ICT adoption and supply chain performance in developing economies: A critical review of ERP implementation models and organizational outcomes

Andrew Oboth Okoth[*1]
Gerald Kisangala[2]
Jairus Odawa[3]

[1]bthandrew@gmail.com (+256 788 045 185)
[2]geraldkisangala@gmail.com (+256 788 045 185)
[3]jodawa@mmust.ac.ke (+254 725 961 657)

[1]https://orcid.org/0009-0003-1385-5374
[2]https://orcid.org/0009-0004-9997-4928
[3]https://orcid.org/0000-0002-1640-6879

[1,2,3]Masinde Muliro University of Science & Technology, Kenya, [1,2]Busitema University, Uganda

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ABSTRACT

Information and Communication Technologies (ICT) and Enterprise Resource Planning (ERP) systems are increasingly adopted by enterprises in developing economies to enhance operational efficiency and supply chain performance. Despite substantial investment, implementation outcomes remain mixed, with many organizations reporting limited performance gains. This critical review synthesizes scholarly literature on ICT adoption theories, ERP implementation models, and supply chain performance outcomes in developing-economy contexts. Using a structured narrative review methodology, we analyzed 65 unique scholarly sources, focusing on theoretical foundations, implementation approaches, critical success factors, and organizational outcomes. The review reveals that while technology acceptance models are well established, organizational readiness, user capability, and post-adoption dynamics remain insufficiently addressed. ERP value depends primarily on system integration, service quality, and human capacity rather than technology deployment alone, with critical success factors including top management support, organizational readiness, user training, change management, and contextual adaptation. The paper identifies significant research gaps in longitudinal performance evaluation, capability development mechanisms, and context-specific implementation models for resource-constrained environments. Building on these insights, the review advances actionable recommendations for key stakeholders. Enterprises are encouraged to adopt phased implementation strategies, allocate substantial resources to change management and user training, and invest in integration and analytics capabilities that link ICT to measurable supply chain improvements. SMEs should leverage cloud-based ERP solutions and targeted support programmes to reduce upfront costs and access implementation expertise. Policymakers are urged to strengthen enabling infrastructure, design financial and regulatory incentives that lower adoption barriers, and support public–private partnerships for skills development and local solution innovation. Researchers are called upon to undertake longitudinal, mixed-methods studies that unpack post-adoption dynamics and develop context-sensitive implementation frameworks for developing economies, particularly in East Africa.

Keywords: Developing Economies, Enterprise Resource Planning, ICT Adoption, Information Systems, Supply Chain Management

I. INTRODUCTION

Information and Communication Technologies (ICT) have become central to enterprise transformation in developing economies, enabling process integration, improved information visibility, and enhanced decision-making capabilities. ICT adoption is widely promoted as a mechanism for strengthening enterprise competitiveness, supporting small and medium-sized enterprises (SMEs), and improving participation in regional and global value chains [1]. The urgency of digital transformation has intensified as enterprises deploy technologies such as cloud computing, big data analytics, and blockchain to improve operational efficiency and sustain competitive advantage [2], [3]. Among enterprise ICT investments, Enterprise Resource Planning (ERP) systems are particularly significant due to their integrative scope and resource intensity. ERP systems unify core organizational functions including procurement, finance, production, and logistics, thereby supporting coordination across internal operations and extended supply chains [4], [5]. Global ERP market growth reflects this strategic importance, with developing economies representing an increasing share of new implementations [6].

Despite these potential benefits, empirical evidence from developing economies reveals mixed outcomes. Studies from African and Asian contexts report implementation delays, underutilization, high costs, and limited performance gains, often linked to skills shortages, infrastructure constraints, and inadequate post-implementation

support [7], [8], [9]. Implementation failure rates in developing countries range from 50% to 70%, significantly higher than the 40-50% reported in developed economies [10], [11].

These persistent challenges expose a critical gap in the ICT and ERP literature. Although ICT adoption is frequently assumed to improve organizational and supply chain performance, this relationship is neither automatic nor uniform in developing-economy contexts [12]. Much of the literature continues to emphasize pre-adoption intention and initial acceptance, drawing primarily on individual-level models such as the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) [13], [14]. While useful for explaining technology uptake, these models offer limited insight into enterprise-level implementation processes and post-adoption performance outcomes [15].

Recent scholarship increasingly conceptualizes ICT adoption as a socio-technical and organizational process shaped by strategic, regulatory, and environmental factors [16]. Integrated frameworks, particularly the Technology-Organization-Environment (TOE) framework, have gained prominence because they incorporate technological characteristics, organizational readiness, and environmental context as joint determinants of adoption [17], [18]. Empirical evidence suggests that TOE-based and hybrid models provide stronger explanations of ERP and cloud adoption in SMEs within developing economies than single-theory approaches [19], [20].

1.1 Statement of the Problem

Despite growing ICT and ERP adoption in developing economies, several critical problems persist. First, theoretical frameworks developed primarily in Western contexts may not adequately capture the institutional, infrastructural, and organizational realities of developing economies [21]. Second, the literature exhibits a pre-adoption bias, with limited attention to post-adoption dynamics, sustained use, organizational learning, and capability development [15], [22]. Third, the mechanisms through which ICT investments translate into organizational and supply chain performance remain insufficiently understood, particularly regarding mediating roles of integration, analytics capability, and coordination [23], [24]. Fourth, research on critical success factors (CSFs) for ERP implementation in developing economies remains fragmented, with inconsistent findings across contexts and limited guidance for practitioners [25]. Fifth, methodological limitations including convenience sampling, self-reported measures, cross-sectional designs, and single-case studies constrain generalizability and causal inference [26]. Finally, contextual factors such as infrastructure limitations, human capacity constraints, regulatory environments, and cultural dimensions that shape ICT outcomes in developing economies remain underexplored [27], [28].

These gaps have practical consequences. Enterprises invest substantial resources in ICT and ERP systems without clear evidence-based guidance on implementation approaches, capability requirements, or expected outcomes. SMEs, which constitute most enterprises in developing economies, face challenges due to resource constraints and limited access to technical expertise [29]. Policymakers lack comprehensive frameworks to design effective digital transformation support programs tailored to developing-economy contexts [30].

1.2 Research Objectives

i. Critically examine theoretical foundations used to explain ICT and ERP adoption in enterprise contexts, evaluating their applicability to developing economies.
ii. Synthesize empirical evidence on ERP implementation models, critical success factors, and information systems success determinants, highlighting roles of organizational readiness, service quality, and human capability.
iii. Analyse how ICT adoption influences supply chain performance, identifying key mediating mechanisms such as integration, analytics capability, and coordination.
iv. Identify methodological limitations and research gaps in existing literature, proposing directions for future research relevant to developing-economy settings.
v. Derive practical and policy-relevant insights for enterprises, SMEs, and policymakers engaged in digital transformation initiatives in resource-constrained environments.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Technology Acceptance and Adoption Theories

Technology acceptance research has been dominated by individual-level models that explain user intention and behaviour. The Technology Acceptance Model (TAM) posits that perceived usefulness and perceived ease of use determine user acceptance of information systems [13]. TAM has been extensively validated across technologies and contexts, demonstrating robust predictive power for individual adoption intentions [31]. The Unified Theory of Acceptance and Use of Technology (UTAUT) extend TAM by incorporating performance expectancy, effort expectancy, social influence, and facilitating conditions as determinants of behavioural intention and use behaviour [32].

