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IMPLEMENTATION MODELS FOR AI AND TECHNOLOGY – A REVIEW

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Abstract: This systematic review synthesizes and classifies diverse theoretical models and frameworks guiding technology and artificial intelligence (AI) implementation in organizations. Through analysis of literature, this study develops a novel classification framework identifying six critical dimensions of implementation models: implementation object, analysis level, transformation character, implementation method, adaptation focus, and implementation depth. The research reveals three significant trends: (1) an evolution from technology-centric to holistic socio-technical approaches, (2) the emergence of specialized AI implementation frameworks addressing unique challenges of artificial intelligence, and (3) the necessity of multi-level synchronization during implementation processes. This review makes four primary contributions: establishing a comprehensive classification system that coherently organizes existing models, identifying emerging patterns in contemporary implementation approaches, proposing an integrated framework that combines complementary perspectives, and providing evidence-based recommendations for practitioners navigating complex implementation challenges. This unified perspective bridges previously fragmented implementation approaches across disciplines and offers a more cohesive foundation for both theoretical advancement and practical application in organizational transformation.
Keywords: artificial intelligence implementation, technology adoption models, organizational change, implementation frameworks, socio-technical systems

1. INTRODUCTION

The implementation of new technologies, particularly AI systems, represents a significant organizational challenge that extends beyond technological acquisition to comprehensive organizational transformation. Despite growing investment in digital technologies, implementation success rates remain problematic, with many organizations struggling to realize expected benefits (Kane et al., 2015). Research suggests that 70% of digital transformation initiatives fail to achieve their objectives (Boutetière et al., 2018), highlighting the critical need for effective implementation approaches.

This systematic review addresses this challenge by synthesizing and classifying the diverse theoretical models and frameworks that guide technology and AI implementation. While numerous models exist across multiple disciplines, they often remain disconnected, creating difficulties for both researchers seeking to advance theoretical understanding and

practitioners attempting to navigate implementation complexities. By providing a comprehensive classification framework, this study bridges fragmented approaches and offers a more integrated perspective on implementation processes.
The purpose of this paper is to analyze and classify existing technology and AI implementation models systematically, identify emerging trends in implementation approaches, and develop an integrated framework that supports both theoretical advancement and practical application in organizational transformation.
The research contributes to both theory and practice in several ways. First, it establishes a systematic classification that organizes existing models according to key dimensions, facilitating more coherent theoretical development. Second, it identifies emerging patterns and trends in implementation approaches, particularly regarding the growing significance of AI-specific models. Third, it proposes an integrated approach that combines complementary frameworks to address implementation challenges holistically. Finally, it provides evidence-based recommendations for practitioners engaged in technology implementation initiatives.

2. METHODOLOGY OF RESEARCH

This systematic literature review followed a structured approach to identify, analyse, and synthesize relevant scholarly work on technology and artificial intelligence implementation models. The review methodology was designed to ensure comprehensive coverage while maintaining analytical rigor. We conducted searches across Scopus and other major electronic repositories of scientific publications using constructed search strings combining terms related to implementation models ("artificial intelligence implementation" OR "artificial intelligence adoption") AND ("organizational adaptation" OR "managerial adaptation" OR "employee readiness" OR "artificial intelligence transformation"). The search was limited to peer-reviewed academic publications in English.
The literature analysis process involved multiple phases beginning with preliminary identification of relevant publications, followed by abstract screening against inclusion criteria, and culminating in detailed content analysis of selected works. The selected literature was analysed through qualitative content analysis techniques to identify key dimensions and theoretical foundations of each model.

