

# Digital Maturity and Change Management Effectiveness in Global Supply Chain Operations: An Empirical Investigation of International Businesses

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## ABSTRACT

The accelerated adoption of digital technologies in global supply chains demands sophisticated change management approaches to ensure successful implementation. This research examines the relationship between organizational digital maturity and change management effectiveness across international supply chain operations. Employing a mixed-methods design, I collected survey data from 217 supply chain professionals spanning four continents, complemented by 25 in-depth interviews and four organizational case studies. Structural equation modeling reveals that digital maturity significantly predicts change management effectiveness ( $\beta = 0.68, p < 0.001$ ), with cultural readiness serving as a critical moderating factor. Results identify resistance to change (73%), skill deficiencies (65%), and cultural barriers (58%) as primary implementation obstacles. The study contributes a validated five-phase framework for managing digital transformation in culturally diverse contexts. Findings suggest organizations must balance technological investment with organizational capability development, emphasizing phased implementation and cultural adaptation strategies. This research advances theoretical understanding of digital transformation while providing actionable guidance for practitioners navigating complex organizational change in international business environments.

**Keywords:** digital maturity, change management, global supply chains, organizational transformation, international business, supply chain digitalization

## 1. Introduction

Global supply chains face unprecedented pressure to digitalize operations, with 85% of organizations increasing digital investments following the COVID-19 pandemic (Mubarik & Khan, 2024). Despite substantial technological investments, implementation failure rates exceed 70% in many sectors, suggesting that technological capability alone proves insufficient for transformation success (Hanelt et al., 2021). This disconnect between digital potential and actual outcomes highlights critical weaknesses in organizational change management, particularly when coordinating initiatives across geographically dispersed operations.

Existing literature extensively examines technological aspects of supply chain digitalization but provides limited guidance on managing human, cultural, and structural transitions accompanying technological change (Queiroz et al., 2021). Three research gaps motivate this investigation: limited understanding of how digital maturity influences change management effectiveness; insufficient empirical evidence on cultural factors affecting transformation success; and absence of validated frameworks integrating technological and organizational dimensions.

This study addresses these gaps by investigating: (1) How organizational digital maturity influences change management effectiveness; (2) What barriers impede digital transformation across different contexts; and (3) What capabilities facilitate effective transformation in global supply chains. Drawing on dynamic

capabilities theory (Teece, 2007), we develop and test relationships between digital maturity, change management effectiveness, and transformation outcomes.

## **2. Literature Review**

### **2.1. Theoretical Foundations: Dynamic Capabilities Theory and Digital Transformation**

Dynamic capabilities theory provides the primary theoretical lens through which this research examines digital transformation in global supply chains. Originally developed by Teece, Pisano, and Shuen (1997) and subsequently refined by Teece (2007), dynamic capabilities theory emphasizes organizations' capacity to sense opportunities and threats, seize strategic options through resource mobilization, and reconfigure operational capabilities to maintain competitive advantage in rapidly changing environments. Unlike ordinary capabilities that enable firms to perform current operations efficiently, dynamic capabilities represent higher-order capacities enabling organizational adaptation, learning, and renewal in response to environmental change (Helfat & Winter, 2011).

Teece (2007) identifies three core dynamic capability dimensions: sensing, seizing, and reconfiguring. Sensing involves scanning organizational environments to identify opportunities and threats, requiring analytical capabilities, market intelligence systems, and organizational receptivity to external information. Seizing encompasses mobilizing resources to capture identified opportunities through investment decisions, strategic partnerships, or capability development initiatives. Reconfiguring involves continuous asset alignment, resource reallocation, and organizational restructuring to maintain evolutionary fitness as environments evolve. These three dimensions operate interdependently rather than sequentially, with successful adaptation requiring simultaneous development across all capability domains.

In digital transformation contexts, dynamic capabilities theory offers particularly relevant insights because digitalization fundamentally requires organizational sensing of technological opportunities, strategic seizing through technology investments and capability development, and ongoing reconfiguring as technologies evolve and organizational requirements change (Warner & Wäger, 2019). Digital transformation represents not a discrete change initiative with defined endpoints but rather continuous evolutionary processes requiring sustained organizational adaptation. Organizations must simultaneously develop technological capabilities including infrastructure, data management systems, and analytical tools and organizational capabilities encompassing workforce skills, cultural adaptability, leadership commitment, and change management capacity (Vial, 2019).

Hanelt et al. (2021) demonstrate empirically that organizations focusing exclusively on technological sensing identifying which technologies to adopt while neglecting organizational reconfiguring achieve suboptimal outcomes in 73% of initiatives. This finding underscores the interdependence between technological advancement and organizational change, suggesting that technological capability development without corresponding organizational transformation frequently results in implementation failures, underutilization of deployed technologies, or inability to capture anticipated benefits. Successful digital transformation thus requires integrated approaches simultaneously addressing technological deployment and organizational adaptation.

Recent research extends dynamic capabilities theory to digital contexts by identifying specific microfoundations the distinct skills, processes, procedures, organizational structures, and decision rules underlying dynamic capabilities (Teece, 2007). In digital transformation contexts, critical microfoundations include data analytics capabilities enabling pattern recognition and predictive insights, agile development processes facilitating rapid experimentation and iteration, collaborative platforms enabling knowledge sharing across organizational boundaries, and leadership practices fostering innovation cultures and risk tolerance (Mikalef & Pateli, 2017). Organizations with well-developed microfoundations demonstrate

greater capacity to navigate digital transformation successfully, suggesting that capability development requires attention to specific organizational mechanisms rather than abstract capability constructs.

## **2.2. Digital Maturity: Conceptualization and Measurement**

Digital maturity represents a multidimensional construct encompassing technological infrastructure, workforce capabilities, leadership commitment, organizational culture, strategic orientation, and customer-centricity (Kane et al., 2017; Berghaus & Back, 2016). Unlike simple measures of technology adoption which merely document whether organizations have implemented specific technologies digital maturity assesses organizations' holistic readiness and capacity to leverage digital technologies effectively for strategic advantage. Digitally mature organizations demonstrate not only advanced technological infrastructure but also workforce skills enabling technology utilization, leadership vision guiding digital strategies, organizational cultures embracing innovation and experimentation, and customer-centric orientations aligning digital investments with evolving market needs.

Recent scholarly work demonstrates growing recognition that digital strategy, Industry 4.0 technologies, and human capital are critical enablers of digital supply chain adoption, with their effectiveness largely contingent on an organization's dynamic capabilities and ability to integrate technological and organizational resources (Bag et al., 2021). Digital maturity models structure assessment into four dimensions: business, organizational, process and method, and technological digitalization, recognizing that digitalization challenges extend beyond technical dimensions to encompass organizational and managerial issues (Hellweg et al., 2023). This multidimensional conceptualization acknowledges that technological infrastructure represents only one component of digital readiness, with organizational factors frequently determining whether technologies deliver anticipated value.