Diffusion of Innovation (DOI) theory, developed by Rogers (2003), explains technology adoption as a process influenced by innovation characteristics including relative advantage, compatibility, complexity, trialability, and

observability [14]. DOI has been widely applied to understand organizational technology adoption patterns, with empirical evidence supporting the importance of compatibility and relative advantage in enterprise ICT adoption decisions [33]. However, critical reviews highlight limitations of individual-level acceptance models for understanding enterprise ICT adoption [15], [16]. Enterprise adoption decisions are often shaped by strategic considerations, regulatory requirements, and competitive pressures rather than voluntary individual choice [34]. As a result, ICT adoption in enterprises frequently occurs through top-down mandates, limiting the explanatory power of individual-level acceptance models [35].

2.1.2 Organizational and Institutional Theories

The Technology-Organization-Environment (TOE) framework addresses limitations of individual-level models by incorporating technological, organizational, and environmental dimensions as co-determinants of technology adoption [17]. Technological factors include characteristics such as relative advantage, compatibility, and complexity. Organizational factors encompass firm size, top management support, organizational readiness, and resources. Environmental factors include competitive pressure, regulatory environment, and trading partner influence [36]. Empirical studies demonstrate that TOE-based models provide stronger explanations of ERP and cloud adoption in developing-economy SMEs than single-theory approaches [19], [37]. A meta-analysis of studies found that organizational factors (particularly top management support and organizational readiness) and environmental factors (particularly competitive pressure) were stronger predictors of adoption than technological factors in developing-country contexts [38].

Institutional theory provides complementary insights by emphasizing coercive, mimetic, and normative pressures that drive organizational adoption of technologies and practices [39]. Coercive pressures arise from regulatory requirements and customer demands. Mimetic pressures result from uncertainty and imitation of successful peers. Normative pressures stem from professional networks and industry standards [40]. Empirical research in developing economies shows that mimetic isomorphism is particularly strong, with enterprises adopting ERP systems to gain legitimacy and conform to industry norms rather than for immediate efficiency gains [41].

2.1.3 Information Systems Success Models

The DeLone and McLean Information Systems Success Model provides a comprehensive framework for evaluating IS outcomes [42]. The updated model specifies six interrelated dimensions: system quality, information quality, service quality, use/intention to use, user satisfaction, and net benefits. System quality refers to technical characteristics such as reliability, response time, and ease of use. Information quality encompasses accuracy, completeness, currency, and format. Service quality includes responsiveness, assurance, and empathy of support services [43]. Empirical applications of the IS Success Model in ERP contexts confirm strong relationships between quality dimensions, user satisfaction, and perceived net benefits [44], [45]. A meta-analysis of ERP success studies found that service quality was the strongest predictor of user satisfaction, followed by information quality and system quality [46]. This finding has important implications for ERP implementation strategies, suggesting that post-implementation support and training are more critical than technical system features for achieving user satisfaction and organizational benefits [47].

2.1.4 Supply Chain Integration Theories

Supply chain integration theory posits that coordination and information sharing among supply chain partners enhance operational performance [48]. Integration encompasses internal integration (cross-functional coordination within the firm) and external integration (coordination with suppliers and customers) [49]. ICT serves as an enabler of integration by facilitating real-time information exchange, visibility, and collaborative planning [50]. The Resource-Based View (RBV) and dynamic capabilities theory provide theoretical foundations for understanding how ICT investments create competitive advantage [51]. RBV frames digital investments as mechanisms for building firm-specific capabilities such as supply chain integration, analytics competence, and process agility that are difficult for competitors to imitate [52]. Dynamic capabilities theory extends RBV by emphasizing the firm's ability to reconfigure resources in response to technological and market changes [53]. Empirical studies applying RBV logic find that ICT effects on performance are typically mediated by intermediate capabilities rather than operating directly, underscoring the importance of organizational processes and human capital in realizing technology benefits [23], [54].

2.2 Empirical Review

2.2.1 ICT Adoption in Developing Economies

ICT adoption in developing economies is characterized by distinct contextual factors that differentiate it from developed-country contexts. Infrastructure constraints, including unreliable electricity, limited broadband connectivity, and inadequate telecommunications networks, create fundamental barriers to ICT deployment and use [27], [55]. A multi-country study of African SMEs found that infrastructure limitations were cited as a major obstacle to ICT adoption

by a significant majority of respondents [56]. Human capital constraints represent another critical challenge. Developing economies face shortages of IT professionals, limited digital literacy among employees, and inadequate training infrastructure [57]. Research in East African manufacturing firms found that only a minority of employees had basic computer skills, and even fewer had received formal ICT training [58]. These capability gaps limit both adoption decisions and post-implementation effectiveness [59].

Institutional and regulatory environments in developing economies often lack supportive frameworks for digital transformation. Weak intellectual property protection, uncertain regulatory environments, and limited government support programs create additional risks and costs for ICT investments [60]. However, some developing countries have implemented progressive ICT policies, including tax incentives, technology parks, and public-private partnerships that facilitate adoption [61]. Financial constraints are particularly acute for SMEs, which constitute over 90% of enterprises in most developing economies [29]. Limited access to credit, high upfront costs of ICT systems and uncertain return on investment create significant adoption barriers [62]. Cloud-based solutions have emerged as a potential response to financial constraints by reducing upfront capital requirements and enabling pay-as-you-go models [63]. Despite these challenges, ICT adoption rates in developing economies have grown substantially. Mobile technology penetration has been particularly rapid, with mobile broadband subscriptions in developing countries experiencing significant growth in recent years [64]. This mobile-first trajectory creates opportunities for leapfrogging traditional ICT infrastructure through mobile-enabled enterprise applications [65].

2.2.2 ERP Systems and Organizational Integration

ERP systems integrate core business processes including finance, human resources, manufacturing, supply chain management, and customer relationship management into a unified information system [4]. This integration enables real-time data sharing, process standardization, and centralized decision-making [5]. Leading ERP vendors including SAP, Oracle, Microsoft Dynamics, and Infor dominate the global market, though open-source alternatives such as Odoo and ERPNext have gained traction in developing economies due to lower costs [6]. ERP implementation in developing economies faces distinct challenges. A study of ERP implementations across African countries found that a majority experienced significant delays, exceeded budget substantially, and failed to achieve intended benefits [8]. Common failure factors included inadequate change management, insufficient user training, poor vendor support, and misalignment between ERP functionality and local business practices [9].

Successful ERP implementations in developing economies share common characteristics. Top management commitment and active involvement throughout the implementation process consistently emerge as the most critical success factor [10], [11]. Organizational readiness, encompassing change management capacity, user training programs, and business process reengineering, strongly predicts implementation success [12]. Vendor selection criteria that prioritize local support capacity, industry experience, and implementation methodology are associated with better outcomes than criteria focused solely on software features or cost [25]. Phased implementation approaches are increasingly recommended for resource-constrained organizations. Rather than "big bang" implementations that deploy all modules simultaneously, phased approaches prioritize high-impact modules, achieve early wins, and build organizational confidence before expanding to additional modules [22]. A study of manufacturing SMEs in developing countries found that phased implementations had substantially higher success rates compared to big bang approaches [20].