3. RESULTS

Based on our systematic analysis of the literature, we developed a comprehensive classification framework for implementation models, as illustrated in Figure 1. This framework identifies six key dimensions that collectively provide a holistic understanding of technology implementation approaches: implementation object, analysis level, transformation character, implementation method, adaptation focus, and implementation depth. Each dimension represents a critical aspect of implementation that organizations must consider when planning and executing technology initiatives. The framework demonstrates how these dimensions converge to form a complete understanding of implementation models, with each dimension offering a distinct but complementary perspective.
The classification by implementation object identifies three major categories of models based on their application scope and specificity. General technology models provide universal frameworks for technology adoption. The Technology-Organization-Environment (TOE) framework (Tornatzky et al., 1990) conceptualizes implementation through technological, organizational, and environmental dimensions. The Technology Acceptance

Model (TAM) (Davis, 1989) focuses on perceived usefulness and ease of use, while the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) integrates eight models with moderating factors. Rogers Diffusion of Innovation model (Rogers, 1962) describes innovation spread through user categories and innovation characteristics. Additional important general models include Theory of Planned Behavior (TPB) (Ajzen, 1991), DeLone & McLean Information Systems Success Model (DeLone & McLean, 2003), Strategic Alignment Model (SAM) (Henderson and Venkatraman, 1993), and Task-Technology Fit (TTF) Model (Goodhue & Thompson, 1995).

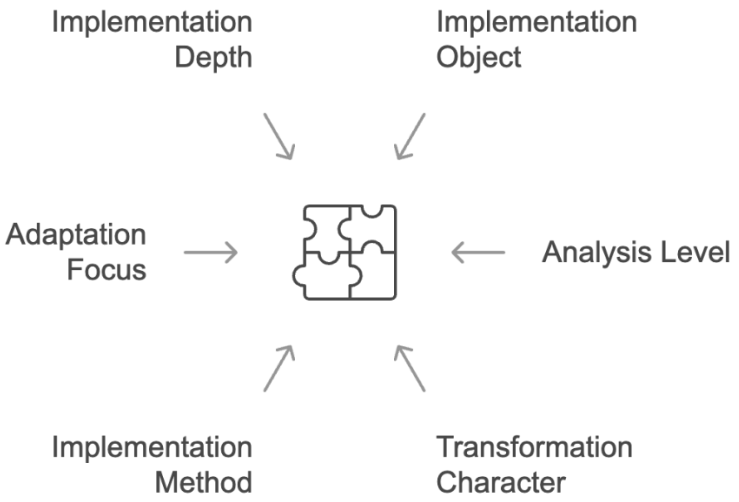

Fig. 1. Understanding of implementation models
Source: developed by author

Specialized AI implementation models address unique AI adoption challenges. Recent research by Kuzior et al. (2023) emphasizes the importance of open innovation approaches when implementing AI technologies, suggesting that successful AI adoption requires not only technological readiness but also organizational openness to external knowledge integration. The AI Readiness Framework (Holmström, 2022) assesses organizational readiness through parameters including strategy, data analytics, and infrastructure. Capgemini's AI Implementation Model (Beardmore, 2020) identifies four stages: tactical, focused, scaled, and transformational AI. The AI Maturity Model (Jöhnk et al., 2021; Noymanee et al., 2022) evaluates implementation maturity across basic, analytical, ML, cognitive, and autonomy levels. Other significant AI-specific models include AI Canvas Framework (Agrawal et al., 2018), Three-Stage AI Implementation Model (Davenport & Ronanki, 2018), IBM AI Ladder Framework (IBM, n.d.), AI Governance Framework (IBM, 2024), Responsible AI Framework (IEEE 7000), and 3D-model for AI transformation (Uba et al., 2023).

Industry-specific models adapt to sectors, such as the AI Maturity Model for public administration (Noymanee et al., 2022) and the banking-specific AI implementation model (Lazo & Ebardo, 2023).

The analysis level dimension categorizes models according to their focal organizational unit, spanning from individual to inter-organizational contexts. Individual models examine

user-level adoption processes. TAM (Davis, 1989) analyses individual technology perception, while coping strategy models focus on stress management during technological change. The Kübler-Ross change acceptance curve maps emotional reactions through five stages, and technological adaptation models identify phases from acceptance to invention.