Research demonstrates correlation between digital maturity and financial performance, with companies using more mature supply chain capabilities generating average EBIT margins of 11.8%, compared with 9.6% among less mature organizations (Accenture, 2025). These performance differentials suggest that digital maturity represents not merely abstract capability constructs but measurable organizational characteristics translating into competitive advantage. However, maturity assessment remains challenging, as assessment procedures vary from five-point Likert scales to complex qualitative questionnaires or on-site visits, reflecting ongoing debate regarding optimal measurement approaches (Hellweg et al., 2023).

Organizational readiness for digital transformation encompasses multiple components including technological infrastructure, workforce capabilities, leadership commitment, and cultural orientation toward innovation (Jewapatarakul & Ueasangkomsate, 2024). Recent empirical research demonstrates that organizational readiness acts as a mediating mechanism through which digital capabilities influence transformation outcomes, highlighting that readiness assessment must precede major digital initiatives (Jewapatarakul & Ueasangkomsate, 2024). Organizations lacking adequate readiness frequently encounter implementation failures regardless of technological sophistication, underscoring readiness assessment's strategic importance.

## **2.3. Organizational Change Management in Digital Contexts**

Organizational change management literature has evolved substantially over recent decades, progressing from early stage models emphasizing discrete change episodes to contemporary frameworks recognizing continuous, iterative change characteristics inherent in digital contexts (By, 2005). Traditional change management frameworks including Lewin's (1947) three-stage model of unfreezing, changing, and refreezing, and Kotter's (2014) eight-step process assume relatively discrete changes with defined endpoints. These frameworks envision change as episodic events where organizations transition from one stable state to another, implementing specific initiatives before returning to operational stability.

However, digital transformation exhibits fundamentally different characteristics, involving continuous technological evolution, iterative implementation approaches, and ongoing adaptation rather than discrete change events (Vial, 2019). Organizations pursuing digital transformation do not implement technologies once and return to stability but rather engage in continuous capability development, technology refreshment, and organizational adaptation responding to evolving technological possibilities and competitive pressures. This continuous change character requires substantial adaptation of traditional change management frameworks emphasizing episodic transitions.

The ADKAR model encompassing Awareness, Desire, Knowledge, Ability, and Reinforcement demonstrates particular effectiveness in digital transformation contexts by focusing on individual change journeys rather than organizational processes (Prosci, 2018). Recent applications demonstrate that the ADKAR approach addresses key barriers to digital transformation success including resistance to change, lack of digital literacy, siloed departments, and cultural inertia by preparing, equipping, and supporting individuals through transitions (Prosci, 2024). The model's emphasis on individual psychological and behavioral dimensions recognizes that organizational change ultimately depends on individual adaptation, with aggregate organizational transformation emerging from individual-level changes.

Contemporary research emphasizes that organizational change management encompasses four major areas: aligning leadership, mobilizing the organization, building capabilities, and ensuring sustainability, with each area requiring deliberate attention throughout transformation initiatives (Aagaard, 2024). Leadership alignment involves developing shared vision regarding digital transformation objectives, with leaders modeling desired behaviors and demonstrating commitment through resource allocation and priority setting. Organizational mobilization requires comprehensive communication strategies ensuring stakeholders understand transformation rationale, anticipated benefits, implementation approaches, and expected individual contributions. Capability building encompasses workforce skill development through training programs, mentoring initiatives, and experiential learning opportunities enabling employees to utilize new technologies effectively. Sustainability mechanisms involve adapting performance management systems, incentive structures, and organizational routines to reinforce desired behaviors and prevent regression to previous practices.

Empirical evidence reveals primary challenges impeding digital transformation success. Research consistently documents that resistance to change, skill gaps, and cultural barriers represent critical obstacles across diverse organizational contexts (Dubey et al., 2021). Resistance manifests in various forms including active opposition to technological implementations, passive non-adoption where employees maintain previous practices despite technology availability, or surface-level compliance without meaningful behavioral change. Skill gaps encompass both technical deficiencies inability to operate new technologies and cognitive gaps involving difficulty understanding how technologies support strategic objectives or integrate with existing workflows.

Recent scholarship emphasizes cultural readiness as critical success factor, with organizational culture, digital leadership, and digital competencies playing crucial roles in transformation processes (Cyfert et al., 2025). Organizations with cultures emphasizing experimentation, tolerating failure, and rewarding innovation demonstrate greater capacity to navigate digital transformation successfully than those with risk-averse cultures punishing mistakes. Cultural transformation frequently represents the most challenging and time-consuming aspect of digital transformation, requiring sustained leadership attention and deliberate cultural interventions over extended periods.

#### **2.4. Cultural Factors in International Digital Transformation**

Global supply chains present unique challenges for digital transformation due to geographical dispersion, cultural diversity, regulatory variations, and infrastructure disparities across operating locations (Frank et

al., 2019; Ivanov & Dolgui, 2020). Organizations implementing digital technologies across international operations must navigate substantially greater complexity than those operating within single cultural contexts, as implementation strategies effective in one cultural context may prove ineffective or counterproductive in others.

Cultural dimensions significantly influence technology adoption patterns and change acceptance across different societal contexts. Hofstede's cultural dimensions theory encompassing power distance, individualism-collectivism, uncertainty avoidance, masculinity-femininity, long-term orientation, and indulgence-restraint provides useful framework for understanding how cultural values shape organizational behavior including technology adoption (Hofstede, 2001). Societies characterized by high uncertainty avoidance, for instance, may exhibit greater resistance to technological changes introducing operational uncertainty, preferring gradual, well-documented implementation approaches with extensive testing. Collectivist cultures may emphasize consensus-building and group-level adoption decisions, requiring different engagement strategies than individualist cultures where personal choice receives greater emphasis.

Recent empirical evidence demonstrates that culturally sensitive implementation strategies achieve substantially higher adoption rates than standardized global approaches. Wamba et al. (2020) document that culturally adapted strategies demonstrate 35% higher adoption rates than standardized implementations, suggesting substantial performance benefits from cultural customization. These adaptation strategies involve tailoring communication approaches to cultural communication norms, adjusting training methodologies to align with local learning preferences, modifying change timelines to accommodate cultural orientations toward time and planning, and customizing stakeholder engagement approaches reflecting cultural relationship norms.

Infrastructure disparities across geographical regions create additional implementation challenges. Quality differences in digital infrastructure including internet connectivity reliability, bandwidth availability, cloud service accessibility, and technical support availability impact implementation success significantly. Ivanov and Dolgui (2020) document that infrastructure quality differences impact transformation success by up to 40%, suggesting that standardized implementation approaches assuming uniform infrastructure capability frequently encounter difficulties when deployed across diverse contexts. Organizations must assess infrastructure capabilities systematically across intended implementation locations, potentially sequencing implementations prioritizing locations with stronger infrastructure or investing in infrastructure enhancement as preliminary step.

Regulatory variations across jurisdictions create additional complexity for international digital implementations. Data sovereignty requirements, privacy regulations, security standards, and technology approval processes vary substantially across countries, requiring careful navigation to ensure compliance while maintaining operational effectiveness. The European Union's General Data Protection Regulation (GDPR), China's Personal Information Protection Law (PIPL), and diverse national data localization requirements exemplify regulatory complexity organizations encounter when implementing digital supply chain technologies involving data flows across jurisdictional boundaries.

