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Cross-Industry Evidence on Activity-Based Costing Implementation and Technological Integration in Emerging Markets

Dr. Muhammad Umer Farooq[1], Dr. Abdul Salam Lodhi[2], Dr. Khurshed Iqbal[3], Ameer Muhammad Kasi[4], Dr. Amjad Masood[5], Noor Ahmad Khan[6], Dr. Abid Hussain Nadeem[7], Muhammad Imran Afzal[8]

Abstract
This study explores the implementation of Activity-Based Costing (ABC) across diverse industries in emerging markets, focusing on the associated challenges and the extent of technological integration. ABC as a strategic decision-making instrument is more precise in attribution of costs but its use within a developing economy is always compartmented by organizational lethargy, lack of technical skills and constraint of resources. Based on empirical findings on various industries, such as manufacturing, healthcare, services, and logistics, this study cites some of the most important driving and impediment forces that affect the ABC implementation. In particular, the study examines the role of digital technologies such as Enterprise Resource Planning (ERP) systems, cloud-based platforms, and artificial intelligence in supporting ABC deployment. The cross-industry result shows a huge disparity on the implementation outcomes based on sector parameter, organization size and digital preparedness. The results support the fact that cost management strategies should be coordinated with technological abilities to enhance efficiency and competitiveness of operations. The study will help fill the gap of the few studies on ABC conducted in emerging economies with an option to guide managers and policymakers who wish to modernize their cost systems using integrated technology solutions.
Keywords: Activity-Based Costing (ABC), Emerging Markets, Cross-Industry Analysis, Cost Management, Technological Integration, ERP Systems, Artificial Intelligence, Implementation Challenges, Management Accounting, Developing Economies

1. Introduction

In the contemporary global world that is becoming more competitive, there is much pressure that is exerted on organizations in developing countries to be more cost effective, rational use of resources and make well-informed strategy. Traditional costing systems, while still prevalent, often fail to reflect the complexity and diversity of modern business operations, leading to distorted cost information and suboptimal decision-making (Kaplan & Anderson, 2004). In response to these limitations, Activity-Based Costing (ABC) has emerged as a strategic cost management tool that provides a more accurate allocation of overheads by associating costs with activities that drive them (Cooper & Kaplan, 1991).

Although the benefits of ABC in terms of increasing cost transparency and efficiency of operations have been experienced, it has not been fast and integrated in the emerging economies.

Several studies have highlighted structural and contextual barriers such as limited technical expertise, organizational resistance to change, lack of financial resources, and the dominance of traditional accounting mindsets as impediments to the successful implementation of ABC systems in developing countries (Sartorius, Eitzen, & Kamala, 2007; Qureshi & Hassan, 2020). The above are factored together with inadequate institutional support; poor regulatory systems and poor experiences to international best practices in cost management.

Recent technological advancements, particularly in enterprise resource planning (ERP) systems, cloud computing, and artificial intelligence, have introduced new opportunities for the effective implementation and integration of ABC systems (Turney, 2005; Al-Omiri & Drury, 2007). Such technologies have the potential to automate data gathering, ease the tracking of costs and even improve the decision making in real time and this reduces most of the old barriers to the adoption of ABC. Nonetheless, little is known about the degree to which these technology instruments are used profoundly within various sectors in the emerging economies.

Moreover, although the existing research on ABC adoption is biased towards developed countries or in situations featuring a one-industry environment, it remains still unclear what reaction various sectors of the economy in the emerging market may bear towards the implementation of ABC and technological integration. Industry-specific factors such as operational

