturing firms and SMEs, limiting the generalizability of the findings to other organizational contexts. Third, although multiple databases were searched, relevant studies may have been omitted because of differences in database coverage. Furthermore, the review included only peer-reviewed and accessible publications, which may introduce publication bias by underrepresenting unpublished studies and gray literature (Paul et al., 2021; Snyder, 2019). Finally, the thematic synthesis relied predominantly on case-study evidence, which may limit the broader generalizability of the identified patterns and relationships across industries (Snyder, 2019).

Future research should examine TDABC implementation in other organizational contexts and investigate its integration with emerging digital technologies, ERP systems, artificial intelligence, and Industry 4.0 applications. Comparative studies across industries and countries would further improve understanding of how contextual factors influence TDABC implementation and organizational outcomes. In addition, future studies are encouraged to employ meta-analysis or other quantitative evidence synthesis techniques to statistically validate the relationships identified in this review and strengthen the generalizability of findings (Paul et al., 2021; Snyder, 2019).

4. Conclusion

This study synthesized evidence from 97 articles published between 2010 and 2025 to examine the implementation and outcomes of Time-Driven Activity-Based Costing (TDABC) in manufacturing firms and SMEs. The findings demonstrate that TDABC improves cost allocation accuracy, supports managerial decision-making, and enhances operational efficiency through better resource utilization and process optimization. However, the review also shows that implementation effectiveness depends on contextual factors—including process complexity, digitalization, data quality, ERP integration, and managerial support—highlighting that TDABC should be viewed as a context-dependent management accounting system rather than a universally superior costing method.

The study contributes to the management accounting literature by extending the application of Contingency Theory to explain variations in TDABC implementation outcomes across organizational settings. Unlike previous reviews that primarily emphasized technical aspects of TDABC, this review provides an integrative synthesis linking contingency factors, implementation practices, operational efficiency, and organizational outcomes. These findings offer both theoretical insights and practical guidance for manufacturing firms and SMEs seeking to improve cost management and organizational performance.

Despite these contributions, the review is limited to English- and Indonesian-language publications and focuses exclusively on manufacturing firms and SMEs. Future research should investigate TDABC implementation in other organizational contexts and explore its integration with digital technologies, ERP systems, artificial intelligence, and Industry 4.0 to further explain how contextual factors shape implementation effectiveness.

5. References

- Anderson, A. M., & Merwe, A. van Der. (2021). Time-driven activity-based costing related to digital twinning in additive manufacturing. *South African Journal of Industrial Engineering*, 32(1).
- Areena, S. N., & Abu, M. yazid. (2019). A Review on Time-Driven Activity-Based Costing System in Various Sectors. *Journal of Modern Manufacturing*