## **2.5. Research Gaps and Study Objectives**

Despite growing scholarly attention to digital transformation, several critical gaps persist in current understanding. First, while digital maturity frameworks exist, limited empirical evidence documents relationships between digital maturity and change management effectiveness, particularly in supply chain contexts. Most existing research either examines digital maturity as outcome variable or treats change management as control variable rather than central construct, leaving relationships between these constructs inadequately understood.

Second, insufficient evidence exists regarding how cultural factors moderate relationships between digital capabilities and transformation outcomes. Most existing research either conducts single-country studies limiting cultural variation analysis or aggregates international data without considering cultural differences systematically. This gap limits understanding of mechanisms through which culture influences digital transformation and provides inadequate guidance for organizations pursuing culturally adapted implementation strategies.

Third, validated frameworks integrating technological and organizational change dimensions remain scarce. Existing frameworks typically emphasize either technological deployment or organizational change management, with limited integration across these domains. Practitioners consequently receive inadequate guidance regarding how to balance technological and organizational investments, sequence implementation activities across these domains, and assess readiness across both dimensions simultaneously.

This research addresses these gaps by: (1) developing and empirically testing integrated model linking digital maturity, change management effectiveness, and transformation outcomes; (2) examining cultural readiness as moderating factor influencing these relationships; and (3) developing and validating comprehensive framework integrating technological and organizational change dimensions while addressing cultural adaptation requirements. The study contributes to theory development by advancing dynamic capabilities theory application to digital contexts while providing practitioners with empirically grounded guidance for navigating complex transformations.

### **3. Methodology**

#### **3.1 Research Philosophy and Design**

This investigation employs a pragmatic research philosophy, which prioritizes practical problem-solving and recognizes that different research questions may require different methodological approaches (Creswell & Creswell, 2017). The research adopts a sequential explanatory mixed-methods design, proceeding in two distinct phases: an initial quantitative phase establishing relationships between constructs across a substantial sample, followed by a qualitative phase exploring mechanisms, contextual factors, and implementation experiences providing depth and explanatory richness complementing quantitative findings (Venkatesh et al., 2013).

#### **3.2 Quantitative Phase: Survey Research**

##### **Sampling Strategy and Data Collection**

The quantitative phase utilized stratified purposive sampling designed to ensure adequate representation across industry sector, geographical region, organizational size, and digital maturity level. Participant recruitment occurred through multiple professional networks including LinkedIn supply chain management groups, the Council of Supply Chain Management Professionals (CSCMP), and the Association for Supply Chain Management (APICS) during a 12-week period from March through May 2024.

Inclusion criteria specified that participants must: (1) hold professional positions with substantive supply chain responsibilities; (2) possess direct experience with digital technology implementations; (3) work for organizations operating internationally; and (4) have minimum three years of professional experience. From 283 initial participants, 217 completed responses were obtained (76.7% completion rate).

Table 1 presents sample characteristics demonstrating diversity across key dimensions. Industry representation spans manufacturing (34.1%), retail (28.1%), logistics/transportation (21.2%), and pharmaceuticals (16.6%). Geographical distribution encompasses Europe (30.9%), North America (28.1%), Asia-Pacific (25.8%), and Latin America (15.2%). Organizational size ranges from fewer than 1,000

employees (20.7%) to over 10,000 employees (19.4%). Digital maturity distribution reveals 26.7% low maturity (scores below 3.0 on 7-point scale), 47.0% medium maturity (3.0-5.0), and 26.3% high maturity (above 5.0).

**Table 1.** Sample Characteristics (N = 217)

Characteristic	Category	n	%
Industry	Manufacturing	74	34.1
	Retail	61	28.1
	Logistics/Transportation	46	21.2
	Pharmaceuticals	36	16.6
Geographic Region	Europe	67	30.9
	North America	61	28.1
	Asia-Pacific	56	25.8
	Latin America	33	15.2
Organization Size	< 1,000 employees	45	20.7
	1,000-5,000 employees	78	35.9
	5,000-10,000 employees	52	24.0
	> 10,000 employees	42	19.4
Digital Maturity Level	Low (< 3.0)	58	26.7
	Medium (3.0-5.0)	102	47.0
	High (> 5.0)	57	26.3

Stratified purposive sampling ensured representation across organizational sizes and digital maturity levels.

### 3.3 Survey Instrument

The survey instrument integrated validated scales from established research while incorporating new items addressing digital transformation's specific context. The complete instrument comprised 87 items organized into seven construct sections.

Digital Maturity assessment utilized adapted scales from Kane et al. (2017) covering five dimensions: technological infrastructure (8 items), workforce digital capabilities (7 items), leadership digital commitment (6 items), organizational culture toward innovation (7 items), and customer-centric digital orientation (6 items). Sample items include "Our organization has invested substantially in digital infrastructure enabling real-time data access" and "Our workforce possesses skills necessary to effectively utilize digital technologies." All items employed 7-point Likert scales (1 = strongly disagree to 7 = strongly agree).

Change Management Effectiveness measurement adapted scales from Holt et al. (2007) assessing four dimensions: change leadership (6 items), stakeholder engagement (7 items), capability development (6 items), and change sustainability mechanisms (5 items). Representative items include "Change initiatives receive consistent support from senior leadership" and "Training programs adequately prepare employees for technology changes."

Cultural Readiness assessment employed 8 items developed through literature review and expert consultation, as existing scales inadequately addressed cross-cultural digital transformation contexts. The scale assessed cultural openness to change, cross-cultural collaboration effectiveness, cultural adaptation in implementation approaches, and cultural learning orientation. Scale development followed DeVellis (2017) guidelines including expert review and pilot testing with 35 practitioners.

Transformation Success measurement incorporated both objective and subjective indicators through 9 items assessing operational performance improvements, strategic objective achievement, stakeholder satisfaction, and sustainable change adoption (Petter et al., 2007).

Supply Chain Integration assessment adapted established operations management scales measuring information integration, process integration, and collaborative relationships across supply chain partners (7 items).

Implementation Barrier Assessment employed a checklist approach presenting 12 common barriers identified through literature review, with respondents indicating whether each represents significant challenge in their organizational context.

### **3.4 Data Preparation and Analysis**

Data preparation involved systematic quality assurance procedures. Missing data analysis revealed missing completely at random (MCAR) patterns (Little's MCAR test:  $\chi^2 = 234.87$ ,  $p = 0.42$ ), enabling expectation-maximization (EM) algorithm imputation for cases with limited missing data. Outlier detection employed univariate and multivariate approaches, with only 3 cases exhibiting careless responding patterns and subsequently excluded.

Common method bias assessment utilized Harman's single-factor test, revealing that the first unrotated factor explained 34.2% of variance—substantially below the 50% threshold suggesting pervasive bias (Podsakoff et al., 2003). Confirmatory factor analysis comparing models with and without common latent factor indicated no significant improvement ( $\Delta\chi^2 = 43.2$ ,  $df = 38$ ,  $p = 0.27$ ).