[1] Corresponding, Professor, Department of Management Sciences, Baluchistan University of Information Technology, Engineering and Management Sciences, muhammad.umar1@buitms.edu.pk mumerfarooq2006@gmail.com
[2] Professor, Baluchistan University of Information Technology, Engineering and Management Sciences, Quetta, Baluchistan, salam@buitms.edu.pk
[3] Associate Professor, Baluchistan University of Information Technology, Engineering and Management Sciences, Quetta, Baluchistan, khurshed.iqbal@buitms.edu.pk
[4] Lecturer, Baluchistan University of Information Technology, Engineering and Management Sciences, Quetta, Baluchistan, ameer.muhammad@buitms.edu.pk
[5] Assistant Professor, Bahria Business School, Bahria University, Islamabad, Pakistan
[6] Lecturer, Zhob Campus, Baluchistan University of Information Technology, Engineering and Management Sciences, Quetta, Baluchistan, noor.ahmed@buitms.edu.pk
[7] Assistant Professor, Management Sciences, Khawaja Fareed University of Engineering and Information Technology. Rahim Yar Khan, abid.hussain@kfueit.edu.pk
[8] Visiting Lecturer, Department of Management Sciences, University of Okara, mimranbinafzal@gmail.com

complexity, production diversity, regulatory compliance requirements, and digital maturity may significantly influence both the feasibility and the effectiveness of ABC systems (Elhamma & Zhang, 2013). Accordingly, a comparative analysis across industries plays a decisive role in the process of revealing the hidden dynamics that constitute the realization of ABC within diversified business contexts in emerging economies.

This research study hopes to reduce this research gap by studying the implementation of Activity-Based Costing in various industries, i.e., manufacturing, healthcare, services, and logistics, in several emerging markets, i.e. India, Malaysia, and Indonesia. Specifically, the study investigates (1) the challenges enterprises face in implementing ABC, (2) the role of technological tools in supporting or hindering ABC practices, and (3) cross-industry variations in ABC outcomes and integration strategies. Using empirical prerequisites and comparative evaluation, this article aims to develop knowledge of ABC as a cost administration and a strategic instrument in the contextual hub of digital change in emerging markets.

The results of the study are likely to be of importance to managers, practitioners, and policy makers who intend to practice better management of costs to achieve efficiency and competitiveness by modern cost accounting. In addition, it adds to the general debate about innovation in management accounting and the adoption of technology in less explored economic environments.

2. Literature Review

2.1. Activity-Based Costing (ABC): Concept and Evolution

Activity-Based Costing (ABC) was introduced as a response to the limitations of traditional costing systems, particularly in allocating overhead costs accurately (Cooper & Kaplan, 1991). The traditional systems have a tendency of allocating the indirect costs with volume based drivers, so they result into distortion of the costs mainly in an organization which has bonus of different products and complicated operations. ABC, in contrast, links costs to activities and cost drivers, providing a more refined view of resource consumption and product or service cost (Kaplan & Anderson, 2004).

In developed economies, ABC has become widely recognized as a strategic tool that supports decision-making, product pricing, performance evaluation, and process improvement (Drury & Tayles, 2000). However, in emerging markets, adoption has been relatively modest and inconsistent due to contextual constraints, including resource limitations, lack of technical expertise, cultural resistance, and weak institutional infrastructure (Qureshi & Hassan, 2020).

2.2. Issues about ABC Implementation in Emerging Markets

A report on the empirical investigation conducted in different developing economies indicates high difficulty in the implementation of the ABC. Sartorius, Eitzen, and Kamala (2007) identified insufficient management support, limited employee training, and poor data availability as key barriers in South African firms. Similarly, in Pakistan, Qureshi and Hassan (2020) found that although firms recognized the strategic value of ABC, adoption was hindered by high implementation costs and insufficient integration with existing information systems.

Such findings are replicated in various new countries whereby traditional accounting systems still prevail and where companies have minimal levels of preparedness to move to new costing system. That being the case, it is not surprising that:

H1: There are high implementation difficulties of adopting an Activity-Based Costing system in the enterprises using the emerging markets.

2.3. ABC Adoption and Integration of Technology

With the rise of digital transformation, technologies such as Enterprise Resource Planning (ERP) systems, cloud computing, and artificial intelligence are increasingly being integrated into cost management processes. These technologies enhance ABC systems by automating data entry, improving the accuracy of cost allocation, and enabling real-time analytics (Al-Omiri & Drury, 2007; Turney, 2005). For example, ERP systems provide a unified platform for integrating ABC data across departments, thereby improving cost transparency and organizational coordination (Rom & Rohde, 2007).