- Systems and Technology*, 2, 15–22.
<https://doi.org/10.15282/jmmst.v2i1.1795>
- Baig, A., Senan, N. A. M., Ali, I., & Ahmad, I. (2021). The Implications Of Time-Driven Activity-Based Costing. *Jornal Economic and Management*, 4(1).
https://www.researchgate.net/publication/364322939_THE_IMPLICATIONS_OF_TIME-DRIVEN_ACTIVITY-BASED_COSTING
- Basti, M., & Boyar, E. (2021). An Application of Time-Driven Activity Based Costing Method in the Mold Manufacturing Industry. *Journal of Accounting Finance and Auditing Studies (JAFAS)*, 7(3), 260–280.
<https://doi.org/10.32602/jafas.2021.029>
- Chenhall, R. H. (2003). Management control systems design within its organizational context: findings from contingency-based research and directions for the future. *Elsevier Accounting, Organizations and Society*, 28(2), 127–168. [https://doi.org/10.1016/S0361-3682\(01\)00027-7](https://doi.org/10.1016/S0361-3682(01)00027-7)
- Devina, M., & Faliany, L. J. (2018). Penerapan Metode Time-Driven Activity-Based Costing Untuk Menghitung Harga Pokok Produk Jasa: Studi Kasus Salon Kecantikan Avv Make Up & Hair Do. *Jurnal Akuntansi*, 9(2), 130–146. <https://doi.org/10.25170/jrak.v9i2.23>
- Duran, O., Afonso, P., Jiménez, V., & Carvajal, K. (2023). Cost of Ownership of Spare Parts under Uncertainty: Integrating Reliability and Costs. *Mathematics*, 11(23). <https://www.mdpi.com/2227-7390/11/15/3316>
- Everaert, P., Bruggeman, W., Sarens, G., Anderson, S. R., & Levant, Y. (2008). Cost modeling in logistics using time-driven ABC: Experiences from a wholesaler. *International Journal of Physical Distribution & Logistics Management*, 38(3), 172–191. <https://doi.org/10.1108/09600030810866977>
- Ganorkar, A. B., Lakhe, R. R., & Agrawal, K. N. (2019). Cost And Productivity Analysis Of The Manufacturing Industry Using Tdabc & Most. *South African Journal of Industrial Engineering*, 30(1), 196–208. https://www.researchgate.net/publication/335029371_Cost_and_productivity_analysis_of_the_manufacturing_industry_using_TDABC_MOST
- Garrison, R. H., Noreen, E. W., Brewer, P. C., & Hinduan, N. (2021). *Managerial Accounting* (17th ed.). Salemba Empat.
- Hidalgo, L. M. S., & Taype, J. A. V. (2023). The TDABC analyzed from the marginal point of view for a manufacturing plant. *Proceedings of the LACCEI International Multi-Conference for Engineering, Education and Technology*, 2023, 1–7. <https://doi.org/10.18687/laccei2023.1.1.1161>
- Horngren, C. T., Datar, S. M., & Rajan, M. V. (2021). *Cost Accounting A MANAGERIAL EMPHASIS* (18 Th Edit). Pearson education Inc.
- Kamil, N. N. N. M., Sri Nur Areena Mohd Zaini, & Abu, M. Y. (2021). A Case Study on the Un-Used Capacity Assessment Using Time Driven Activity Based Costing for Magnetic Components. *International Journal-of Industrial Management*, 9(32–53).

- https://www.researchgate.net/journal/International-Journal-of-Industrial-Management-0127-564X?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uLiwicGFnZSI6InB1YmxpY2F0aW9uIn19
- Kaplan, R. S., & Anderson, S. R. (2007). *Time-Driven Activity-Based Costing A Simpler and More Powerful Path to Higher Profits*. Harvard Business Review Press.
- Kitchenham, B. (2004). Procedures for Performing Systematic Reviews, Version 1.0. *Empirical Software Engineering*, 33(2004), 1-26.
- Koolmees, D., Ramkumar, P. N., Hessburg, L., Guo, E., Bernstein, D. N., & Makhni, E. C. (2021). Time-Driven Activity-based Costing for Anterior Cruciate Ligament Reconstruction: A Comparison to Traditional Accounting Methods. *Arthroscopy, Sports Medicine, and Rehabilitation*, 3(1), e39-e45. <https://doi.org/10.1016/j.asmr.2020.08.006>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Journal of Clinical Epidemiology*, 62(10), 1006-1012. <https://doi.org/10.1016/j.jclinepi.2009.06.005>
- Musov, M. (2017). Time-Driven Activity-Based Costing: Potential for Application at the SMEs in Poland and Bulgaria. *Jornal Economics Business*, 6(11). <https://www.semanticscholar.org/paper/Time-Driven-Activity-Based-Costing%3A-Potential-for-Musov/5b48cc850118a1ad83e179edb17443f90d3304cd>
- Otley, D. T. (1980). The contingency theory of management accounting: Achievement and prognosis. *Accounting, Organizations and Society*, 5(4), 413-428. [https://doi.org/10.1016/0361-3682\(80\)90040-9](https://doi.org/10.1016/0361-3682(80)90040-9)
- Page, M. J., Boutron, I., McKenzie, oanne E., Bossuyt, P. M., Hoffmann, T. C., & Mulrow, C. D. (2021). CCBY Open access Research Methods & Reporting The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. In *Research Methods & Reporting* (Vol. 372). <https://doi.org/10.1136/bmj.n71>
- Paul, J., Lim, W. M., O'Cass, A., Hao, A. W., & Bresciani, S. (2021). Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR). *International Journal of Consumer Studies*. <https://doi.org/10.1111/ijcs.12695>
- Pinheiro, G. F. M., Sousa, E. F. de, & Faria, L. H. L. (2023). Time Driven Activity-Based Costing: A Cost Management Tool For Small Business. *Edição de Primavera*, 1(12). <https://journals.sespted.org/rinterpap/article/view/77>
- Reynolds, A., Fourie, H., & Erasmus, L. (2018). A framework for time-driven activity-based costing implementation at small and medium enterprises. *The Southern African Journal of Entrepreneurship and Small Business Management*, 10(1), 1-11. <https://doi.org/10.4102/sajesbm.v10i1.194>
- Rifandi, A. M., Mas, I., Miqdad, M., Akuntansi, J., Ekonomi, F., Unej, U. J., &

