Vol.4, No.4, Page 2010- 2024, 2026 https://doi.org/10.59628/jast.v4i4.2682 ISSN 2958-9568 JAST

SUN PUBLISHER

مجلة جامعة صنعاء للعلوم التطبيقية والتكنولوجيا

Sana'a University Journal of Applied Sciences and Technology

https://journals.su.edu.ye/index.php/jast/

Organizational AI Readiness for Telecom Project Management: A Conceptual Review and Diagnostic Framework

Mohammed Abdullah Thabit Al-maazi [1] *, Ibrahim Alameri [1] and Farouk A. Al-Fahaidy[2]

[1] **Department of Civil Engineering, Faculty of Engineering, Sana'a University, Sana'a, Yemen,**
[2]**Department of Electrical Engineering, Faculty of Engineering, Ibb University, Ibb, Yemen.**

*Corresponding author: m.almaazi@su.edu.ye

Abstract

Telecommunications operators are under increasing pressure to use Artificial Intelligence (AI) to keep up with the recent technologies and stay ahead in the service provision advancement. However, within organizations that are not adequately prepared for AI adoption, many of these initiatives fail to gain traction. The study explores how existing academic research and practical frameworks can conceptualize organizational AI readiness in project-based telecom contexts. It synthesizes six peer-reviewed academic studies on AI readiness and digital transformation and four telecom-relevant AI readiness and maturity frameworks from industry bodies. Using a hybrid Technology–Organization–Environment (TOE) and People–Process–Technology-in-use–Data (PPTD) lens, the 80 readiness indicators derived from the academic and practical resources were coded. Then, analyzed them through reflexive thematic analysis and identified nine interrelated AI readiness themes: strategic AI vision and business alignment; leadership, culture and change climate; human capital and AI skills; data assets, governance and protection; technology and infrastructure backbone; AI solutions, lifecycle and experimentation; organizational processes, governance and project operations; value realization and performance impact; and external ecosystem, regulation and partnerships. These themes are integrated into a conceptual diagnostic framework tailored to project management in telecom organizations and motivated by the challenges of communication service providers in contexts such as Yemen. The resulted framework addresses the gap of fragmented academic and practical perspectives. This offers telecom project management offices (PMOs) a conceptualizing mechanism to reflect on AI readiness, identify potential gaps and prioritizing interventions. In the same time, it provides a basis for future empirical validation and cross-sector comparison.

Article Info

Keywords:
Artificial Intelligence, Organizational Readiness, Project Management, Telecommunications, Digital Transformation, Readiness Framework

Article History:
Received: 24-December-2025,
Revised: 23-January-2026,
Accepted: 01-March-2026,
Published: 28 April 2026.

1. INTRODUCTION

In the rapid digitization landscape, telecommunications companies worldwide are under significant pressure to execute projects with high efficiency, adhering strictly to timelines and budgetary constraints [1]. Digital disruption occurs when digital-based businesses, such as telecom providers, exploit emerging technologies in their operations and services, threatening traditional offerings [2]. The nature of this dynamic environment necessitates that project management practices within the telecom sector are characterized by flexibility, effectiveness, and precision [1]. Artificial intelligence (AI) has been recognized as a powerful tool for navigating these complexities, offering substantial opportunities to enhance project management efficiency, reduce risks, and optimize the allocation of critical resources [1].

To understand what makes AI a suitable option for treating these pressures, it is important to explain the meaning of AI in this context. Artificial intelligence itself is broadly understood as a technology capable of ana-

lyzing data, informing decisions, and potentially acting autonomously to achieve predefined objectives [3]. AI encompasses a wide range of applications, from simple systems (e.g., predictive text) to advanced frameworks, such as deep learning and neural networks [1], [2]. As a potentially era-defining technology, AI is progressively simplifying various aspects of life and work, and its integration into project management aligns with the rise of digitalization, which has encouraged the use of collaborative tools in project management [4], [5].