### **3.5 Measurement Model Validation**

Comprehensive measurement model validation occurred through confirmatory factor analysis (CFA) using AMOS 26.0 software with maximum likelihood estimation and bootstrapping procedures (5,000 samples). The measurement model specified five latent constructs with observed items loading on their respective constructs according to theoretical specifications.

Final measurement model demonstrated excellent fit:  $\chi^2/df = 2.23$ , CFI = 0.95, TLI = 0.94, RMSEA = 0.061, SRMR = 0.054 (Hu & Bentler, 1999). Reliability assessment revealed all constructs exceeded conventional thresholds: digital maturity ( $\alpha = 0.92$ , CR = 0.93), change management effectiveness ( $\alpha = 0.89$ , CR = 0.90), cultural readiness ( $\alpha = 0.87$ , CR = 0.88), transformation success ( $\alpha = 0.91$ , CR = 0.92), and supply chain integration ( $\alpha = 0.85$ , CR = 0.86).

Convergent validity assessment through average variance extracted (AVE) revealed all constructs exceeded 0.50 threshold: digital maturity (AVE = 0.58), change management effectiveness (AVE = 0.55), cultural readiness (AVE = 0.52), transformation success (AVE = 0.61), and supply chain integration (AVE = 0.54). Discriminant validity was confirmed through Fornell-Larcker criterion and heterotrait-monotrait (HTMT) ratios below 0.85 threshold (Henseler et al., 2015).

### **3.6 Qualitative Phase: Interviews and Case Studies**

#### **3.6.1 Interview Methodology**

Semi-structured interviews were conducted with 25 supply chain and digital transformation leaders selected through theoretical sampling (Eisenhardt & Graebner, 2007). Selection criteria targeted individuals with: (1) senior leadership responsibility for digital transformation initiatives; (2) direct involvement in change management activities; (3) experience implementing transformations across multiple geographical locations; and (4) willingness to discuss both successes and challenges candidly.

Interview participants represented diverse industries (manufacturing  $n=9$ , retail  $n=6$ , logistics  $n=5$ , pharmaceuticals  $n=5$ ) and geographical contexts (Europe  $n=8$ , North America  $n=7$ , Asia-Pacific  $n=6$ , Latin America  $n=4$ ). Participants' organizational tenure ranged from 6 to 23 years (mean = 12.4 years).

Interview protocols comprised 32 core questions organized into five thematic sections: digital transformation journey, change management approaches, cultural challenges and adaptation strategies, implementation successes and failures, and lessons learned. Interviews lasted 60-90 minutes and were

conducted via video conferencing between June and August 2024. All interviews were audio recorded with participant consent and professionally transcribed verbatim, producing over 750 pages of transcript data.

### 3.6.2 Case Study Methodology

Four organizational case studies provided in-depth longitudinal perspective on digital transformation implementation processes. Case selection employed theoretical sampling seeking variation across industry context, geographical scope, technology types implemented, and transformation maturity level (Yin, 2018).

Selected organizations included: Alpha Manufacturing (Germany) implementing Industrial IoT and predictive maintenance across 12 facilities; Beta Logistics (Singapore) implementing blockchain for supply chain transparency; Gamma Pharma (Switzerland) implementing AI-driven demand forecasting across 8 countries; and Delta Retail (United States) pursuing end-to-end supply chain digitalization. Table 2 summarizes case characteristics and key outcomes.

**Table 2.** Case Study Summary and Key Outcomes

Case	Industry	Initiative	Key Outcomes	Critical Success Factors
Alpha Manufacturing (Germany)	Manufacturing	Industrial IoT and predictive maintenance	32% maintenance cost reduction; 18% downtime reduction	Phased rollout across 12 facilities; extensive technician training; integration with existing systems
Beta Logistics (Singapore)	Transportation & Logistics	Blockchain for supply chain transparency	45% documentation time reduction; 28% dispute reduction	Multi-stakeholder engagement; regulatory compliance focus; pilot in limited trade lanes
Gamma Pharma (Switzerland)	Pharmaceuticals	AI-driven demand forecasting	23% inventory reduction; 15% forecast accuracy improvement	Data quality improvement; cross-functional collaboration; change management across 8 countries
Delta Retail (United States)	Retail	End-to-end supply chain digitalization	38% order fulfillment time reduction; 21% cost savings	Executive sponsorship; comprehensive training program; phased 3-year implementation

Each case study involved multiple data collection methods: 4-6 interviews per case with individuals at different organizational levels, internal documentation review (project charters, implementation plans, performance reports), observation of technology demonstrations, and quantitative performance data. Data collection occurred between July and September 2024, with each case involving 2-3 site visits totaling 12-15 hours per organization.

### 3.6.3 Qualitative Data Analysis

Qualitative data analysis followed template analysis procedures using NVivo 14 software (King, 2012). Initial template development began with a priori codes derived from theoretical framework and quantitative constructs, providing structured starting point while remaining open to emergent themes.

Data coding proceeded through three iterative cycles. The first cycle involved open coding where two independent coders applied a priori codes while remaining alert to emergent content. Inter-rater reliability at first cycle conclusion yielded Cohen's kappa = 0.78, indicating substantial agreement (Landis & Koch, 1977). The second cycle focused on template refinement and hierarchical code organization, grouping conceptually similar codes into higher-order themes. The third cycle applied the refined template systematically across all data. Final template comprised 47 codes organized into 12 major themes with hierarchical sub-theme structure.

Case study analysis followed within-case and cross-case comparison procedures (Eisenhardt, 1989). Within-case analysis developed comprehensive narratives for each organization documenting transformation journeys chronologically. Cross-case analysis systematically compared cases identifying common patterns, contextual variations, and relationships between implementation approaches and outcomes.

#### 4. Framework Development and Validation

Mixed-methods integration occurred at multiple points throughout the research process, synthesizing quantitative and qualitative insights into cohesive interpretation. This synthesis informed development of the five-phase Digital Transformation Change Management Framework (Figure 1).

##### Phase 1: Digital Readiness Assessment

- Technology infrastructure evaluation
- Workforce capability assessment
- Cultural readiness analysis
- Leadership commitment evaluation
- Gap identification and prioritization

##### Phase 2: Strategic Planning & Stakeholder Engagement

- Vision and objectives definition
- Stakeholder mapping and engagement strategy
- Resource allocation planning
- Risk assessment and mitigation planning
- Cultural adaptation strategy development

##### Phase 3: Phased Implementation with Cultural Adaptation

- Pilot program launch in selected locations
- Culturally adapted training programs
- Local change champion development
- Technical integration and testing
- Communication campaigns (culturally contextualized)

##### Phase 4: Performance Monitoring & Adjustment

- KPI tracking (leading and lagging indicators)
- Regular progress reviews
- Issue identification and resolution
- Lesson capture and sharing
- Adaptive strategy refinement

##### Phase 5: Sustainable Integration & Continuous Improvement

- Standardization of successful practices
- Ongoing skill development programs
- Technology refresh and upgrade planning
- Cultural embedding of digital practices
- Next-generation capability planning

**Figure 1.** Five-Phase Digital Transformation Change Management Framework

This framework addresses both technological implementation and organizational change management dimensions. Each phase incorporates activities spanning technical, organizational, and cultural domains. The framework emphasizes iterative learning and adaptation rather than rigid linear progression, recognizing that organizations may need to revisit earlier phases based on implementation experience.