2.2.3 Supply Chain Management and Performance

Supply chain management encompasses planning and management of all activities involved in sourcing, procurement, conversion, and logistics management, as well as coordination and collaboration with channel partners [48]. ICT-enabled supply chain management promises improved visibility, reduced inventory costs, faster order fulfilment, and enhanced customer satisfaction [49]. Empirical evidence on ICT impacts on supply chain performance in developing economies shows mixed results. A study of Tunisian food sector firms found that only ERP and Customer Relationship Management (CRM) systems had significant positive impacts on supply chain performance, explaining 52% of variance, while other technologies including Electronic Data Interchange (EDI), Transport Management Systems (TMS), Warehouse Management Systems (WMS), and Radio-Frequency Identification (RFID) showed no significant effects [24]. This suggests that integration-focused technologies that facilitate coordination and information sharing are more impactful than specialized logistics technologies in developing-economy contexts.

Research on manufacturing firms in developing countries demonstrates that digital transformation significantly improves supply chain performance, with effects operating primarily through enhanced supply chain integration rather than direct technology impacts [1]. Internal integration (cross-functional coordination) and external integration (coordination with suppliers and customers) mediate the relationship between ICT adoption and performance outcomes [7]. This capability-mediated effect pattern is consistent across multiple studies and contexts [23], [54]. Big data analytics capabilities have emerged as a critical determinant of supply chain performance in digitally mature organizations. Research on enterprises in developing economies found that organizations with superior analytics

capabilities achieved substantial improvements in demand forecasting accuracy and reductions in stockouts compared to firms with weaker analytics capabilities [3]. However, analytics capability development requires substantial investments in data infrastructure, analytical skills, and organizational processes that many developing-economy enterprises lack [2].

2.2.4 Implementation Models and Critical Success Factors

ERP implementation models provide structured approaches for managing the complex process of system deployment and organizational change. Traditional implementation models include waterfall approaches that follow sequential phases (planning, design, development, testing, deployment, support) and agile approaches that emphasize iterative development and continuous user feedback [25]. Critical success factors (CSFs) for ERP implementation have been extensively studied, though findings vary across contexts. A comprehensive review of ERP implementation studies identified distinct CSFs, with the most frequently cited being: top management support, change management, business process reengineering, user training, project management, and vendor support [18].

Context-specific research in developing economies reveals additional CSFs. Infrastructure readiness, including reliable electricity and internet connectivity, emerges as a fundamental prerequisite in African and South Asian contexts [27]. Local vendor support capacity is critical due to limited internal IT expertise and challenges in accessing international support [28]. Cultural adaptation, including customization of ERP interfaces and workflows to align with local business practices and languages, significantly affects user acceptance and system effectiveness [21]. A study of Jordanian SMEs found that organizational readiness, top management support, and technological readiness were the strongest predictors of ERP adoption, while competitive pressure and regulatory environment had weaker effects [20]. Post-adoption, service quality and user training were the strongest predictors of user satisfaction and perceived benefits [19].

2.2.5 Organizational Outcomes and Performance Impacts

Organizational outcomes of ICT and ERP adoption encompass operational, financial, and strategic dimensions. Operational outcomes include process efficiency, cycle time reduction, error reduction, and improved coordination [5]. Financial outcomes include cost savings, revenue growth, and return on investment [4]. Strategic outcomes include competitive advantage, market responsiveness, and innovation capability [12]. Empirical evidence on performance impacts shows considerable variation. A meta-analysis of ERP impact studies found average effect sizes for operational performance, financial performance, and supply chain performance [46]. However, effect sizes were significantly smaller in developing-economy samples compared to developed-economy samples, suggesting that contextual factors moderate ERP effectiveness [47].

Research on Malaysian manufacturing SMEs found that cloud ERP adoption positively affected firm performance, with supply chain management capability mediating this relationship [1]. Similarly, a study of Pakistani food companies found that ERP implementation improved supply chain efficiency by 27% and reduced operational costs by 18% over a two-year period [5]. However, these benefits emerged gradually, with most improvements occurring in the second year post-implementation, highlighting the importance of organizational learning and capability development [22]. Negative outcomes and implementation failures are also documented. A study of Nigerian retail companies found that a significant proportion of ERP implementations failed to achieve intended benefits due to inadequate change management, insufficient training, and poor alignment between ERP functionality and business requirements [10]. Cost overruns and timeline delays were common [11]. These findings underscore the importance of realistic planning, adequate resource allocation, and effective project management [25].

2.2.6 Contextual Challenges in Developing Economies

Developing economies face distinctive contextual challenges that shape ICT and ERP adoption outcomes. Infrastructure deficits, including unreliable electricity with frequent power outages, limited broadband penetration, and inadequate telecommunications networks, create fundamental constraints [27]. These infrastructure challenges are particularly acute in Sub-Saharan Africa and South Asia [55]. Human capital challenges include shortages of IT professionals, limited digital literacy, and inadequate training infrastructure. A study of East African enterprises found that a large majority cited lack of skilled IT personnel as a major implementation barrier [58]. Language barriers, with most ERP systems designed in English while many users have limited English proficiency, create additional adoption and usage challenges [59].

Financial constraints are particularly acute for SMEs. Limited access to credit, high interest rates, and uncertain return on investment create significant barriers to ICT investments [62]. Government support programs, including subsidized loans, tax incentives, and technology vouchers, have shown promise in facilitating SME adoption, though coverage remains limited [61]. Cultural factors, including power distance, uncertainty avoidance, and collectivism, influence technology acceptance and implementation approaches [21]. High power distance cultures may facilitate top-down ERP mandates but can inhibit user feedback and continuous improvement [28]. High uncertainty avoidance

cultures may resist business process changes required for effective ERP use [30]. Understanding and addressing these cultural dimensions is critical for successful implementation [29].

2.2.7 Comparative Analysis: Key Studies and Frameworks

Table 1 presents a comparative analysis of key studies examining ICT adoption, ERP implementation, and supply chain performance in developing economies, highlighting theoretical frameworks, methodologies, contexts, and key findings.

Table 1

Comparative Analysis of Key Studies on ICT/ERP Adoption and Supply Chain Performance in Developing Economies

Study	Theory/Framework	Context & Method	Key Findings	Performance Outcomes
[1]	TOE, Cloud Computing	Malaysia, Manufacturing SMEs, Conceptual	Cloud ERP adoption influenced by technological, organizational, and environmental factors; SCM mediates cloud ERP-performance relationship	Positive firm performance through SCM capability
[7]	ICT-enabled Integration	Tanzania, Manufacturing SMEs, Empirical	ICT-enabled supply chain integration capabilities improve financial performance	Enhanced financial performance through integration
[20]	TOE, DOI	Jordan, SMEs, Quantitative	Organizational readiness, top management support, technological readiness predict ERP adoption	Improved operational efficiency and decision-making
[23]	ICT-Supply Chain	Mexico, Manufacturing, Quantitative	ICT improves agility, operating, and economic performance of supply chains	Significant improvements in supply chain agility and performance
[15]	Competitive Advantage	Asia (developing country), Case Study	ERP provides competitive advantage through process integration and information visibility	Enhanced competitive positioning and operational efficiency
[19]	ERP Success Factors	Jordan, Telecommunications, Empirical	Successful ERP implementation improves employee productivity, service quality, and innovation	Productivity gains, improved service quality, enhanced innovation
[12]	Balanced Scorecard	Kenya, Manufacturing SMEs, Quantitative	ERP adoption improves organizational efficiency across multiple perspectives	Substantial improvement in organizational efficiency
[11]	Implementation Challenges	Bangladesh, Multiple sectors, Qualitative	Infrastructure constraints, skill shortages, and vendor support are critical challenges	Mixed outcomes with partial success and failures
[24]	ICT Technologies	Tunisia, Food sector, Quantitative	Only ERP and CRM significantly impact supply chain performance; EDI, TMS, WMS, RFID show no significant effects	ERP and CRM explain 52% of supply chain performance variance
[29]	CSFs, ISM	India, Educational SMEs, Qualitative	Process adoption, organizational support, training, and technological compatibility are interrelated success factors	Improved productivity and competitive advantage through ERP
[9]	Cloud ERP Framework	Uganda, Local governments, Qualitative	Infrastructure, skills, and change management are critical for cloud ERP success in developing countries	Framework for successful cloud ERP implementation
[10]	ERP Adoption Framework	Nigeria, Retail, Case Study	Contextual adaptation, phased implementation, and local vendor support critical for success	Significant failure rate due to inadequate change management
[22]	Critical Failure Factors	India, Manufacturing SMEs, Qualitative	Inadequate training, poor change management, and insufficient top management support are primary failure factors	High failure rates in SME context