In this definitional context, scholar examined how AI can be applied specifically within project management. Academic studies underscore the growing enthusiasm in AI adoption for project management, driven by its capacity to process vast datasets, forecast outcomes, and streamline workflows. Considering the market uncertainty where risk and opportunity coexist, the organization that can utilize a certain are more likely to gain advantage [6]. By 2025, the global AI-in-project-management market is projected to exceed USD 5.8 billion, reflecting increasing demand for AI tools and necessitating upskilling among professionals [1]. AI has the potential to fundamentally change how projects are managed and delivered, as highlighted by the Project Management Institute (PMI) [7]. Some forecasts even suggest that 80 percent of current project management tasks will be eliminated as AI takes over [8]. The most optimistic project management knowledge areas for AI applications are the ones where data is beneficial for estimation and planning, schedules, forecasting, and baselining. On the other hand, the least susceptible knowledge areas are those where human interaction and soft skills are required [8]. Against this global trend, it is more obvious the AI potential to reshape project management with Yemen's telecom industry.

Businesses that ignore digital transformation today will struggle to remain competitive in a digital environment [2]. In many developing countries, including Yemen, the telecommunications sector is undergoing rapid transformation, driven by the increasing demand for mobile broadband and digital services. A significant three-fold increase in Yemen's Internet capacity in 2023 exemplifies this trend, with a continued high demand for advanced technologies [9]. In response, Communication Service Providers (CSPs) in Yemen are undertaking numerous projects aimed at network expansion, service enhancement, and maintaining a competitive edge [6]. However, manual and error-prone processes impede decision-making and efficiency [4]. This underscores the urgency of automation-driven project management strategies to boost project performance and foster more sustainable project success [1]. Globally, leading telecom operators have already demonstrated the value of AI by utilizing it across network operations, service delivery, and business expansion [6]. Given that telecom projects often revolve around these same areas and that industry sectors with well-established, rich data stand to benefit most from AI [6], [10], the potential for AI in Yemeni telecom project management is significant.

In the current industrial era, leveraging cutting-edge technologies such as AI is becoming essential for companies, particularly in telecommunications, to streamline operations and project management [1], [4], [5]. Consequently, successful AI adoption necessitates a clear grasp of relevant AI readiness factors, an effective method for assessing organizational readiness, and a strategic alignment between the organization's current capabilities and its AI adoption objectives to fully leverage AI's potential business value [5], [11]. Crucially, the existing literature suggests that there is no single, universally applicable theory for innovation adoption; hence, readiness frameworks need to be customized to the setting, field, and technology involved [5]. Existing work on organizational readiness is distributed across several domains. Telecom-specific industry frameworks tend to present broad maturity models rather than project-management-oriented readiness constructs. In response to these challenges, this study aims to synthesize existing academic and practical work on organizational AI readiness and develop a holistic and conceptually grounded diagnostic framework for telecom project management, inspired by the Yemeni context. This will answer the study's central question: How does the existing literature conceptualize and measure organizational readiness for AI adoption in project management, particularly in telecom-relevant contexts?

2. LITERATURE REVIEW

2.1. Organizational readiness for AI and digital transformation

Organizational readiness is considered the main factor for successful change. The level of an organization's staff to execute development initiatives represents its readiness for change. Organizational readiness and individual willingness to perform the change are proportional. This means that individual resistance and lack of effort occurred due to low organizational readiness, resulting in change failure. In the context of digital transformation, many digital initiatives fail because readiness is not precisely assessed before implementation [2].

Beyond being prepared, recent AI and digital transformation show that a structured readiness assessment is the cornerstone for strategic roadmap establishment and effective resource allocation. Such an assessment should provide a complete view of the entire organization, covering its technological infrastructure, data landscape, culture, staff skills, business processes, and regulatory environment. Through this comprehensive view, leaders can make informed decisions regarding their entire AI-based digital transformation strategy [11]. Often, com-

panies focus solely on technology and overlook the fundamental questions regarding their target, what they will get, and what changes are required. [12].

In this sense, Organizational readiness for AI-based digital transformation is understood as a multidimensional concept that includes the entire organization's strategy, capabilities, and capacity for change. Designing a successful path toward this readiness always begins with two critical steps; accurate evaluation and clear identification of the necessary technological and organizational changes [11], [13]. These steps involve defining Key Performance Indicators (KPIs) and metrics that provide a balanced view of how well processes are performing. These metrics help identify exactly where AI can add the most value, and allow managers to compare operational performance both before and after AI implementation [11]. Complementary research focused on areas like Industry 4.0 and sustainability emphasizes that having strong project management leading the implementation is one of the critical factors determining the success of any digital transformation effort [12]. Therefore, it is critical to figure out how these readiness issues emerge specifically in project management context.