Expert validation sessions with 12 senior industry practitioners assessed framework comprehensiveness, practical utility, and cultural adaptability. Participants included supply chain executives from multinational corporations, digital transformation consultants with international implementation experience, and change management specialists. Validation employed structured questionnaires and facilitated discussion sessions exploring framework applicability across diverse organizational contexts.

#### 4.1 Results

The structural equation model demonstrated excellent fit ( $\chi^2/df = 2.14$ , CFI = 0.94, TLI = 0.93, RMSEA = 0.06).

Table 3 presents standardized path coefficients demonstrating strong relationships between constructs. Digital maturity emerged as the strongest predictor of change management effectiveness ( $\beta = 0.68$ ,  $p <$

0.001), explaining 46% of variance. Change management effectiveness strongly predicted transformation success ( $\beta = 0.72$ ,  $p < 0.001$ ). Cultural readiness demonstrated significant positive impact ( $\beta = 0.43$ ,  $p < 0.001$ ).

**Table 3.** Structural Model Path Coefficients

Hypothesized Path	$\beta$	SE	CR	p	R <sup>2</sup>
Digital Maturity → Change Management Effectiveness	0.68	0.08	8.24	< 0.001	0.462
Change Management Effectiveness → Transformation Success	0.72	0.07	9.18	< 0.001	0.518
Digital Maturity → Supply Chain Integration	0.54	0.09	6.12	< 0.001	0.291
Cultural Readiness → Change Management Effectiveness	0.43	0.08	5.37	< 0.001	0.185
Infrastructure Quality → Digital Maturity	0.61	0.09	6.78	< 0.001	0.372

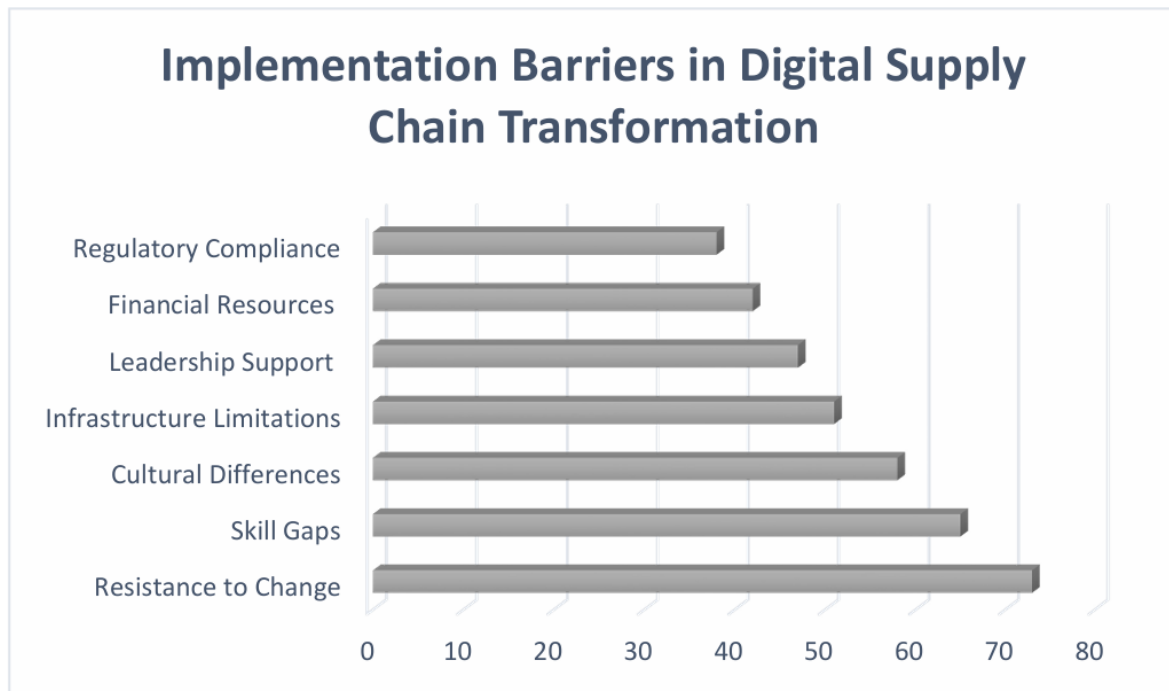
*Note.*  $\beta$  = standardized path coefficient; SE = standard error; CR = critical ratio; R<sup>2</sup> = variance explained.

Change management effectiveness strongly predicted transformation success ( $\beta = 0.72$ , SE = 0.07,  $p < 0.001$ ), explaining 51.8% of variance. Digital maturity also directly influenced supply chain integration ( $\beta = 0.54$ , SE = 0.09,  $p < 0.001$ ), explaining 29.1% of variance. Cultural readiness demonstrated significant positive impact on change management effectiveness ( $\beta = 0.43$ , SE = 0.08,  $p < 0.001$ ), explaining 18.5% unique variance beyond digital maturity's contribution.

Mediation analysis examined whether change management effectiveness mediates digital maturity's impact on transformation success. Results revealed full mediation. The direct path from digital maturity to transformation success became non-significant ( $\beta = 0.11$ ,  $p = 0.19$ ) when change management effectiveness entered the model, while the indirect effect through change management effectiveness was substantial and significant ( $\beta = 0.49$ , 95% CI [0.38, 0.61],  $p < 0.001$ ). This pattern indicates that digital maturity influences transformation outcomes primarily through enhanced change management capacity rather than direct technological effects.

#### 4.2 Implementation Barriers Analysis

Survey results identified primary implementation barriers through checklist assessment where respondents indicated whether each barrier represented significant challenge in their organizational context.



**Figure 2.** Prevalence of Digital Transformation Barriers (N = 217)

*Note.* Percentages represent proportion of respondents (N = 217) identifying each barrier as significant. Multiple responses permitted.

Figure 2 displays prevalence rates for major challenges. Resistance to change emerged as the most frequently cited barrier, identified by 73% of respondents, consistent with established change management literature emphasizing behavioral resistance as persistent implementation obstacle. Skill gaps represented the second most common barrier (65% of respondents), reflecting challenges organizations encounter developing workforce capabilities matching digital technology requirements. Cultural differences constituted significant barriers for 58% of respondents, highlighting challenges implementing standardized approaches across culturally diverse contexts.

*Note.* Percentages represent proportion of respondents (N = 217) identifying each barrier as significant. Multiple responses permitted.

Infrastructure limitations affected 51% of respondents, though prevalence varied substantially across geographical regions. Organizations in Asia-Pacific regions reported infrastructure challenges more frequently (67%) than European organizations (34%), reflecting infrastructure quality disparities across developed and emerging markets. Leadership support issues represented barriers for 47% of respondents, indicating that inadequate or inconsistent executive commitment undermines transformation initiatives.