- Kalimantan, J. (2019). Perhitungan Biaya Produksi Berbasis Time-Driven Activity Based Costing (TDABC) Pada Produk Rokok Gagak Hitam Di Bondowoso. *Jurnal Administrasi Bisnis (JAB)*, 3(10), 1.
- Safeiee, F. L. M., Abu, M. Y., Kamil, N. N. N. M., & Zamrud, N. F. (2019). The Application of Time-Driven Activity Based Costing System on Inductors in Electrics and Electronics Industry. *IMEC-APCOMS*, 14(6).
https://doi.org/10.1007/978-981-15-0950-6_14
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339.
<https://doi.org/10.1016/j.jbusres.2019.07.039>
- Sri Nur Areena Mohd Zaini, Safeiee, F. L. M., Ghani, A. S. A., Jaafar, N. N., & Abu, M. Y. (2023). Integration of Mahalanobis-Taguchi System and Time-Driven Activity-Based Costing in a Production Environment. *Applied Sciences*, 13(4), 2633.
https://www.researchgate.net/publication/368675183_Integration_of_Mahalanobis-Taguchi_System_and_Time-Driven_Activity-Based_Costing_in_a_Production_Environment
- Stonciuvienė, N., Ūsaitė-Duonielienė, R., & Zinkevičienė, D. (2020). Integration of Activity-Based Costing Modifications and LEAN Accounting into Full Cost Calculation. *Engineering Economics*, 31(1), 50–60.
<https://doi.org/10.5755/j01.ee.31.1.23750>
- Vedernikova, O., Siguenza-Guzman, L., Pesantez, J., & Arcentales-Carrion, R. (2020). Time-driven activity-based costing in the assembly industry. *Australasian Accounting, Business and Finance Journal*, 14(4), 3–23.
<https://doi.org/10.14453/aabfj.v14i4.2>
- Waleed, S., Ismael, E., Sabri, T., & Al-Ghabban, M. (2023). *The role of the Activity Based Budget Time Driven to apply Throughput Accounting (An Applied Research In Wasit Textile And Knitting Factory)*.
- Zaini', S. N. A. M., & Abu, M. Y. (2020). Implication of time equation in mature and immature area of ramp using time driven activity-based costing. *Journal of Modern Manufacturing Systems and Technology*, 4(1), 36–39.
<https://doi.org/10.15282/jmmst.v4i2.4884>
- Zhuang, Z.-Y., & Chang, S.-C. (2017). Deciding product mix based on time-driven activity-based costing by mixed integer programming. *Journal of Intelligent Manufacturing*, 11(5).
https://www.researchgate.net/publication/272494755_Deciding_product_mix_based_on_time-driven_activity-based_costing_by_mixed_integer_programming