2.2. AI ADOPTION IN PROJECT MANAGEMENT

Project management is increasingly regarded as a promising field for AI adoption. The evolving relationship between humans and new technologies is creating both opportunities and challenges in the field of project management. AI is part of a wider technological shift that is reshaping how projects are defined, planned, and executed [13].

Within this emerging field, researchers have identified the main drivers and benefits of AI-enabled project management. The factors considered most crucial for adopting AI in project management include AI-driven availability, organizational AI experience, and stakeholder pressure for innovation and demonstrated value. These drivers are directly tied to the main anticipated benefits of integrating AI into project management practices, such as increased productivity, improved decision-making, and enhanced overall performance. The decision to introduce and implement AI in project management is a shared process across multiple organizational levels. Executive decision-makers who set strategy and budget, followed by project and program governance structures that are responsible for defining standards and oversight, and project teams for determining practical needs and usage [13].

These results will never be achieved unless the technology fits into the broader culture and structure of the organization. A fundamental factor enabling AI in project management is the organization's degree of digital maturity. In the absence of data and workflows, it is impossible to effectively incorporate AI tools into project planning, scheduling, or tracking tasks. Additionally, establishing a defined AI strategy often addresses obstacles to adoption. The AI strategy should explicitly align with both the organization's business goals and project portfolio objectives. Ultimately, this ties AI adoption in project management to the bigger issues of organizational readiness and strategic alignment [13]. These observations highlight the need for a solid framework for AI and digital transformation, rather than focusing on isolated projects.

2.3. ACADEMIC PERSPECTIVES ON AI AND DIGITAL TRANSFORMATION READINESS

Several academic studies have responded to this need and offered more structured models for AI and digital transformation readiness. These studies agree on one key point: readiness is multi-dimensional and extends beyond technology.

Machado et al. (2020) investigated digital readiness in project-based organizations using the SMARTEM and SMART PM Digital Maturity Frameworks. They ensure that organizations must understand their current digital level, define new digital projects based on clear needs and risks, and ensure that these projects are governed by cross-functional teams. They also stressed that success hinges on strong leadership, capable teams, good collaboration, and effective performance management [12].

Alkhamery et al. (2021) argued that organizational readiness for digital transformation is the key factor in determining success. They attributed the digital initiative's failure to the fact that readiness is either underestimated or not assessed. They define readiness as a specific organizational state that successfully combines technological capabilities, organizational culture, and dynamic capabilities, essentially framing it as an intrinsic requirement for any successful digital project [2].

Aldoseri et al. (2024) developed an AI readiness assessment by combining real-world experience with a thorough literature review and expert interviews. They highlighted that the procedure should start with an initial evaluation encompassing infrastructure, data, culture, leadership, talent, processes, and legal limitations. Their study additionally provides an in-depth analysis of the difficulties, hazards, and potential drawbacks, including low-quality data, skill shortages, integration difficulties, and ethical concerns such as bias and excessive dependence on AI. To manage these problems, they argue for rigorous analysis, strategic mitigation planning, and fostering a continuous culture of learning and ethical awareness in the field.

Taken together, these studies prove that preparing for AI and digital transformation is not just a technical issue. It comprises many elements, including a clear strategy, digital capabilities, strong data and infrastructure, human talent, organizational culture, effective leadership, and

solid risk management. While these studies provide great conceptual depth, practical insights from industry groups complement and offer a much clearer picture of AI readiness for telecom companies.

2.4. Industry and Telecom-Oriented AI Readiness Frameworks

In parallel with the academic literature, several industry bodies and consortia have developed practical AI readiness and maturity frameworks that are particularly relevant to telecommunications and ICT operators.