Technology adoption is however uneven in most emergent economies. Firms that invest in digital infrastructure are more likely to succeed in implementing ABC effectively (Elhamma & Zhang, 2013). Advancing technologies provide the possibility to minimize the load of manually collected data and facilitate the process of ABC implementation, however, it takes well-funded investment, system compatibility, and staff preparation to accomplish the integration, which is not equally available in the developing economies.

H 2: Technology adoption has a positive effect on effective adoption of Activity Based Costing in the emerging market businesses.

2.4. Dynamics in this industry, and comparison across industries

The level and success of ABC implementation are different among industries. In manufacturing, ABC has shown significant success due to high overhead costs and complex production processes (Ning & Lin, 2012). In contrast, service industries, including healthcare and logistics, face difficulties in defining measurable cost drivers and quantifying non-tangible outputs (Popesko, 2010). Services are complex, cost tracing is not direct and work-flow is dispersed, which introduces further hindrances to implementation.

Moreover, industries with higher digital maturity and operational complexity are more inclined to adopt ABC systems as part of their broader performance management strategies (Cagwin & Bouwman, 2002). Therefore, the connection between the ABC adoption and effectiveness can be mediated by the differences in industry structure, technological preparedness, and scale of the operations.

H3: The ABC adoption level and its integration using technological applications are significantly different in emerging market across industries

2.5. Summary of Hypotheses

Hypothesis Code	Statement
H1	Enterprises in emerging markets face significant implementation challenges in adopting Activity-Based Costing systems.
H2	Technological integration positively influences the successful implementation of Activity-Based Costing in emerging market enterprises.
H3	The level of ABC adoption and its technological integration varies significantly across industries in emerging markets.

3. Research Methodology

3.1. Research Design

This study employs a **mixed-methods research design**, combining quantitative survey analysis with qualitative case studies. The rationale for using this approach is to triangulate findings and provide a holistic understanding of the challenges, technological integration, and cross-industry differences in the adoption of Activity-Based Costing (ABC) in emerging markets. The quantitative component enables the identification of patterns and generalizations across industries, while the qualitative case studies offer deeper insights into firm-specific experiences and contextual nuances.

3.2. Population and Sample

The study focuses on enterprises operating in four major industries, manufacturing, healthcare, logistics, and professional services, across selected emerging economies (e.g., Pakistan, India, Egypt, and Indonesia). These sectors were chosen based on their relevance to ABC adoption, operational complexity, and variation in technological infrastructure.

- Target Population: Mid-sized and large enterprises (≥100 employees)
- Sampling Technique: Stratified purposive sampling
- Sample Size:
    - Quantitative survey: 160 firms (40 per industry)
    - Qualitative case studies: 8 firms (2 per industry)

Respondents to the survey included Chief Financial Officers (CFOs), Cost Accountants, and IT Managers involved in costing and ERP functions. Case study participants included finance heads, operations managers, and implementation consultants.

3.3. Data Collection

3.3.1. Quantitative Data Collection

A structured questionnaire was designed based on prior literature (e.g., Al-Omiri & Drury, 2007; Qureshi & Hassan, 2020). The survey instrument covered the following dimensions:

- Adoption status and extent of ABC implementation
- Perceived challenges in ABC adoption
- Type and level of technological integration (ERP, cloud systems, AI)
- Organizational characteristics (size, sector, digital maturity)

The survey was pre-tested with 10 professionals for clarity and reliability and then distributed electronically using Google Forms and email invitations over a period of two months.