Geographical analysis revealed significant regional variations in barrier prevalence. European organizations more frequently cited regulatory compliance issues (54%) than Asia-Pacific organizations (28%), potentially reflecting Europe's more extensive regulatory frameworks governing data privacy and security. Latin American respondents reported higher rates of supplier readiness issues (52%) than North American respondents (28%), possibly reflecting supply chain digitalization maturity differences.

Organizational size analysis revealed that large organizations (>10,000 employees) reported greater coordination challenges (78%) versus medium-sized firms of 1,000-5,000 employees (45%). However, smaller organizations more frequently reported resource constraint barriers (62% for <1,000 employees vs. 31% for >10,000 employees), reflecting limited resources available for transformation initiatives.

## 5. Discussions

### 5.1 Theoretical Contributions

This research advances digital transformation literature through several theoretical contributions with implications for understanding how organizations navigate technological change in complex international contexts. The findings provide empirical validation of dynamic capabilities theory predictions while extending theory application to digital transformation contexts.

**Digital Maturity as Organizational Capability.** The finding that digital maturity significantly predicts change management effectiveness ( $\beta = 0.68$ , explaining 46% variance) provides substantial empirical support for conceptualizing digital maturity as organizational capability rather than merely technological attribute. This relationship demonstrates that organizations with well-developed digital capabilities spanning technological infrastructure, workforce skills, leadership commitment, organizational culture, and customer orientation possess greater capacity to manage organizational change effectively. This pattern aligns with dynamic capabilities theory's emphasis on organizational capacity for sensing, seizing, and reconfiguring as determinants of competitive advantage in dynamic environments (Teece, 2007).

The relationship's magnitude suggests digital maturity represents foundational capability enabling subsequent capability development, including change management capacity. Organizations lacking digital maturity encounter substantial difficulties developing effective change management regardless of other organizational characteristics, suggesting digital readiness prerequisites exist before successful transformation becomes feasible. This finding challenges perspectives treating digital maturity as desirable but optional organizational characteristic, instead positioning it as fundamental capability requirement for organizations operating in digitally intensive environments.

**Change Management as Mediating Mechanism.** The finding that change management effectiveness fully mediates digital maturity's impact on transformation success challenges technology-deterministic perspectives assuming technological capabilities directly determine outcomes. Full mediation indicates digital maturity influences transformation outcomes primarily through enhanced organizational change capacity rather than direct technological effects. Technologically sophisticated organizations do not automatically achieve superior transformation outcomes; rather, digital maturity enables development of change management capacity which subsequently determines whether transformations succeed.

This mediation pattern has important theoretical implications. It suggests that technology-centric theories inadequately explain digital transformation outcomes without incorporating organizational change mechanisms. The relationship pattern indicates that organizational processes converting technological capability into operational reality represent critical mechanisms determining transformation success. Theories emphasizing technological attributes while neglecting organizational conversion processes consequently miss critical determinants of whether digital investments generate anticipated value.

The finding extends organizational change theory by demonstrating how technological readiness influences change capacity. Traditional change management frameworks often treat technological and organizational change as separate domains requiring independent attention. However, results suggest these domains interact dynamically, with technological capability development enhancing change management effectiveness. This interaction suggests integrated frameworks addressing technological and organizational dimensions simultaneously provide superior theoretical foundation compared to frameworks treating these dimensions independently.

**Cultural Readiness as Critical Moderator.** Cultural readiness's significant contribution ( $\beta = 0.43$ , explaining 18.5% unique variance) advances cross-cultural management literature by providing empirical evidence of

cultural influences on technology adoption across international contexts. This finding demonstrates that organizations demonstrating cultural openness to change, cross-cultural collaboration capability, and cultural adaptation in implementation approaches exhibit enhanced change management effectiveness independent of technological readiness.

The cultural readiness effect indicates that technological and organizational capabilities alone prove insufficient for transformation success in international contexts; cultural dimensions represent additional critical success factor requiring deliberate attention. This pattern extends cross-cultural management theory by documenting specific mechanisms through which culture influences organizational outcomes in digital transformation contexts. Cultural readiness affects not merely technology adoption rates often examined in existing research but fundamental change management capacity determining whether organizations can navigate complex transformations successfully.

The finding suggests that cultural intelligence organizational capacity to function effectively across diverse cultural contexts represents strategic capability rather than desirable attribute for multinational corporations (Ang & Van Dyne, 2008). Organizations lacking cultural intelligence encounter systematic implementation difficulties limiting transformation effectiveness regardless of technological sophistication or change management expertise developed within single cultural contexts.

**Geographical and Contextual Variation.** Documented geographical variations in implementation barriers contribute to understanding how contextual factors shape digital transformation experiences. Asia-Pacific organizations' higher infrastructure challenges (67% vs. 34% European organizations) reflect developmental stage differences and infrastructure investment history variations across regions. European organizations' more frequent regulatory compliance issues (54% vs. 28% Asia-Pacific) illustrate how institutional contexts shape implementation challenges requiring navigation.

These variations challenge universalistic perspectives assuming transformation dynamics operate identically across contexts. Instead, findings support contingency perspectives emphasizing that effective transformation strategies must adapt to local contextual characteristics (Donaldson, 2001). Contextual factors including infrastructure quality, regulatory environments, cultural norms, and institutional characteristics shape both challenges organizations encounter and approaches likely proving effective. Theories neglecting contextual variation consequently provide inadequate foundation for understanding transformation dynamics across diverse international settings.

## **5.2 Practical Implications**

Research findings generate several actionable implications for organizations pursuing digital transformation in international supply chain contexts.

**Prioritize Comprehensive Digital Readiness Assessment.** Organizations should conduct thorough digital readiness assessment spanning technological infrastructure, workforce capabilities, leadership commitment, organizational culture, and cultural readiness before pursuing major transformation initiatives. Assessment should employ multiple methodologies surveys, interviews, capability testing, infrastructure audits generating comprehensive understanding of current capabilities and gaps. Results should inform realistic objective setting, appropriate initiative sequencing, and targeted capability development addressing identified deficiencies.

Assessment should occur at multiple organizational levels avoiding overreliance on executive perspectives potentially disconnected from operational realities. Frontline employee perspectives regarding skill levels, cultural readiness, and change capacity often differ substantially from executive perceptions, with ground truth more accurately reflecting readiness for successful implementation. Cross-functional and cross-geographical assessment ensures comprehensive understanding spanning diverse organizational contexts.

**Invest Adequately in Change Management.** Organizations must allocate sufficient resources to change management activities accompanying technological deployment. Findings indicate successful organizations invest approximately 23% more in change management compared to unsuccessful counterparts, with investment spanning dedicated change management staffing, comprehensive training programs, communication campaigns, change champion networks, and ongoing support structures. Change management budget should represent significant proportion of overall transformation investment rather than marginal add-on.