The Cisco AI Readiness Index (2024) assesses organizations across aspects such as strategy, infrastructure, data, talent, and culture. The Index revealed that while numerous companies have started to formulate AI strategies, substantial hurdles persist. These challenges include a significant shortage of specialized talent, cybersecurity risks associated with AI tasks, long lead times to procure the necessary infrastructure, and data silos that restrict data accessibility. Consequently, the Index stresses the need for clear AI strategies aligned with business objectives, investment in secure and scalable infrastructure, improved data integration and governance, and continuous efforts to develop and upskill employees [14].

The "ITU Framework" (2024) takes a broad, cross-industry view, separating infrastructure into physical and communication infrastructure. It emphasizes the crucial role of infrastructure elements, such as available computing power, storage, and high-speed fiber or wireless networks, to support essential tasks such as data collection, model training, and delivering AI solutions broadly. The framework also underpins the value of innovation fostering through experimental sandboxes and robust developer ecosystems, which include providing open-source solutions and APIs for specialized AI applications [15].

The GSMA AI (RAI) Maturity Roadmap provides a systematic approach to assess an organization's ethical AI initiative. It distinctly outlines dimensions, maturity stages ranging from basic to advanced, and an evaluation process that includes identifying stakeholders, scoring based on evidence, and periodic reviews that evolve with the AI strategy. Furthermore, the Roadmap strongly emphasizes the necessity of robust risk management, model risk practices, strong controls, and detailed documentation of data quality and governance [16].

Finally, the TM Forum AI Maturity Model (2024) was tailored for telecom operators. It assesses AI maturity across several dimensions, including data management, technology/infrastructure, governance, ethics, and operations. It emphasizes the management of metrics and Key Performance Indicators (KPIs) within the AI domain. This is crucial for guaranteeing that AI initiatives deliver tangible business value and support continuous improvement efforts [17]. According to these industry frameworks, being AI-ready is a multilayered challenge. For telecom companies, this means having a dedicated strategy, modern infrastructure, data quality, the right talent, and robust governance to handle risks. However, when considered together with academic studies, these frameworks uncover important fragmentation and gaps in how AI readiness is conceptualized.

2.5. Synthesis and Research Gap

Overall, the existing literature envisions AI readiness as a multidimensional concept that spans strategy, governance, infrastructure, data, talent, culture, change management, risk, and external partnerships. Although both academic research and industry frameworks provide rich insights into these individual areas, the overall perspective on readiness is fragmented. Academic research highlights the importance of organizational readiness and digital maturity. Practical frameworks offer models tailored specifically for the telecom sector, providing operators with criteria for diagnosis and high-level roadmaps for action [2], [11–13], [15–17].

Despite this existing knowledge, we still face three gaps. First, the AI readiness dimensions are dispersed across different studies and frameworks. Each resource uses its own terminology and categories, making it difficult to obtain a unified and clear view of organizational AI readiness. Second, even when frameworks focus on telecom, they usually look at the company as a whole, failing to explicitly focus on project management. Third, there is little connection between academic readiness models and practical frameworks used by telecom operators. This study addressed these gaps and attempted to combine academic and industry views into a holistic, project-management-focused, AI readiness framework tailored specifically for the telecom industry.

3. METHODOLOGY

3.1. Research Design

This study adopts a purely qualitative, exploratory research design based on a structured narrative review combined with conceptual framework development. This design was used to develop an organization-level AI readiness framework for project-based telecom contexts by integrating findings from existing academic studies and practical AI readiness/maturity frameworks. The development of an assessment framework based on previous studies is a well-established academic approach and has been used in many studies to derive diagnostic or maturity models [12]. This research is structured around a holistic AI readiness framework derived from an extensive review of the academic literature and practical frameworks.

Conceptually, the design reflects three considerations:

Table 1. Inclusion/Exclusion criteria for academic

Criteria Type	Specific Criteria
Inclusion Criteria	(1) English language
	(2) Peer-reviewed journal articles or research reports
	(3) Published from 2020 onwards
	(4) Direct relevance to AI/Digital Transformation readiness and Project Management
Exclusion Criteria	(1) Conceptual papers lacking empirical data
	(2) Studies focused solely on non-telecom/non-IT domains

First, organizations need to assess their readiness for the adoption of digital transformation [2], [18]. Second, AI requires a specific assessment of readiness factors [19]. Third, the research objectives and "telecom AI project management" context, where AI initiatives are typically implemented as projects and programs within telecom operators, are adhered to.