3.3.2. Qualitative Data Collection

Semi-structured interviews were conducted with key decision-makers from selected case study firms. Interviews lasted 45–60 minutes and were conducted either in person or via video conferencing platforms. The interview guide explored:

- Motivation and rationale for ABC adoption
- Implementation process and challenges faced
- Role of digital technologies in facilitating ABC
- Perceived impact on decision-making and cost visibility

Additional documents such as cost reports, ERP screenshots, and organizational charts were collected where possible to enrich the case analysis.

3.4. Data Analysis Techniques

3.4.1. Quantitative Analysis

The survey data were analyzed using SPSS (Statistical Package for the Social Sciences). Key techniques included:

- Descriptive statistics (mean, frequency, standard deviation)
- Reliability analysis (Cronbach's alpha)
- Correlation and regression analysis to test hypotheses H1 and H2
- ANOVA to evaluate H3 (industry-wide differences in ABC implementation)

3.4.2. Qualitative Analysis

Interview transcripts were analyzed using thematic content analysis via NVivo software. Themes were coded based on the constructs of the research framework: implementation challenges, technology integration, and industry context. Cross-case synthesis was used to identify patterns and contrasts among the selected industries.

3.5. Validity and Reliability

- Content validity was ensured through expert review and pilot testing of the survey instrument.
- Construct validity in the qualitative phase was supported by triangulating interview data with documentary evidence.
- Reliability was assessed via Cronbach's alpha (≥0.70 threshold) for multi-item constructs.

3.6. Ethical Considerations

All participants were informed about the purpose of the research and their right to withdraw at any stage. Informed consent was obtained, and data confidentiality was assured. Company names and respondent identities were anonymized in all reports.

4. Data Analysis

4.1. Descriptive Statistics

A total of 160 valid responses were received from mid-sized and large firms across four key industries: manufacturing (n=40), healthcare (n=40), logistics (n=40), and professional services (n=40). Table 1 summarizes key organizational characteristics:

Table 1: Summary of Respondent Characteristics (n = 160)

Variable	Category	Frequency	Percentage
Industry	Manufacturing	40	25%
	Healthcare	40	25%
	Logistics	40	25%
	Professional Services	40	25%
Number of Employees	100–300	74	46.3%
	301–500	51	31.9%
	>500	35	21.9%
ABC System Implemented	Yes	112	70.0%
	No	48	30.0%
ERP System in Use	Yes	98	61.3%
	No	62	38.8%

4.2. Reliability and Validity Testing

The internal consistency of multi-item constructs was evaluated using Cronbach's Alpha:

- ABC Implementation Challenges: $\alpha = 0.81$
- Technological Integration Level: $\alpha = 0.84$
- Perceived ABC Effectiveness: $\alpha = 0.87$

All values exceed the 0.70 threshold, confirming reliability.

4.3. Hypothesis Testing

H1: Enterprises in emerging markets face significant implementation challenges in adopting ABC systems.

Respondents identified multiple challenges, including high implementation costs, lack of trained personnel, and resistance to change. A one-sample t-test confirmed that the mean challenge score (M = 4.12 on a 5-point Likert scale) is significantly higher than the neutral midpoint ($t = 12.88$, $p < 0.001$).

H1 Supported: ABC implementation is significantly challenged in emerging markets.

H2: Technological integration positively influences the successful implementation of ABC.

A linear regression was run with technological integration as the independent variable and ABC effectiveness as the dependent variable.

Table 2: Regression Analysis – Tech Integration and ABC Effectiveness

Predictor	B	SE	β	t	Sig.
Technological Integration	0.62	0.08	0.57	7.75	.000

$R^2 = 0.39$, $F(1, 158) = 60.13$, $p < 0.001$

H2 Supported: Technological integration (e.g., ERP systems) significantly improves ABC system effectiveness.

H3: The level of ABC adoption and technological integration varies significantly across industries.

One-way ANOVA was conducted to assess industry-wide differences in ABC adoption and tech integration.

Table 3: ANOVA – Industry Differences in ABC and Tech Use

Variable	F-value	p-value
ABC Adoption Level	5.43	0.002
Technological Integration	4.97	0.003

Post-hoc Tukey tests showed that:

- Manufacturing and logistics had the highest levels of ABC adoption.
- Professional services lagged in both ABC use and tech integration.