Group models address team-based technology adoption. The Human-AI Teaming model (National Academies of Sciences, Engineering, and Medicine, 2022) examines human-AI interaction through role distribution and shared understanding, while the techno-social leader model supports group adaptation through human-centred implementation.

Organizational models provide enterprise-level frameworks. The TOE framework (Tornatzky et al., 1990) examines contextual implementation factors, while the extended Leavitt Diamond Model (Tanvi Bhosale, 2023; Tomaževič et al., 2024) integrates five organizational elements. Lewin's organizational change model (Burnes, 2004; Hussain et al., 2018) sequences unfreezing, movement, and refreezing phases, and AI Governance models structure implementation through strategic, tactical, and operational levels.

Models classified by transformation character reflect different emphases on technological versus organizational aspects of implementation. Technology-centric approaches focus primarily on technical aspects, as seen in the AI Adoption Pyramid model (Sid Bharath, 2025) and technical TOE framework factors. Socio-technical approaches balance technological and human factors, exemplified by the extended Leavitt Diamond Model (Tomaževič et al., 2024) and the 3D model for AI transformation (Uba et al., 2023). Organizationally transformative approaches emphasize comprehensive change through Westerman's digital transformation model (MIT Management Executive Education, 2019).

The implementation method dimension distinguishes models based on their approach to sequencing and coordinating change activities. Phased approaches implement technologies sequentially, including the ADKAR model's five sequential stages (Majka, 2024), Rogers diffusion model, and Lewin's three-stage change model. Integrative approaches develop multiple components simultaneously, as seen in the 3D model for AI transformation (Uba et al., 2023) and the extended Leavitt Diamond Model. Iterative approaches employ cyclical improvement through feedback loops and continuous learning.

Adaptation focus categorizes models according to the primary entity that undergoes change during implementation. Technological adaptation adjusts technologies to organizational needs. Organizational adaptation modifies structures and processes, exemplified by Teece dynamic capabilities model. Personnel adaptation focuses on employee adjustment through models like ADKAR and the J-curve adaptation model (Siderova, 2021). Management adaptation develops leadership capabilities through transformational leadership and "sandwich manager" models.

Implementation depth classifies models based on the extent of organizational change they involve, from superficial to profound transformation. The automation approach focuses on replacing routine operations, as in tactical AI (Capgemini model) (Beardmore, 2020) and basic AI Maturity levels. The augmentation approach enhances existing capabilities through Human-AI teaming and focused/scaled AI implementations. The transformational approach fundamentally changes business models through transformational AI and autonomous systems.

4. DISCUSSION

The integrated analysis of implementation models reveals several important patterns and implications. First, there is a clear evolution from technology-centric to more holistic socio-technical approaches. Earlier models like TAM (Davis, 1989) focused primarily on individual acceptance, while contemporary frameworks recognize the complex interplay between technological, organizational, and human factors. This evolution reflects a maturing understanding that implementation success depends not merely on the technology itself but on its integration within organizational contexts. This shift toward socio-technical approaches is further supported by Kuzior and Kwilinski (2022), who demonstrate that cognitive technologies require specific management approaches that integrate both technological capabilities and organizational priorities, particularly in industrial enterprises undergoing digital transformation.

Second, specialized AI implementation models represent a significant development addressing unique AI challenges including data governance, ethics, and new competencies. Models such as AI Maturity frameworks (Jöhnk et al., 2021; Noymanee et al., 2022) exemplify this trend, highlighting the importance of staged approaches and specialized governance structures.

Third, successful implementation requires synchronization across multiple organizational levels. The classification by adaptation focus reveals that alignment is needed between technological adaptation, organizational adaptation, personnel adaptation, and management adaptation. This multi-level perspective is particularly evident in McKinsey's AI Success Factors and the multi-stakeholder approach (Lazo & Ebardo, 2023).

Fourth, there exists tension between structured, phased implementation approaches and more flexible, iterative methodologies. While models like ADKAR and Lewin advocate for sequential progression, adaptive management approaches emphasize continuous learning. This tension reflects broader debates regarding planned versus emergent change (Burnes, 2004) and suggests contextual appropriateness for different methodologies.