Methodologically, this study is exploratory, as the research delves into a relatively new area in this context that has not been examined much in Yemen. In exploratory research, the overall design should be flexible to provide the opportunity to consider the different aspects of the problem and allow new dimensions to emerge from the literature [20]. This study's understanding is grounded in a comprehensive review of existing research, which helped create a framework of key areas that influence AI readiness. These theoretical constructs were then used to develop a diagnostic AI readiness framework motivated by the challenges facing Yemeni telecommunications organizations and their project management practices.

The research design is thus carefully aligned with the study's objectives to generate theoretically grounded and practically relevant insights through a structured, conceptually driven synthesis of existing literature rather than through primary data collection. Taken together, these design choices justify the use of a structured literature review for this study. The following section describes the search strategy and source identification.

3.2. Source identification, inclusion criteria, and search strategy

Focusing on conceptual and diagnostic framework development, this review considers two types of sources:

1- Academic researches: (journal articles, and formal research reports).

2- Practical frameworks developed by industry bodies and technology providers.

The inclusion/ exclusion criteria for academic source are listed in Table 1:

To operationalize these criteria, literature review keywords were carefully chosen. A literature review was conducted using keywords such as "AI adoption readiness," "Digital Transformation readiness assessment," "AI in Project management," "Telecom AI readiness," "AI in Telecom project management," and "AI adoption success factor." A literature review was conducted in June-2024. Google Scholar was chosen because it can be used to search for a variety of literature that is appropriate for an exploratory, conceptually driven synthesis [21]. However, exclusive reliance on Google Scholar limits replicability and may miss some studies. This limitation is acknowledged in the limitations section of this paper. The search results were subjected to a two-stage screening process.

1- Title and Abstract screening for initial relevance based on the inclusion criteria.

2- Full-text review of selected articles to extract data points relevant to AI readiness factors [11].

In parallel, practical AI readiness frameworks were identified through targeted web searches on the websites and publications of telecom-relevant industry bodies and global technology providers. The inclusion criteria were that the framework sources must be produced by a globally recognized industry standards body or technology, explicitly address AI readiness, be relevant to the telecom industry, and be recently published. This resulted in six academic sources and four practical frameworks, which together formed the basis for the framework synthesis. The next step was to use these ten sources to construct a conceptual AI-readiness assessment framework.

3.3. Research Framework and Model Development

The methodology employed to construct the AI readiness assessment framework is grounded in a multi-source, drawing on a mixed-method synthesis approach, which aligns with established academic best practices for framework development in applied research. As there is no need to introduce an entirely new framework specifically for AI adoption in the project management domain, the assessment of AI adoption readiness using the produced holistic organization-level assessment framework is sufficient to cover the main drivers and barriers of AI adoption [13]. The established framework proposed in this study as a diagnostic framework that can be used to conceptually assess the AI readiness of Yemeni telecom project management is a contribution to the knowledge body of AI adoption within the telecom industry [2].

The integration of multiple validated frameworks, the use of triangulation between academic and practical sources, and the thematic consolidation of indicators align with design science principles. Furthermore, the

focus on construct validity (via literature synthesis) and contextual relevance (via adaptation to Yemeni CSPs) reflects rigorous adherence to research standards recommended in organizational studies and IS literature [22]. The synergy and combination of theoretical and practical resources boost the richness and depth of research findings. This methodological alignment ensures that the resulting framework is not only academically valid but also practically actionable for evaluating AI adoption in project management in the telecom sector [11].

The figure illustrates the key steps for integrating academic and practical frameworks into a holistic AI readiness framework.