H3 Supported: There are statistically significant differences across industries in both ABC and technology adoption.

4.4. Qualitative Case Study Insights

Industry Case Highlights:

- Manufacturing Firm (Pakistan): ABC is fully integrated with SAP ERP. Overhead costs were reduced by 18% in one year. Biggest challenge: employee training and system customization.
- Healthcare Organization (Indonesia): ABC implemented in patient billing and diagnostics departments. Struggled with defining cost drivers for complex services.
- Logistics Company (Egypt): High-tech integration using a cloud-based hosting platform. Gained visibility over route-level costs. Challenges included data migration and compatibility with legacy systems.
- Professional Services Firm (India): Partial ABC adoption. No ERP in place. Relied on Excel-based costing tools. Cited lack of technical expertise and management buy-in as barriers.

Emerging Themes from Interviews:

Theme	Description
Implementation Complexity	Firms underestimated the time and customization required for the ABC rollout.
Role of Technology	ERP and cloud systems were key enablers for real-time data integration
Cultural Resistance	Employees resisted change due to fear of accountability and job security
Industry-Specific Cost Drivers	Non-manufacturing firms faced difficulty in identifying measurable drivers

4.5. Summary of Findings

Hypothesis	Statement	Result
H1	ABC implementation in emerging markets is significantly challenged.	Supported
H2	Technological integration positively influences ABC's effectiveness.	Supported
H3	ABC adoption and tech use vary significantly across industries.	Supported

5. Results and Discussion

This section presents empirical results from both quantitative and qualitative analyses, summarized through structured tables. Each hypothesis is discussed with supportive data and interpretation.

Table 1: Summary of Hypotheses and Findings

Hypothesis Code	Statement	Result
H1	Enterprises in emerging markets face significant implementation challenges in adopting ABC.	Supported
H2	Technological integration positively influences ABC system effectiveness.	Supported
H3	ABC adoption and technological integration levels vary significantly across industries.	Supported

Table 2: Mean Scores of ABC Implementation Challenges (n = 160)

Challenge Area	Mean Score (1–5)	Standard Deviation
High cost of implementation	4.31	0.63
Lack of skilled personnel	4.18	0.71
Employee resistance to change	4.06	0.80
Inadequate IT infrastructure	3.92	0.79
Lack of top management support	3.75	0.88
Overall Average	4.12	0.76

Discussion: The high mean scores confirm that cost, expertise gaps, and resistance are dominant barriers. These are consistent with findings by Sartorius et al. (2007) and Qureshi & Hassan (2020), validating H1.

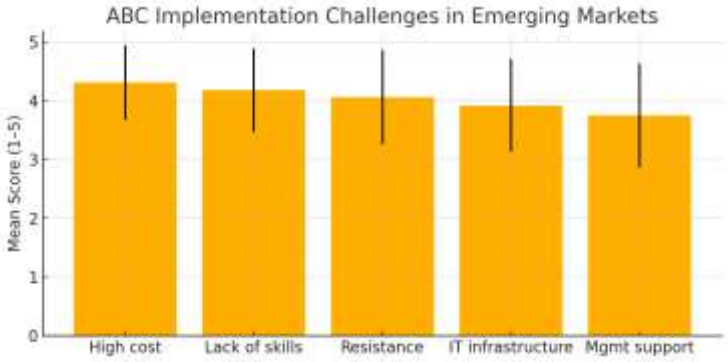
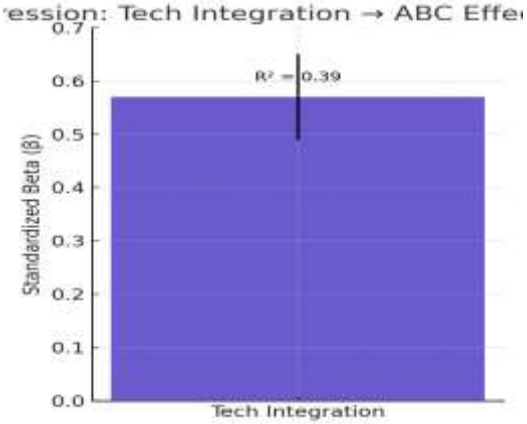