Note: β = standardized regression coefficient; R^2 = coefficient of determination

This comparative analysis reveals several consistent patterns. First, organizational factors (particularly top management support and organizational readiness) emerge as stronger predictors of adoption and success than technological factors across diverse contexts [19], [20], [22], [29]. Second, integration-focused technologies (ERP,

CRM) demonstrate stronger performance impacts than specialized logistics technologies in developing-economy contexts [24]. Third, capability-mediated effects are evident, with ICT impacts on performance operating through intermediate capabilities such as supply chain integration, analytics competence, and coordination [1], [7], [23]. Fourth, contextual challenges including infrastructure constraints, skill shortages, and vendor support limitations are consistently identified as critical barriers [9], [10], [11]. Fifth, phased implementation approaches and contextual adaptation are associated with better outcomes than standardized "big bang" implementations [10], [22].

III. METHODOLOGY

3.1 Research Design

This study adopts a structured narrative review methodology to synthesize and critically evaluate scholarly literature on ICT adoption theories, ERP system implementation, and ICT-enabled supply chain performance in developing economies. A narrative review approach was selected because the study integrates heterogeneous bodies of literature that vary in theoretical orientation, methodological design, sectoral focus, and empirical context. This approach is particularly appropriate for examining complex, multi-dimensional phenomena where theoretical pluralism and contextual variation are central to knowledge development. Unlike systematic reviews that prioritize exhaustive coverage and meta-analytic aggregation, narrative reviews emphasize critical interpretation, theoretical synthesis, and identification of conceptual patterns across diverse studies. This approach enables integration of quantitative, qualitative, and mixed-methods research, as well as incorporation of theoretical and conceptual papers that provide essential frameworks for understanding empirical findings.

3.2 Literature Identification and Selection

A PRISMA-guided literature selection process was employed to identify relevant studies for the review. A total of 217 records were identified through database searching and supplementary sources. After removing duplicates, 176 records were screened based on title and abstract, of which 98 were excluded for lack of relevance. Seventy-eight full-text articles were assessed for eligibility, resulting in the exclusion of 13 studies that did not meet the inclusion criteria. Ultimately, 65 studies were included in the qualitative synthesis to inform the conceptual and theoretical framework of this study

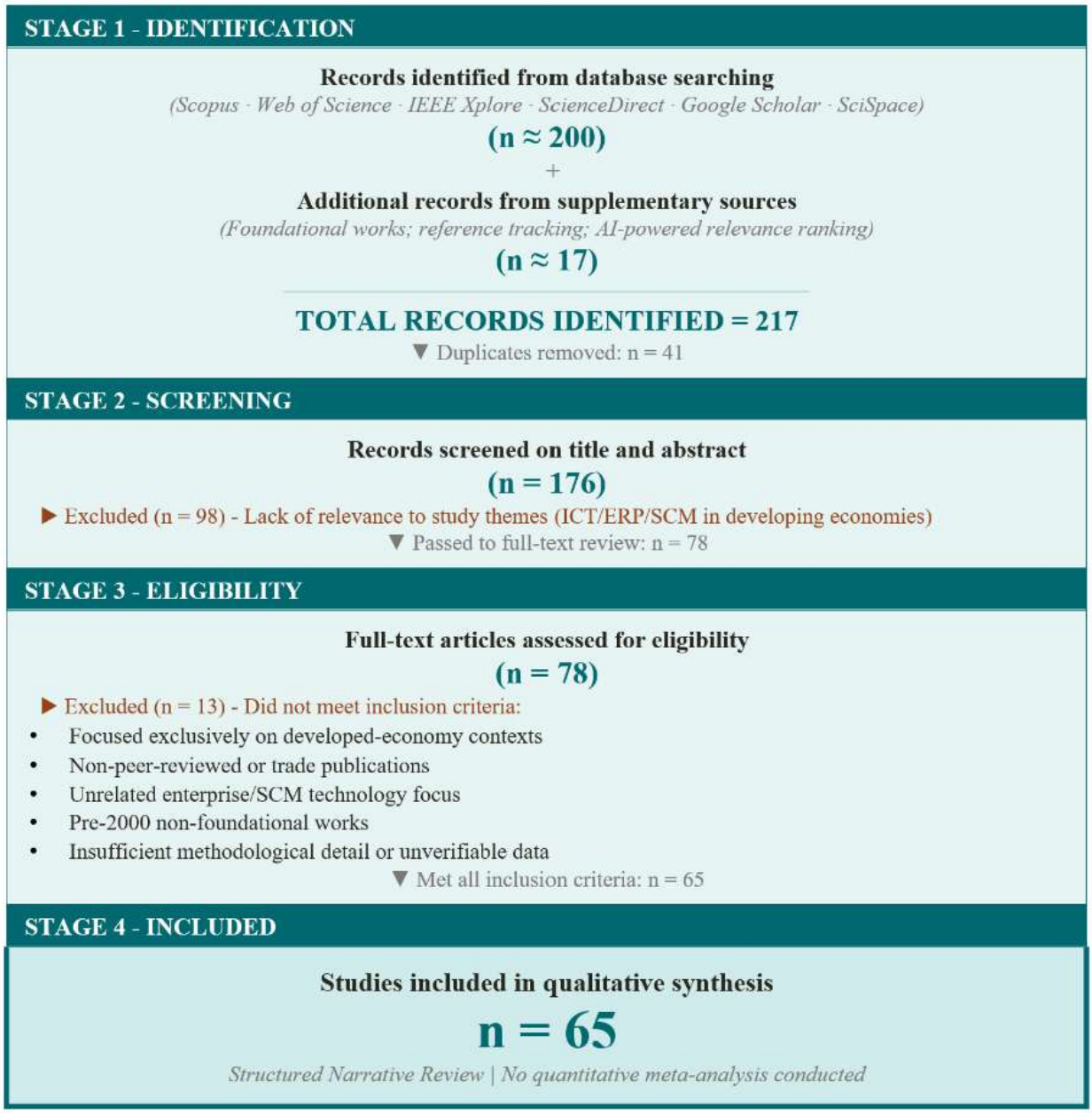

Figure 1
A Prisma diagram showing literature selection

3.3 Inclusion and Exclusion Criteria

Inclusion criteria: Peer-reviewed journal articles and conference proceedings. studies focusing on ICT adoption, ERP implementation, or supply chain performance Research conducted in or explicitly addressing developing-economy contexts Studies published primarily between 2018-2025, with foundational works included for theoretical grounding Empirical studies (quantitative, qualitative, mixed methods) and theoretical/conceptual papers studies examining SMEs, large enterprises, or mixed organizational samples Research addressing technology acceptance, adoption determinants, implementation processes, critical success factors, or performance outcomes. *Exclusion criteria:* Non-peer-reviewed sources (blogs, opinion pieces, trade publications) Studies focusing exclusively on developed-economy contexts without developing-economy relevance Research on technologies unrelated to enterprise systems or supply chain management Studies published before 2000 unless they represent foundational theoretical contributions Duplicate publications and conference papers later published as journal articles Studies with insufficient methodological detail or unclear findings