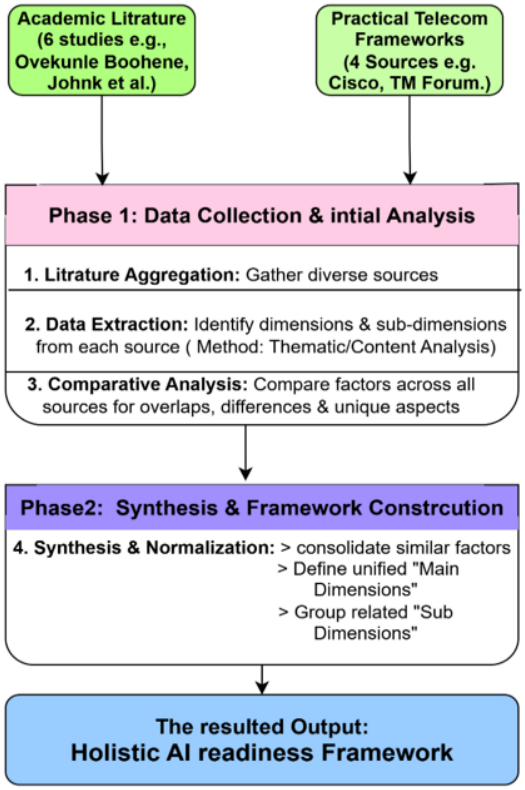

Figure 1. Assessment Framework Construction Methodology

To ground the framework in evidence, the next section summarizes the academic and practical insights that construct it.

3.4. Academic and Practitioner Foundations of the Framework

The development of the holistic AI readiness framework was based on two complementary sources. First, the extraction of AI readiness constructs from six peer-reviewed studies, which covered diverse methodologies, including qualitative interviews [18], [19], theoretical model building [2], hybrid expert-driven analysis [11], and large-scale quantitative validation [2]–quantitative phase. They provide conceptually rich and empirically anchored constructs related to strategy, culture, resources, data, and governance issues.

Second, academic sources were triangulated with four telecom-specific practical frameworks [14–17], which reflect industry-validated indicators and maturity models that reflect real-world AI adoption practices among communication service providers (CSPs) and related organizations. These frameworks are based on large-scale surveys, expert consultations, and industry co-creation and capture how operators and vendors operationalize AI readiness in practice, including strategy, operating model, data, technology, and ecosystem dimensions.

By combining these academic and practitioner sources, this study ensures that the resulting framework is simultaneously theoretically grounded and aligned with how AI readiness is assessed in the global telecom industry. The detailed characteristics of these studies and frameworks are summarized in the literature review section. The following section explains how these sources were systematically coded and synthesized to form the final set of themes using reflexive thematic analysis.

3.5. Data Synthesis / Thematic Analysis Subsection

The data were thematically analyzed following Braun and Clarke's reflexive thematic analysis approach [23], [24]. First, all readiness factors were consolidated into an 80-row dataset (49 from six academic studies and 31 from four practical frameworks) in an Excel file. The dimensions, which contained approximately 54 unique main labels and 80 sub-labels, were heavily focused on organizational factors, especially strategy, culture, leadership, and people/skills. However, a smaller but important group focused on data and technology, and the smallest group covered the external environment.

Subsequently, all 80 rows were coded using the TOE (Technology, Organization, Environment) and PPTD (People, Process, Technology-in-use, Data) frameworks and thematically analyzed following Braun and Clarke's phases. The coding confirmed the initial observation: most dimensions fell under organization, followed by Environment and Technology.

A reflexive, researcher-centered approach was selected, aligning with Braun and Clarke's guidance on reflexive thematic analysis. Depending on the first author's background in telecom engineering and project management, coding and theme development were conducted. Through iterative discussions with the co-authors, the theme boundaries and assumptions were refined. The subsequent reflexive thematic analysis process ensured that the findings were both transparent and informed by professional expertise.

The following tables (Tables 2 and 3) show the TOE and PPTD distributions within the organization:

Using the TOE and PPTD codes, a thematic analysis

Table 2. TOE distribution

TOE category	Meaning	Number of rows
T	Technology	6
O	organization	62
E	Environment	12
Total		**80**

Table 3. PPTD distribution within organization

PPTD category	Meaning	Number of rows
People	People-related factors	25
Process	Process-related factors	15
Technology-in-use	AI in use / operations	7
Data	Data-related factors	15
Total O-rows		**62**

of all 80 data dimensions was conducted. This involved grouping similar codes across academic and practical sources to create nine candidate readiness themes (e.g., strategic vision, leadership, data, technology, and value realization). After refining their definitions for clarity and relevance to telecom project management, a final set of nine coherent themes was established, each traceable back to the original data.