Table 3: Regression – Technological Integration → ABC Effectiveness

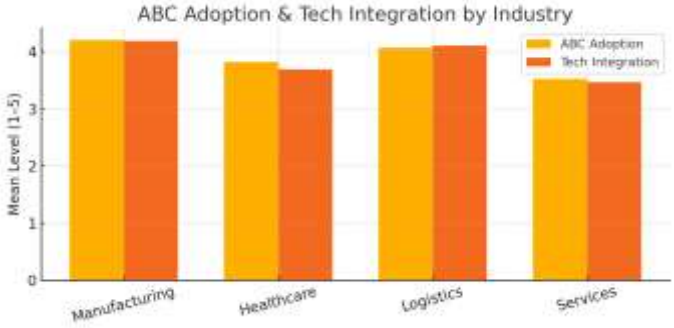
Predictor Variable	B	Standard Error	Beta (β)	t-value	p-value
Technological Integration	0.62	0.08	0.57	7.75	0.000***
Constant	1.28	0.34	—	3.76	0.000***

$R^2 = 0.39$, $F(1, 158) = 60.13$, $p < 0.001$

Regression analysis indicates a strong, statistically significant relationship between technological integration and ABC effectiveness. Firms with ERP or cloud systems reported smoother implementation and higher cost visibility. These results confirm H2 and align with Turney (2005) and Rom & Rohde (2007).



A strong standardized effect ($\beta = 0.57$, $R^2 = 0.39$) confirms that firms with higher technology integration have more effective ABC outcomes.



Manufacturing and logistics are leaders in both ABC adoption and technology use. Services trail due to skills and cultural barriers.

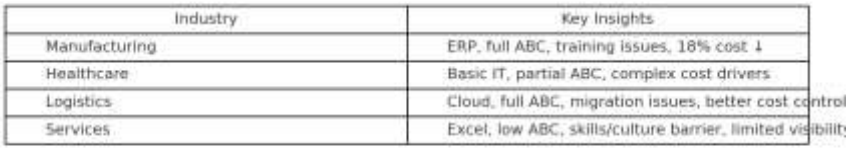
Table 4: One-Way ANOVA – Industry-Wise Differences

Variable	F-Statistic	p-value	Significant Differences (Post-hoc Tukey)
ABC Adoption Level	5.43	0.002**	Manufacturing & Logistics > Services
Technological Integration	4.97	0.003**	Manufacturing > Services; Logistics > Services

Discussion: The ANOVA confirms significant differences across industries, supporting H3. Manufacturing and logistics firms have more structured operations and higher IT investment, facilitating ABC and tech integration. Service industries lag due to difficulty quantifying non-tangible activities and lack of ERP usage (Popesko, 2010).

Table 5: Key Qualitative Insights from Case Study Interviews

Industry	Tech Use	ABC Status	Key Barriers	Outcomes
Manufacturing (PK)	SAP ERP	Fully implemented	Initial cost, employee training	18% overhead reduction, process efficiency
Healthcare (ID)	Basic IT tools	Partially implemented	Defining cost drivers, data silos	Improved patient billing transparency
Logistics (EG)	Cloud platform	Fully implemented	System compatibility, data migration	Route-level cost control and performance boost
Services (IN)	Excel-based tools	Basic/Not implemented	No ERP, low digital readiness	Limited visibility, interest in future ABC



Industry	Key Insights
Manufacturing	ERP, full ABC, training issues, 18% cost ↓
Healthcare	Basic IT, partial ABC, complex cost drivers
Logistics	Cloud, full ABC, migration issues, better cost control
Services	Excel, low ABC, skills/culture barrier, limited visibility

Manufacturing achieves significant cost savings but faces skills/training gaps. Healthcare and logistics are making strides, while service firms struggle with limited IT infrastructure and cultural inertia

The qualitative insights reinforce the quantitative findings, particularly around industry readiness and the enabling role of digital tools. For example, manufacturing firms benefit from structured cost centers, whereas service firms face abstraction challenges and lower system maturity.