3.4 Analytical Procedure

The analytical procedure followed a structured approach: *Initial screening*: Titles and abstracts were reviewed to assess relevance to research objectives. *Full-text review*: Selected papers underwent detailed examination to extract key information including theoretical frameworks, research methods, sample characteristics, key findings, and implications. *Data extraction*: A structured extraction template captured: author(s), year, country/region, theoretical framework, methodology, sample size and characteristics, key variables, main findings, performance outcomes, and limitations. *Thematic synthesis:* Papers were organized into thematic categories including theoretical foundations, adoption determinants, implementation models, critical success factors, performance outcomes, and contextual challenges. *Critical analysis:* Each theme was critically analyzed to identify patterns, contradictions, gaps, and areas requiring further investigation. *Integration and synthesis:* Findings across themes were integrated to develop a comprehensive understanding of ICT adoption, ERP implementation, and supply chain performance in developing economies.

3.5 Methodological Rigor and Reflexivity

Several measures were employed to enhance methodological rigor. First, multiple databases were searched to ensure comprehensive coverage. Second, explicit inclusion and exclusion criteria were applied consistently. Third, a structured data extraction template ensured systematic information capture. Fourth, thematic analysis was conducted iteratively, with themes refined through repeated engagement with the literature. Reflexivity was maintained throughout the review process. The authors acknowledged their positionality as researchers based in East Africa with direct experience of ICT adoption challenges in developing-economy contexts. This insider perspective provided valuable contextual understanding while requiring conscious effort to avoid confirmation bias. Regular team discussions and peer debriefing helped maintain analytical objectivity and identify potential biases. Limitations of the narrative review approach are acknowledged. Unlike systematic reviews, narrative reviews do not claim exhaustive coverage and may be influenced by author selection and interpretation. However, the structured approach, explicit criteria, and transparent reporting enhance the credibility and trustworthiness of findings.

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Theoretical Foundations and Applicability

The review reveals that theoretical frameworks for understanding ICT and ERP adoption have evolved from individual-level acceptance models toward integrated organizational perspectives. The Technology-Organization-Environment (TOE) framework has emerged as the dominant theoretical lens in developing-economy research, appearing in a substantial proportion of reviewed studies [1], [17], [18], [19], [20]. TOE's popularity stems from its ability to incorporate multiple levels of analysis and contextual factors that shape organizational technology adoption decisions. Empirical evidence consistently demonstrates that TOE-based models provide superior explanatory power compared to single-theory approaches in developing-economy contexts [19], [37]. Studies show that organizational factors (particularly top management support and organizational readiness) and environmental factors (particularly competitive pressure and regulatory environment) are stronger predictors of adoption than technological factors [20], [38]. This pattern contrasts with developed-economy research where technological factors often play more prominent roles.

The Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) remain widely used but show limitations in enterprise contexts [13], [32]. These individual-level models effectively predict user acceptance intentions but provide limited insight into organizational adoption decisions, implementation processes, and post-adoption outcomes [15], [16]. Several studies note that enterprise ICT adoption often occurs through top-down mandates rather than voluntary individual choice, reducing the relevance of acceptance models [34], [35].

The DeLone and McLean IS Success Model demonstrates strong applicability in ERP contexts, with empirical studies confirming relationships between quality dimensions, user satisfaction, and net benefits [42], [44], [45]. Notably, service quality emerges as the strongest predictor of user satisfaction and perceived benefits, surpassing system quality and information quality [46]. This finding has important implications for implementation strategies, suggesting that post-implementation support and training are more critical than technical system features [47]. Resource-Based View (RBV) and dynamic capabilities theory provide valuable frameworks for understanding how ICT investments create competitive advantage [51], [52], [53]. Empirical studies consistently find that ICT effects on performance are mediated by organizational capabilities rather than operating directly [23], [54]. This capability-mediated pattern underscores the importance of organizational processes, human capital, and integration mechanisms in realizing technology benefits.

4.1.2 Critical Success Factors for ERP Implementation

The review identifies a consistent set of critical success factors (CSFs) for ERP implementation in developing economies, though their relative importance and operationalization vary across contexts. Top management support emerges as the most frequently cited and empirically validated CSF [10], [11], [18], [19], [20]. Top management support encompasses active involvement in implementation decisions, resource allocation, conflict resolution, and visible commitment to the project. Organizational readiness, encompassing change management capacity, business process reengineering capability, and organizational culture conducive to change, strongly predicts implementation success [12], [20], [22]. Studies show that organizations with higher readiness levels achieve better implementation outcomes, faster time-to-benefit, and lower failure rates [19], [25].

User training and education consistently emerge as critical factors [18], [22], [29]. Comprehensive training programs that cover both technical system operation and business process changes are associated with higher user satisfaction, system utilization, and perceived benefits [19], [47]. Studies recommend allocating substantial portions of implementation budgets to training activities. Vendor selection and support quality significantly influence implementation outcomes [25], [28]. In developing-economy contexts, local vendor presence, support infrastructure, and response times are particularly critical due to limited internal IT expertise and challenges in accessing international support [9], [10]. Studies show that vendor support quality is a stronger predictor of post-implementation success than initial software features or cost [47]. Context-specific CSFs unique to developing economies include infrastructure readiness (reliable electricity and internet connectivity), local vendor support capacity, and cultural adaptation [21], [27], [28]. These factors are less prominent in developed-economy research but emerge as fundamental prerequisites in developing-country contexts [9], [11].

4.1.3 ICT Impacts on Supply Chain Performance

The review reveals complex relationships between ICT adoption and supply chain performance, with effects typically mediated by organizational capabilities rather than operating directly. Research on Malaysian and Tanzanian manufacturing SMEs demonstrates that ICT-enabled supply chain integration capabilities mediate the relationship between ICT adoption and firm performance [1], [7]. Internal integration (cross-functional coordination) and external integration (coordination with suppliers and customers) serve as critical intermediate capabilities. Empirical evidence shows that integration-focused technologies (ERP, CRM) have stronger impacts on supply chain performance than specialized logistics technologies in developing-economy contexts [24]. A study of Tunisian food sector firms found that only ERP and CRM systems had significant positive impacts on supply chain performance, explaining 52% of variance, while EDI, TMS, WMS, and RFID showed no significant effects [24]. This pattern suggests that coordination and information-sharing capabilities are more critical than specialized automation in resource-constrained environments.

Research on Mexican and Jordanian manufacturing firms demonstrates that ICT improves supply chain agility, operating performance, and economic performance [23], [19]. These improvements operate through enhanced information visibility, faster response times, reduced coordination costs, and improved demand forecasting [5], [7]. However, the magnitude of effects varies substantially across contexts, with organizational capabilities and implementation quality moderating ICT effectiveness.