Finally, the nine themes were organized into a holistic AI readiness framework structured by the TOE and PPTD. This framework integrates diverse readiness constructs from both academic studies and practical AI readiness/maturity frameworks into a single, organization-level diagnostic structure that can be applied to assess AI readiness for project management in telecom contexts.

4. RESULTS

4.1. Review Findings

The thematic analysis of the six academic studies and four practical frameworks yielded nine interrelated readiness themes. These themes describe how the literature and practice frameworks conceptualize organizational readiness for AI adoption in project-based telecom environments, as structured by the TOE–PPTD lens. The final themes refined and retained the nine candidate themes identified during the analysis.

1. Strategic AI vision & business alignment (O – Process):

It measures an organization's ability to link its AI vision directly to its telecom business and project objectives (e.g., service quality, network modernization, and customer experience). When this alignment is weak, PMOs run isolated AI pilots with little impact; when strong, AI is fully integrated into project charters, roadmaps, and performance metrics (KPIs) [12], [14], [17], [19].

2. Leadership, culture & change climate (O – People):

Focuses on senior leadership commitment, sponsorship, and cultural attitudes toward AI (curiosity vs. fear, openness vs. rigidity). In telecom project environments, this determines whether sponsors champion the use of AI in PM tools, trust decisions based on data, and actively drive the necessary organizational changes [12–14], [16], [18].

3. Human capital & AI skills (O – People):

This theme addresses the crucial need for AI-relevant skills across all necessary roles, including project managers, engineers, data experts and business stakeholders. For telecom project management, this means having the ability to interpret AI-generated forecasts, knowing how to configure new AI planning tools, and effectively collaborating with specialized data and AI teams. The theme is anchored by workforce and HR readiness dimensions [13], [18] and by Cisco's "Talent" pillar and GSMA training elements [14], [16].

4. Data assets, governance & protection (O – Data):

It captures the extent to which an organization possesses consistent, high-quality, secure, and well-governed data that is ready to train and power AI models. For telecom project management, this specifically means having reliable access to key information, such as project histories, network metrics (KPIs), customer data, and trouble ticket records, all backed by robust governance, privacy, and security protocols. This is well supported by academic "Data," "Data Landscape" [10] and "Data security/privacy" dimensions [18] and by Cisco/TM Forum data and ITU sandbox-validation dimensions [14], [15], [17].

5. Technology & infrastructure backbone (T):

It captures the technical readiness for the large-scale deployment of AI. This involves having the right network and ICT infrastructure, sufficient computing and storage, and the necessary platforms for integration. For telecom Project Managers, this translates into having access to cloud/DC resources, functional network telemetry pipelines, secure connections, and the ability to integrate PM tools with key systems such as OSS and BSS. It draws on ICT capabilities and digital maturity dimensions [2], [12], [13] and on Cisco/ITU infrastructure-readiness indicators [14], [15].

6. AI solutions, lifecycle, and experimentation (O – Technology-in-use):

It addresses the organization's ability to use mature AI solutions in real-world scenarios (such as AI forecasting or Robotic Process Automation (RPA) in workflows). This involves establishing processes for the entire AI lifecycle—development, testing, deployment, and monitoring—plus secure sandboxes for safe experimentation. In telecom project management, this means that AI is actively deployed for tasks such as resource planning,

risk prediction, and service rollout schedule optimization. This theme is grounded in "AI Capabilities," "AI Integration Strategy & Empowerment" [11], [13] and in TM Forum technology/operations, plus ITU's sandbox and developer-ecosystem pillars [15], [17].

7. Organizational processes, governance & project operations (O – Process):

It focuses on governance structures, operating models, and core processes that manage AI adoption, including change management plans, project management (PM) standards, and clear decision rights. For project management in the telecom context, this is crucial for determining how and whether AI outputs are formally integrated into key PM activities, such as gate reviews, risk logs, change control procedures, and benefit tracking. This is supported by Aldoseri's process/system evaluation [11], Machado's "Organization & Governance (Digital Maturity)" [12], Alkhamery's readiness for digital transformation [2], GSMA "Operating Model", Cisco "Governance", and TM Forum operations [14], [16], [17].