Investment should occur throughout transformation lifecycle rather than concentrating in early phases. Many organizations front-load change management investment during initial implementation but reduce investment prematurely, leading to backsliding as attention shifts elsewhere. Sustained investment maintaining change management capacity throughout implementation and post-implementation phases proves critical for achieving lasting transformation rather than temporary change.

**Employ Culturally Adapted Implementation Strategies.** Organizations operating across culturally diverse contexts must adapt implementation strategies to local cultural norms rather than deploying standardized global approaches. Cultural adaptation should encompass communication strategies, training methodologies, implementation timelines, stakeholder engagement approaches, and change champion selection reflecting local cultural contexts. Adaptation requires involving local stakeholders understanding cultural nuances rather than headquarter-driven mandate imposing Western management practices globally.

Cultural adaptation should occur within overall strategic framework maintaining consistency regarding transformation objectives, core technologies, and fundamental change management principles while allowing tactical flexibility accommodating cultural preferences. Balance between global standardization achieving scale economies and local adaptation ensuring cultural appropriateness represents ongoing tension requiring explicit management rather than assuming either extreme proves universally superior.

**Ensure Sustained Executive Leadership.** Transformation success requires sustained executive commitment throughout implementation journeys including difficult periods when challenges emerge. Initial executive approval proves insufficient; visible, consistent championship maintaining momentum through obstacles determines whether organizations persevere through inevitable implementation difficulties. Executive commitment should manifest through resource allocation prioritizing transformation objectives, personal participation in transformation activities, regular communication reinforcing importance, and performance management aligning with transformation goals.

Executive teams should establish explicit governance mechanisms maintaining transformation visibility and priority throughout implementation. Regular executive reviews tracking progress, addressing obstacles, and making adjustment decisions prevent transformation from fading into background as competing priorities emerge. Executive compensation and performance assessment should explicitly incorporate transformation objectives ensuring personal incentives align with organizational priorities.

**Develop Local Change Champion Networks.** Organizations should establish change champion networks distributing change leadership across organizational levels and geographical locations rather than concentrating change management centrally. Champions should be carefully selected based on local credibility, genuine transformation enthusiasm, communication capability, and willingness to invest discretionary effort supporting colleagues. Champions require training regarding transformation objectives, change management approaches, and mechanisms for providing feedback to central coordination teams.

Champion networks should include individuals at multiple organizational levels—executives providing strategic direction, middle managers managing day-to-day implementation, and frontline employees demonstrating technology utilization and providing peer support. Multi-level networks create redundancy ensuring local change leadership exists even if particular individuals depart roles, while also providing vertical communication channels connecting different organizational levels.

### 5.3 Limitations and Future Research Directions

Several limitations affect result interpretation and suggest directions for future research extending current understanding.

**Cross-Sectional Design Limitations.** The quantitative phase employed cross-sectional design measuring all variables at single time point, limiting causal inference strength despite theoretical rationale for hypothesized relationships. While structural equation modeling tests theory-driven causal models, cross-sectional data cannot definitively establish causal directionality or eliminate alternative explanations involving reverse causation or reciprocal relationships. For example, while theory and results suggest digital maturity influences change management effectiveness, successful change management experiences might simultaneously enhance digital maturity through capability development feedback loops.

Future research should pursue longitudinal designs tracking organizations throughout transformation journeys over extended periods. Longitudinal approaches enable examination of temporal sequences establishing clearer causal relationships, investigation of how relationships evolve throughout transformation stages, and assessment of long-term sustainability versus short-term success. Panel designs measuring constructs at multiple time points would enable testing dynamic models examining reciprocal relationships and feedback effects currently inaccessible through cross-sectional data.

**Sample Composition and Generalizability.** Sample composition, while diverse across multiple dimensions, focused on larger organizations operating internationally. Approximately 80% of participants represented organizations exceeding 1,000 employees, with 44% from organizations exceeding 5,000 employees. This composition potentially limits generalizability to small and medium enterprises (SMEs) encountering different digital transformation challenges and possessing different resource bases, organizational structures, and change management capacities.

Future research should explicitly examine digital transformation dynamics in SME contexts. SMEs often lack dedicated change management capabilities, digital expertise, and financial resources available to large corporations, potentially requiring fundamentally different transformation approaches. Research examining how SMEs successfully navigate digital transformation despite resource constraints would generate valuable insights, potentially identifying innovative approaches large organizations might adapt while also providing actionable guidance for substantial portion of businesses underrepresented in current research.

**Cultural Measurement Depth.** Cultural readiness measurement relied primarily on self-reported survey items and geographical location as cultural proxies rather than deeper cultural dimension assessment. While results document significant cultural influences, measurement approach does not identify specific cultural dimensions such as power distance, uncertainty avoidance, or collectivism-individualism driving observed effects. This limitation restricts theoretical understanding of mechanisms through which culture influences transformation processes and outcomes.

Future research should employ more sophisticated cultural measurement capturing specific dimensions from established cultural frameworks such as Hofstede's cultural dimensions, GLOBE study cultural practices and values, or Schwartz's cultural value orientations. Detailed cultural assessment would enable examination of which cultural dimensions most strongly influence digital transformation, whether cultural effects vary across transformation phases, and how organizations can most effectively adapt strategies to specific cultural configurations. Multi-level studies examining both societal culture and organizational culture simultaneously would illuminate how these nested cultural layers interact influencing transformation dynamics.

**Technology-Specific Dynamics.** The research examined digital transformation broadly without differentiating unique requirements of different digital technologies. However, technologies such as blockchain, artificial intelligence, IoT, and robotic process automation exhibit different technical

characteristics, implementation challenges, and organizational implications potentially requiring distinct change management approaches. Aggregating across technologies provides general insights but may obscure technology-specific dynamics relevant for practitioners implementing particular technologies.

Future research should conduct technology-specific investigations examining unique implementation requirements, change management approaches, and success factors for different digital technologies. Comparative studies systematically contrasting multiple technologies would illuminate where general transformation principles apply universally and where technology-specific approaches prove necessary. Such research would generate more granular practitioner guidance tailored to specific technological contexts.

**Industry-Specific Considerations.** While sample included multiple industries providing breadth, industry-specific analysis remained limited given sample size constraints when subdividing by industry. Industries vary substantially regarding regulatory intensity, supply chain structures, competitive dynamics, and digitalization maturity potentially affecting transformation approaches and success factors. Manufacturing, retail, logistics, and pharmaceutical sectors represented in this research face distinct industry-specific challenges potentially requiring tailored transformation frameworks.

Future research should develop industry-specific transformation frameworks building on general insights identified here while incorporating industry-specific considerations. Industry-focused research employing larger samples within particular sectors could identify industry-specific best practices, unique barriers, and specialized capabilities critical for success. Industry associations represent potential research partners enabling access to substantial within-industry samples supporting robust industry-specific analysis.

**Longitudinal Transformation Journeys.** While case studies provided implementation insights, relatively brief observation periods (24-36 months) limit understanding of long-term transformation sustainability and evolution. Digital transformation represents ongoing journey rather than discrete project, with initial implementation representing only beginning. Long-term trajectories including whether organizations sustain initial gains, continue advancing digital capabilities, or experience capability degradation remain inadequately understood.