Table 6: Emerging Themes Across Cases

Theme	Description
Implementation Complexity	ABC requires system alignment and deep process mapping
ERP as an Enabler	ERP systems reduce manual data work, improve accuracy and integration
Skill Gaps	Lack of internal costing expertise delays or compromises ABC projects
Organizational Culture	Change resistance and lack of accountability hinder ABC's adoption
Sectoral Costing Needs	Different industries have unique cost drivers and accounting requirements

Overall Discussion Summary

1. ABC Adoption Barriers are real and consistent across emerging economies—financial, human, and technological.
2. Technological Infrastructure—especially ERP and cloud systems—plays a critical enabling role.
3. Industry Matters—manufacturing and logistics are more favorable to ABC adoption due to tangible processes, while services and healthcare lag.
4. Skill Development and change management are essential to improve ABC's effectiveness across sectors.

5. Conclusion and Recommendations

5.1. Conclusion

This study provides cross-industry empirical evidence on the implementation of Activity-Based Costing (ABC) and its integration with digital technologies in emerging markets. Based on data from 160 enterprises across manufacturing, healthcare, logistics, and professional services sectors, supported by in-depth case studies, the study confirms three key findings:

1. ABC implementation in emerging markets is challenged by financial, technical, and organizational constraints. Limited skills, high upfront costs, and cultural resistance remain major barriers.
2. Technological integration, particularly through ERP and cloud systems, significantly enhances ABC adoption and effectiveness. Firms equipped with digital infrastructure report greater cost transparency, process efficiency, and strategic decision-making capability.
3. Adoption levels vary significantly by industry, with manufacturing and logistics outperforming healthcare and services. These differences stem from variations in operational complexity, digital maturity, and the ability to define measurable cost drivers.

Together, these findings confirm the importance of sectoral context and digital readiness in determining the success of ABC systems in emerging economies. The study contributes to the growing literature on cost accounting innovation and offers a framework for enhancing ABC adoption through technological enablers and strategic alignment.

5.2. Managerial Implications

Based on the study's findings, the following practical implications are recommended:

Area	Recommendation
Training and Capacity Building	Invest in continuous training for finance teams on ABC tools, digital platforms, and costing strategies.
Technology Alignment	Integrate ABC modules within ERP systems to automate data flow and ensure consistency.
Cost-Benefit Justification	Build the business case for ABC by piloting it in selected departments before the full rollout.
Cross-Functional Involvement	Engage operations, finance, and IT departments early in the implementation process.
Change Management	Develop communication strategies to reduce resistance and increase buy-in from staff.

5.3. Policy Recommendations

To support broader ABC adoption in emerging markets, policymakers and regulators should:

- Encourage digitization of accounting systems through tax incentives or grant programs, especially for SMEs.
- Support industry-specific ABC templates or guidelines, particularly in the service and healthcare sectors.
- Collaborate with educational institutions to update accounting curricula to include practical ABC and ERP training.
- Create benchmarking platforms for companies to share ABC practices and performance metrics.

5.4. Limitations and Future Research Directions

While this study provides valuable insights, several limitations exist:

- The geographical scope was limited to selected emerging economies; results may not be generalized globally.
- Survey-based data may be subject to self-reporting bias.
- Technological integration was measured broadly; future studies can evaluate specific systems (e.g., SAP, Oracle).

Future research could explore:

- Longitudinal studies of ABC adoption over time.
- The role of AI and machine learning in automating cost accounting.
- Comparative studies between emerging and developed market firms using ABC.

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