Fifth, strategic considerations around implementation depth (automation, augmentation, transformation) are critical. Organizations must determine whether their technology aims to automate existing processes, augment capabilities, or transform their business model. The Capgemini model acknowledges progression from tactical to transformational AI, suggesting evolutionary AI maturity development.

Finally, ethical aspects of implementation are receiving increased attention, particularly for AI technologies. Frameworks addressing responsible AI (IEEE 7000), fairness, transparency, and ethical oversight reflect growing societal concerns. This suggests future implementation models will need to more explicitly incorporate ethical considerations as core components.

For organizations implementing Industry 4.0 and 5.0 solutions, we propose a practical implementation path integrating multiple frameworks from this review. First, assess manufacturing readiness using the AI Readiness Framework dimensions (Holmström, 2022) adapted for production environments: digital infrastructure (IoT sensors, connectivity, data analytics), workforce competencies, and organizational structures. Second, begin with pilot automation projects following the phased TOE framework approach (Tornatzky et al., 1990), validating technology-organization-environment fit while establishing data governance. Third, scale successful pilots using Capgemini's staged model (Beardmore, 2020), ensuring parallel adaptation across technology, structure, people, and tasks via the ex-

tended Leavitt Diamond Model (Tomaževič et al., 2024). Fourth, transition from automation-focused Industry 4.0 to augmentation-focused Industry 5.0 by developing Human-AI teaming capabilities (National Academies, 2022) that enhance critical decision-making. Fifth, embed sustainability considerations aligned with Industry 5.0's societal objectives while maintaining operational efficiency.

The integration model proposed combines different frameworks to cover strategic, organizational, individual, cross-level, and management aspects of implementation. This integrated approach recognizes that no single framework adequately addresses all dimensions of successful technology adoption. Practitioners and researchers must draw from multiple models, adapting them to specific contexts and objectives.

This study acknowledges several limitations that should be considered when interpreting the findings. First, the rapidly evolving nature of AI technology means that new implementation models continue to emerge, and this review represents a snapshot of the current state of knowledge. Second, the classification framework, while comprehensive, represents one possible way of organizing implementation models, and alternative taxonomies may offer different insights. Third, the empirical validation of the proposed integrated framework remains a task for future research, as this review focuses on theoretical synthesis rather than practical testing.

5. CONCLUSION

This systematic review establishes a comprehensive classification framework for technology and AI implementation models, bridging previously fragmented approaches across multiple disciplines. The six-dimensional framework – implementation object, analysis level, transformation character, implementation method, adaptation focus, and implementation depth – provides a structured foundation for navigating the complex landscape of digital transformation.

Our analysis reveals three significant trends: (1) evolution from technology-centric to socio-technical approaches recognizing the interdependence of technological, organizational, and human factors; (2) emergence of specialized AI implementation models addressing unique challenges including ethics, governance, and competency requirements; and (3) the necessity of synchronized adaptation across organizational levels, balancing technological modification with organizational restructuring and personnel development.

The tension between structured methodologies and flexible, iterative approaches indicates that contextual factors should determine implementation strategies. Strategic decisions regarding implementation depth (automation, augmentation, or transformation) fundamentally shape implementation outcomes, while ethical considerations have gained unprecedented prominence, particularly for AI technologies.

The integrated approach proposed combines complementary frameworks to address the multifaceted nature of technology implementation, acknowledging that no single model adequately captures all dimensions. For practitioners, this classification framework offers a roadmap for comprehensive implementation planning that systematically addresses technological, organizational, and human considerations throughout the transformation process.

Future research should explore interactions between implementation dimensions, develop metrics for implementation success, and investigate contextual factors influencing implementation effectiveness in diverse organizational settings. This structured understanding

of implementation models contributes to both theoretical coherence and practical effectiveness, ultimately supporting higher success rates in digital transformation initiatives.

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