Future research should conduct extended longitudinal case studies following organizations throughout multi-year transformation journeys. Such studies would illuminate sustainability factors distinguishing organizations maintaining transformation momentum from those experiencing backsliding, document how transformation strategies evolve responding to technological and competitive changes, and identify long-term capability development patterns enabling continuous digital advancement.

## **6. Conclusions**

This research examined digital maturity's impact on change management effectiveness in global supply chain operations, addressing critical gaps in understanding organizational dimensions of digital transformation. Through mixed-methods investigation combining quantitative surveys from 217 supply chain professionals across four continents, 25 qualitative interviews with transformation leaders, and four comprehensive organizational case studies, we provide robust empirical evidence documenting relationships between digital readiness, change management capacity, cultural factors, and transformation outcomes.

Key empirical findings demonstrate that digital maturity significantly predicts change management effectiveness ( $\beta = 0.68, p < 0.001$ ), with this relationship fully mediating digital maturity's impact on transformation success. This pattern challenges technology-deterministic perspectives, indicating that technological readiness influences outcomes primarily through enhanced organizational change capacity rather than direct technological effects. Cultural readiness emerges as important moderating factor ( $\beta = 0.43, p < 0.001$ ), with culturally adapted implementation strategies achieving substantially higher success

rates than standardized approaches. Implementation barriers vary systematically across geographical regions and organizational contexts. Asia-Pacific organizations report higher infrastructure challenges while European organizations more frequently cite regulatory compliance issues requiring tailored strategies addressing specific contextual challenges.

The validated five-phase Digital Transformation Change Management Framework integrating technological and organizational change dimensions provides practitioners with structured guidance for managing complex transformations across international contexts. Framework phases digital readiness assessment, strategic planning and stakeholder engagement, phased implementation with cultural adaptation, performance monitoring and adjustment, and sustainable integration with continuous improvement address critical gaps in existing practice where organizations often pursue technology implementation without systematic attention to organizational change dimensions. The framework emphasizes iterative learning through phased implementation, cultural adaptation tailored to local contexts, substantial change management investment, sustained leadership engagement, and local change champion development as critical success factors consistently associated with effective transformation.

Theoretical contributions advance multiple research streams. Digital transformation literature benefits from empirical validation of relationships between digital maturity, change management effectiveness, and transformation outcomes, with findings demonstrating that organizational change capacity represents critical mechanism converting technological readiness into transformation success. Change management theory extends through documentation of how traditional frameworks require substantial adaptation for continuous digital transformation contexts exhibiting ongoing evolution rather than episodic change characteristics. Cross-cultural management literature advances through empirical evidence documenting cultural influences on technology adoption across international contexts, with cultural readiness explaining substantial variance in change management effectiveness beyond technological and organizational factors. Dynamic capabilities theory application to digital contexts receives empirical validation, with findings supporting theoretical predictions that organizational sensing, seizing, and reconfiguring capacity determine competitive advantage in dynamic environments.

Methodological contributions include validated measurement scales for digital maturity, change management effectiveness, and cultural readiness in supply chain contexts, supporting future research examining these constructs. The research demonstrates mixed-methods approaches integrating quantitative surveys, qualitative interviews, and organizational case studies generate comprehensive understanding combining statistical generalizability with contextual depth, providing richer insights than purely quantitative or qualitative approaches could achieve independently.

Practical implications emphasize holistic transformation strategies integrating technological and organizational dimensions rather than emphasizing technology deployment while neglecting organizational change requirements. Organizations must invest in foundational digital capabilities technological infrastructure, workforce skills, leadership commitment, organizational culture before pursuing ambitious transformation objectives, as inadequate readiness undermines implementation regardless of technology quality. Change management activities require adequate resourcing, with successful organizations investing approximately 23% more in organizational change dimensions compared to unsuccessful counterparts experiencing implementation difficulties. This investment should span dedicated change management staffing, comprehensive training programs, multi-channel communication campaigns, change champion networks, and ongoing support structures throughout transformation lifecycle.

Leadership commitment throughout transformation journeys—not merely during initial approval proves critical for success, with sustained visible championship maintaining momentum through inevitable implementation challenges. Organizations should establish explicit governance mechanisms maintaining transformation visibility and priority throughout extended implementation periods when competing pressures might otherwise shift attention elsewhere. Cultural adaptation strategies tailored to local contexts

significantly enhance adoption and effectiveness, requiring organizations to balance global strategic consistency with local tactical flexibility. Adaptation should encompass communication strategies, training methodologies, implementation timelines, and stakeholder engagement approaches reflecting cultural norms while maintaining core transformation objectives.

As global supply chains continue evolving in response to technological advancement, competitive pressures, and market disruptions, organizational capacity to manage digital transformation effectively will increasingly determine competitive advantage. Organizations developing sophisticated change management capabilities alongside technological investments will be best positioned to capture value from digital innovations, while those neglecting organizational dimensions in pursuit of technological advancement will likely join the substantial proportion of organizations whose digital transformation initiatives fail to achieve objectives. The imperative for digital transformation will only intensify as technologies advance including artificial intelligence, blockchain, IoT, and emerging technologies and competitive pressures mount from digitally sophisticated competitors.

This research provides theoretical foundation and practical guidance for understanding and navigating these complex organizational changes. By demonstrating that transformation success depends on integrated development of technological and organizational capabilities, supported by cultural adaptation and sustained leadership commitment, this study challenges simplistic perspectives emphasizing technology deployment while providing evidence-based frameworks supporting successful digital transformation in international business contexts. Organizations pursuing digital transformation should recognize that technology represents enabler rather than solution, with ultimate success depending on organizational capacity to adapt processes, develop workforce capabilities, align culture, and manage complex change across diverse contexts.

The five-phase framework, validated through empirical research and expert consultation, offers actionable roadmap for organizations at various digital maturity stages and across diverse industry and geographical contexts. Organizations should adapt the framework to their specific circumstances rather than implementing rigidly, maintaining framework principles while adjusting implementation details reflecting contextual realities. The framework's emphasis on assessment, strategic planning, phased implementation, continuous monitoring, and sustainable integration provides structure while remaining flexible enough to accommodate diverse organizational contexts and transformation objectives.

Future research should extend current findings through longitudinal designs tracking transformation journeys over extended periods, technology-specific investigations examining unique requirements of different digital technologies, multi-level studies examining how individual, team, and organizational factors interact, and industry-specific research developing tailored frameworks for particular sectors. Comparative international research could identify how national institutional contexts influence transformation approaches and outcomes, while implementation science approaches could examine how evidence-based frameworks translate into practice across diverse organizational settings.

The research landscape surrounding digital transformation continues evolving rapidly as technologies advance, competitive dynamics shift, and organizational learning accumulates. Ongoing research generating empirical evidence, theoretical advancement, and practical guidance remains essential for supporting organizations navigating this critical organizational challenge. This study contributes to that ongoing effort by providing robust empirical evidence, validated frameworks, and actionable insights advancing both scholarly understanding and practitioner capability for managing digital transformation in increasingly complex global business environments.

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