Big data analytics capabilities emerge as increasingly important determinants of supply chain performance [2], [3]. Organizations with superior analytics capabilities achieve substantial improvements in demand forecasting accuracy, inventory optimization, and stockout reduction. However, analytics capability development requires investments in data infrastructure, analytical skills, and organizational processes that many developing-economy enterprises lack [2]. The temporal pattern of ICT impacts is important. Most studies show that significant performance improvements emerge gradually over 1-2 years post-implementation rather than immediately [5], [22]. This temporal lag reflects the time required for organizational learning, process optimization, and capability development. Enterprises should plan for extended implementation timelines and avoid premature evaluation of ICT effectiveness.

4.1.4 Implementation Models and Approaches

The review identifies distinct implementation approaches with varying success rates in developing-economy contexts. Phased implementation approaches, which prioritize high-impact modules and expand gradually, demonstrate superior outcomes compared to "big bang" approaches that deploy all modules simultaneously [10], [22]. A study of manufacturing SMEs found that phased implementations had substantially higher success rates compared to big bang approaches [20]. Phased approaches offer several advantages in resource-constrained environments. They reduce financial risk by spreading costs over time, enable organizational learning before expanding to additional modules, achieve early wins that build stakeholder confidence, and allow time for capability development [22], [25]. However, phased approaches require longer overall implementation timelines and may create temporary integration challenges between implemented and non-implemented modules.

Agile implementation methodologies that emphasize iterative development, continuous user feedback, and adaptive planning show promise in developing-economy contexts [25]. Agile approaches enable rapid response to emerging challenges, facilitate user involvement, and reduce risk of major failures. However, agile approaches require organizational cultures that support experimentation and learning, which may conflict with hierarchical structures common in some developing-economy organizations [21], [28].

Customization versus standardization represents a critical implementation decision. Studies show that some degree of customization to align with local business practices, languages, and regulatory requirements is necessary for user acceptance and system effectiveness [21], [29]. However, excessive customization increases costs, complicates upgrades, and reduces ability to leverage vendor best practices [25]. Successful implementations balance standardization of core processes with customization of interfaces and reports. Cloud-based ERP implementations are increasingly common in developing economies, offering advantages of reduced upfront costs, lower infrastructure requirements, and vendor-managed updates [1], [9], [63]. However, cloud implementations introduce dependencies on internet connectivity and raise concerns about data security and sovereignty [9]. Studies show that cloud ERP adoption is influenced by technological, organizational, and environmental factors, with infrastructure readiness and data security concerns being particularly salient in developing-economy contexts [1], [20].

4.1.5 Organizational Outcomes and Performance Impacts

Empirical evidence on organizational outcomes of ICT and ERP adoption shows substantial variation, with successful implementations achieving significant benefits while failures and limited benefits remain common. Research on Pakistani food companies found that ERP implementation improved supply chain efficiency by 27% and reduced operational costs by 18% over a two-year period [5]. A study of Kenyan manufacturing SMEs found substantial improvement in organizational efficiency across financial, customer, internal process, and learning perspectives [12].

Research on Jordanian telecommunications firms found that successful ERP implementation improved employee productivity by significant margins, along with improvements in service quality and innovation capability [19]. Malaysian manufacturing SMEs adopting cloud ERP experienced positive effects on firm performance, mediated by supply chain management capability [1]. These findings demonstrate that well-implemented ICT and ERP systems can deliver substantial organizational benefits in developing-economy contexts. However, implementation failures and limited benefits are also common. A study of Nigerian retail companies found that a significant proportion of ERP implementations failed to achieve intended benefits, with substantial cost overruns and timeline delays [10]. Research on Bangladeshi enterprises found that a majority achieved only partial success or experienced outright failure, primarily due to inadequate change management, insufficient training, and poor vendor support [11].

The variation in outcomes is explained by several factors. Implementation quality, measured by adherence to project management practices, user training comprehensiveness, and change management effectiveness, strongly predicts outcomes [18], [25]. Organizational readiness, including change management capacity and user capability, moderates the relationship between ICT adoption and performance [12], [20]. Vendor support quality, particularly post-implementation support and training, significantly influences user satisfaction and perceived benefits [47]. Contextual factors also moderate ICT effectiveness. Infrastructure quality, human capital availability, and regulatory environment shape the extent to which ICT investments translate into organizational benefits [27], [28]. Studies show that effect sizes for ICT impacts on performance are smaller in developing-economy samples compared to developed-economy samples, suggesting that contextual constraints limit ICT effectiveness [46], [47].

4.1.6 Contextual Challenges in Developing Economies

Infrastructure deficits create fundamental constraints on ICT adoption and effectiveness. Unreliable electricity with frequent power outages disrupts system availability and data integrity [27]. Limited broadband penetration constrains cloud-based solutions and real-time integration [55]. Inadequate telecommunications networks increase latency and reduce reliability of supply chain coordination systems [56]. Human capital challenges are pervasive. A study of East African enterprises found that a large majority cited lack of skilled IT personnel as a major implementation barrier [58]. Digital literacy limitations among employees constrain system utilization, with studies showing that only a minority of employees in developing-economy enterprises have basic computer skills [59]. Language barriers create additional challenges, with most ERP systems designed in English while many users have limited English proficiency [59].

Financial constraints are particularly acute for SMEs. Limited access to credit, high interest rates, and uncertain return on investment create significant barriers to ICT investments [62]. However, government support programs including subsidized loans, tax incentives, and technology vouchers have shown promise in facilitating SME adoption, though coverage remains limited [61].

Cultural factors influence technology acceptance and implementation approaches. High power distance cultures may facilitate top-down ERP mandates but can inhibit user feedback and continuous improvement [28]. High uncertainty avoidance cultures may resist business process changes required for effective ERP use [30]. Research shows

that culturally adapted implementation approaches that acknowledge and address these dimensions achieve higher success rates than standardized approaches [21], [29]. Regulatory and institutional environments in developing economies often lack supportive frameworks for digital transformation. Weak intellectual property protection, uncertain regulatory environments, and limited government support programs create additional risks and costs for ICT investments [60]. However, some developing countries have implemented progressive ICT policies that facilitate adoption [61].

4.2 Discussion

4.2.1 Theoretical Implications

The findings have several important theoretical implications. First, the dominance of TOE framework in explaining enterprise ICT adoption in developing economies suggests that integrated multi-level frameworks are more appropriate than individual-level acceptance models for understanding organizational technology adoption [17], [37]. Future theoretical development should continue to emphasize organizational and environmental dimensions while incorporating post-adoption constructs such as infusion, assimilation, and capability development. Second, the consistent finding that ICT effects on performance are mediated by organizational capabilities validates the Resource-Based View and dynamic capabilities perspectives [51], [53]. This suggests that ICT adoption research should shift focus from technology characteristics to capability development mechanisms. Future research should examine how enterprises develop integration capabilities, analytics capabilities, and coordination capabilities through ICT investments, and how these capabilities evolve over time.

Third, the strong predictive power of service quality in IS Success Model applications highlights the importance of post-implementation support and user experience [46]. This suggests that IS success models should place greater emphasis on service quality dimensions, particularly in developing-economy contexts where technical support infrastructure is limited [47]. Future theoretical development should incorporate constructs related to vendor support quality, training effectiveness, and ongoing capability development. Fourth, the identification of context-specific critical success factors (infrastructure readiness, local vendor support, cultural adaptation) suggests that universal CSF frameworks may be insufficient for developing-economy contexts [27], [28], [29]. Future theoretical work should develop contingency frameworks that specify how contextual factors moderate the importance and operationalization of different CSFs.

Collectively, these theoretical contributions point toward a broader reconceptualization of ICT adoption theory in developing-economy contexts. Rather than treating adoption as an endpoint, the evidence presented here calls for theoretical models that are inherently dynamic ones that account for the co-evolution of technology use, organizational capabilities, and contextual constraints over time. This study therefore proposes that future theoretical frameworks explicitly integrate adoption, post-adoption, and capability-development phases into a unified longitudinal model, Moreover, the recurring moderating role of environmental factors such as infrastructure limitations and institutional pressures, suggests that context-sensitivity should be elevated from a peripheral consideration to a core theoretical principle. Such a reorientation would strengthen the explanatory and predictive power of ICT adoption theories across diverse organizational and national settings.

A key synthetic insight emerging from this study is that no single theoretical lens adequately captures the complexity of ICT adoption in resource-constrained environments. The convergence of TOE, RBV, IS Success, and CSF perspectives across the reviewed literature reveals a theoretically fragmented field - yet one where the fragments are complementary rather than contradictory. This study's findings suggest that these frameworks can be integrated along two axes: an ***internal axis*** spanning technology characteristics, organizational capabilities, and performance outcomes, and an ***external axis*** spanning environmental pressures, institutional context, and infrastructure readiness. Such a two-dimensional integration offers a richer theoretical scaffold than any single framework provides alone.

Furthermore, the findings both extend and modify existing theories in substantive ways. The TOE framework is extended by demonstrating that environmental factors operate not merely as adoption barriers but as capability-shaping forces that determine the *quality* and *depth* of ICT assimilation beyond initial uptake. The RBV and dynamic capabilities perspectives are modified by the finding that ICT-enabled capabilities in developing economies are often externally co-developed through vendor relationships, donor-funded training, and inter-firm networks rather than being internally generated as the classic RBV would assume. Similarly, the IS Success Model is extended by showing that service quality in low-infrastructure contexts functions as a compensatory mechanism, partially substituting for missing technical ecosystems. These modifications collectively suggest that theoretical constructs developed in high-income, high-infrastructure settings require not just contextual calibration, but structural reinterpretation when applied to developing-economy enterprises.

4.2.2 Methodological Considerations

The review reveals several methodological limitations in existing research. First, cross-sectional designs dominate the literature, limiting ability to establish causality or trace capability development over time [26]. Only a

minority of reviewed studies employed longitudinal designs, and most of these covered periods of less than two years. Future research should prioritize longitudinal designs that track ICT adoption, capability development, and performance outcomes over extended periods (3-5 years) to capture temporal dynamics and long-term effects. Second, self-reported performance measures are prevalent, raising concerns about common method bias and social desirability effects [26]. Only a minority of reviewed studies incorporated objective performance measures such as inventory turnover, order fulfilment cycle time, or financial ratios. Future research should combine self-reported measures with objective performance indicators and archival data to enhance validity and reduce bias.

Third, convenience sampling is common, limiting generalizability of findings. Only a minority of reviewed studies employed probability sampling or census approaches. Future research should prioritize representative sampling strategies and report detailed sample characteristics to enable assessment of external validity. Fourth, single-case studies, while providing rich contextual insights, limit generalizability. Future research should employ multi-site comparative designs that enable identification of common patterns while accounting for contextual variation. Mixed methods approach that combine quantitative analysis of patterns with qualitative investigation of mechanisms and contextual factors are particularly valuable. Fifth, limited use of advanced analytical methods constrains ability to examine complex relationships and mediating mechanisms. Only a minority of reviewed quantitative studies employed structural equation modelling or other techniques capable of testing mediation and moderation effects. Future research should employ advanced analytical methods including SEM, multilevel modelling, and configurational approaches to examine complex relationships.

Similarly, variation in the importance of critical success factors across studies is best understood through the lens of contextual contingency rather than theoretical inconsistency. Factors such as top management support, IT infrastructure readiness, and employee training emerge as universally important, yet their relative weight shifts substantially depending on the organizational, sectorial, and national context under investigation. In contexts where basic digital infrastructure is unreliable, infrastructure readiness predictably dominates all other CSFs; in more infrastructure-stable settings, organizational factors such as change management and strategic alignment assume greater prominence. Methodologically, this variation is compounded by differences in how CSFs are operationalized some studies treat them as binary preconditions while others measure them as continuous moderators making direct cross-study comparison unreliable. Future research should therefore adopt standardized CSF measurement instruments and explicitly model contextual variables as moderators rather than control variables, enabling more precise identification of when and for whom specific success factors matter most.

4.2.3 Practical Implications for Enterprises

The findings provide several actionable insights for enterprises implementing ICT and ERP systems in developing economies. First, enterprises should prioritize organizational readiness and capability development alongside technology deployment [12]. This includes investing in comprehensive user training programs, establishing change management processes, and developing internal IT capacity before and during implementation. Second, vendor selection should emphasize post-implementation support, local service capacity, and industry experience rather than focusing solely on software features or cost [25]. Enterprises should evaluate vendors based on: local support infrastructure and response times, training program quality and comprehensiveness, implementation methodology and project management capabilities, industry-specific experience and reference customers, and total cost of ownership including support and maintenance.

Third, phased implementation approaches are recommended for resource-constrained organizations [22]. Enterprises should: prioritize high-impact modules that address critical business needs, achieve early wins to build organizational confidence and secure continued management support, allow time for organizational learning and process optimization before expanding to additional modules, and maintain realistic timelines that account for capability development requirements. Fourth, enterprises should invest in integration capabilities that enable coordination across internal functions and with external supply chain partners [7]. This includes: standardizing data formats and business processes, establishing governance structures for cross-functional coordination, developing analytics capabilities to leverage integrated data, and building collaborative relationships with key suppliers and customers. Fifth, enterprises should plan for extended implementation timelines and avoid premature evaluation of ERP effectiveness [5]. Realistic expectations should recognize that: significant benefits typically emerge in the second-year post-implementation, organizational learning and process optimization require time, capability development is gradual and requires sustained investment, and continuous improvement processes are essential for realizing full ERP potential.

4.2.4 Policy Implications for Developing Economies

The findings have important implications for policymakers supporting digital transformation in developing economies. First, infrastructure investment is a fundamental prerequisite for effective ICT adoption [27]. Governments should prioritize reliable electricity supply through grid improvements and backup systems, broadband connectivity expansion particularly in underserved areas, telecommunications network modernization, and technology parks and

innovation hubs that provide shared infrastructure. Second, human capital development is critical for ICT adoption and effectiveness [57]. Policy interventions should include digital literacy programs integrated into primary and secondary education, vocational training programs focused on IT skills and ERP competencies, university curriculum development aligned with industry needs, certification programs for IT professionals, and incentives for enterprises to invest in employee training.

Third, financial support mechanisms can facilitate SME adoption [62]. Effective programs include: subsidized loans with favourable terms for ICT investments, tax incentives for technology adoption and training, technology vouchers that reduce upfront costs, matching grants for consulting and implementation support, and risk-sharing mechanisms that reduce financial barriers. Fourth, regulatory frameworks should support rather than hinder digital transformation [60]. Policy priorities include: clear data protection and privacy regulations that build trust, intellectual property protection that encourages innovation, e-commerce regulations that facilitate digital business models, interoperability standards that reduce vendor lock-in and public procurement policies that support local IT sector development.

Fifth, public-private partnerships can leverage resources and expertise [61]. Effective partnership models include: industry-government collaboration on skills development, vendor-government programs providing subsidized solutions for SMEs, university-industry research partnerships addressing local challenges, technology transfer programs bringing international best practices to local contexts, and innovation challenges and competitions that stimulate local solution development.

4.2.5 Research Gaps and Future Directions

The review identifies several critical research gaps that warrant future investigation. First, post-adoption dynamics including sustained use, infusion, and capability development remain insufficiently understood [15], [22]. Future research should examine how enterprises transition from initial adoption to deep infusion of ICT into organizational routines, what factors facilitate or inhibit sustained use and continuous improvement, how organizational capabilities evolve over time through ICT use, and what interventions effectively support post-adoption capability development. Second, mechanisms through which ICT investments translate into organizational capabilities and performance outcomes require deeper investigation [23]. Future research should: identify specific organizational processes and practices that mediate ICT-performance relationships, examine how different types of capabilities (integration, analytics, coordination) develop and interact, investigate temporal sequences and feedback loops in capability development, and explore boundary conditions and contextual factors that moderate capability-performance relationships.

Third, context-specific implementation models tailored to developing-economy realities are needed. Future research should: develop and validate implementation frameworks that explicitly address infrastructure constraints, skill shortages, and resource limitations, identify context-specific critical success factors and their operationalization, examine how cultural dimensions influence implementation approaches and outcomes, and compare effectiveness of different implementation strategies across diverse developing-economy contexts. Fourth, SME-specific research is needed given their economic importance and distinct challenges [29]. Future research should: examine how resource constraints shape SME adoption decisions and implementation approaches, identify effective low-cost implementation strategies suitable for SMEs, investigate how SMEs develop ICT capabilities with limited resources, evaluate effectiveness of government support programs in facilitating SME adoption, and examine how SMEs leverage ICT for supply chain integration with larger partners. Fifth, sector-specific research can provide actionable insights for particular industries. Future research should: examine ICT adoption and implementation patterns in key developing-economy sectors (agriculture, manufacturing, retail, services), identify sector-specific critical success factors and implementation challenges, develop sector-specific performance metrics and evaluation frameworks, and investigate how sector characteristics moderate ICT effectiveness.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This critical review of literature on ICT adoption, ERP systems, and supply chain performance in developing economies reveals a complex landscape characterized by substantial potential benefits alongside significant implementation challenges. While ICT and ERP investments promise improved operational efficiency, enhanced coordination, and competitive advantage, realizing these benefits in developing-economy contexts requires careful attention to organizational readiness, capability development, and contextual adaptation.

Several key conclusions emerge from the synthesis. First, theoretical frameworks have evolved from individual-level acceptance models toward integrated organizational perspectives that recognise the multi-dimensional nature of enterprise ICT adoption. The Technology Organization Environment framework has emerged as a dominant lens, and

resource-based and dynamic capabilities perspectives provide essential foundations for understanding how ICT investments create competitive advantage through capability development rather than technology deployment alone.

Second, critical success factors for ERP implementation are well documented, with top management support, organizational readiness, user training, change management, and vendor support consistently emerging as primary determinants of success. Developing-economy contexts introduce additional factors, including infrastructure readiness, local vendor support capacity, and cultural adaptation, that are essential for successful implementation. Phased implementation approaches also tend to demonstrate superior outcomes compared to "big bang" approaches in resource-constrained environments.

Third, ICT impacts on supply chain performance operate primarily through mediating capabilities such as supply chain integration, analytics competence, and coordination rather than through direct effects. Integration-focused technologies such as ERP and CRM demonstrate stronger performance impacts than specialized logistics technologies in developing-economy contexts, suggesting that coordination and information-sharing capabilities are more critical than specialized automation where resources are constrained.

Fourth, organizational outcomes of ICT and ERP adoption show considerable variation, with successful implementations achieving substantial benefits, including improvements in operational efficiency, supply chain performance, and cost reduction, while failures and limited benefits remain common. These benefits typically emerge gradually over one to two years post-implementation, highlighting the importance of organizational learning, capability development, and continuous improvement processes.

Fifth, contextual challenges in developing economies including infrastructure deficits, human capital constraints, financial limitations, and cultural factors significantly shape ICT adoption and effectiveness. These contextual factors moderate the relationship between ICT investments and organizational outcomes, indicating that universal implementation models and generic success-factor frameworks are often insufficient for these settings.

The review identifies several critical research gaps. Post-adoption dynamics such as sustained use, infusion, and capability development remain insufficiently understood, and the mechanisms through which ICT investments translate into organizational capabilities and performance require deeper investigation. Context-specific implementation models tailored to developing-economy realities are needed, and methodological limitations such as cross-sectional designs, self-reported measures, convenience sampling, and limited use of advanced analytical methods constrain the rigor and generalizability of existing research.

For practice, the findings emphasise that successful ICT and ERP implementation in developing economies requires a holistic approach that balances technology deployment with organizational readiness, capability development, and contextual adaptation. Enterprises should prioritise user training, change management, and vendor support alongside technological choices. Phased implementation approaches that achieve early wins and enable organizational learning are recommended for resource-constrained organisations. Integration capabilities that enable coordination across internal functions and with external partners are critical for realising supply chain performance benefits.

For policy, the findings highlight the importance of enabling infrastructure, human capital development, financial support mechanisms, supportive regulatory frameworks, and public–private partnerships in facilitating enterprise digital transformation. ICT adoption is not merely a technological challenge but a complex socio-technical process requiring coordinated interventions across multiple dimensions. In conclusion, while ICT and ERP systems offer substantial potential for improving organizational and supply chain performance in developing economies, realising this potential requires careful attention to the organizational, human, and contextual factors that shape implementation processes and outcomes. Success depends not on technology alone, but on the organizational capabilities, human competencies, and institutional support systems that enable effective technology use. As developing economies continue their digital transformation journeys, evidence-informed approaches that acknowledge contextual realities while leveraging international best practices will be essential for achieving sustainable improvements in enterprise performance and competitiveness.

5.2 Recommendations

The review suggests that enterprises and practitioners in developing economies should prioritise organizational readiness over technological sophistication by investing early and consistently in change management, user training, and capability development, dedicating a clear portion of implementation budgets to these activities rather than focusing primarily on technology acquisition. They are better served by phased implementation strategies that begin with high-impact modules, deliver early wins, and expand gradually, while choosing vendors on the basis of proven implementation methodologies, strong support capacity, and local presence, and by building robust integration capabilities that facilitate coordination across internal functions and with supply chain partners, recognising that substantial performance gains typically materialise only after an initial learning period. For SMEs, the evidence points to the value of cloud-based solutions that reduce upfront costs and provide scalable functionality, strategic use of public support schemes such as concessional finance and tax incentives, a staged roll-out starting with core business modules like accounting and inventory management, sustained investment in staff training often in collaboration with external

providers, and active participation in industry networks to access shared experiences and good practices. Policymakers are encouraged to focus on enabling conditions by strengthening infrastructure particularly reliable electricity and affordable broadband developing comprehensive digital skills programmes across education and vocational systems, designing targeted financial mechanisms that lower adoption barriers for SMEs, creating clear and supportive regulatory frameworks for data, e-commerce, and interoperability, and fostering public–private partnerships that connect government, firms, and education institutions around skills, innovation, and locally adapted solutions. For researchers, the review highlights the need for more longitudinal work that tracks adoption and outcomes over time, mixed-methods designs that combine quantitative and qualitative insight, greater use of objective performance indicators alongside perceptions, the development of implementation and success frameworks tailored to developing-economy contexts, and a stronger focus on post-adoption dynamics such as sustained use, capability building, and continuous improvement.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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