8. Value realization & performance impact (O – Process):

It tracks whether AI projects are successfully translating into better business results, specifically improvements in decision quality, productivity, and project performance. In the telecom PMO environment, this means realizing real-world gains, such as reducing delays, making better CAPEX investment choices, resolving faults faster, and highly reliable rollout forecasts. It is mainly driven by Oyekunle and Boohene 's(2024) [18] and Bodea et al. 's(2020) benefit/impact dimensions [13], complemented by practical emphasis on KPIs within strategy/governance pillars.

9. External ecosystem, regulation & partnerships (E):

This theme encompasses all external factors influencing AI adoption: regulatory compliance, legal and ethical constraints, market standards, and relationships with third-party partners (such as vendors, integrators, training firms, and open-source communities). For the telecom sector, this is vital because AI deployment must operate within strict telecom and data protection rules and heavily depend on working with external vendors and adhering to global standards (such as the ITU or GSMA ecosystems). Grounded in Oyekunle and Boohene's regulatory and vendor evaluation factors [18], Aldoseri's vendor evaluations [11], and GSMA/ITU third-party and standards-participation pillars [15], [16]. Each final theme retained the TOE/PPTD assignments stated above (O-People, O-Process, O-Technology-in-use, O-Data, T, E).

Overall, both academic studies and practical frameworks assert strategic alignment, leadership/culture, data governance, and infrastructure. They also capture governance and operating models as key factors for AI adoption. This convergence strengthens the validity of the themes. The academic perspective focuses on organizational culture, dynamic capabilities, and perceived/anticipated benefits [2], [12]. This is useful when considering AI readiness for project management as a strategic organizational capability in telecommunications. Comparatively, the industry perspective focuses on operationalization factors such as AI lifecycle management, sandboxes, developer ecosystems, concrete KPIs, and detailed talent management practices [14], [16]. Practical aspects add depth to conceptual academic themes. The nine identified themes satisfy the need to bridge the gap between human strategy and technical infrastructure. This suggests that AI readiness is a strategic capability where Culture/Strategy is integrated with Data/Infrastructure. Taken together, these nine themes provide a structured conceptual framework for thinking about how telecom organization readiness to use AI in its projects.

4.2. Holistic AI Readiness Framework

In order to operationalize these themes for assessment and future research, Table 4 summarizes the final holistic AI readiness framework, aligning each theme with its TOE and PPTD position, a concise definition, evidence base, and illustrative indicators. In addition, figure 2 visualizes how these nine readiness themes positioned across Technology, Organization (disaggregated into People, Process, Technology-in-use, Data), and Environment.

Table 4. Holistic AI Readiness Framework

NO.	Final theme name	TOE/PPTD (if O)	Definition	Evidence base	Examples
1	Strategic AI vision & business alignment	O/Process	Captures how clearly the organization defines an AI vision and links it to business and project objectives. For telecom PM, this means AI is embedded in portfolios, project charters and KPIs rather than isolated pilots. Strong alignment ensures AI projects support network modernization, service quality and customer experience goals.	Strongly supported by Academic + Practical	"Strategic alignment" [10]; "Digital Strategy & Business Model (Digital Maturity)" [12]; "AI strategy definition & scope" [14]; "Strategy – Portfolio and Ideation" [17].
2	Leadership, culture & change climate	O/People	Reflects leadership sponsorship, digital/AI vision and cultural openness to experimentation and change. In telecom project environments, this determines whether AI-based recommendations are trusted and backed by sponsors, and whether staff feel safe to adapt processes.	Strongly supported by Academic + Practical	"Organizational leadership" [18]; "Organizational Culture and Support" [13]; "Creating a climate for digital transformation" [12]; "Culture" [14].
3	Human capital & AI skills	O/People	Concerns depth and distribution of AI-relevant competences, plus training and talent strategies. For telecom PMOs, this covers project managers, engineers and analysts who can interpret AI outputs, collaborate with data teams and adjust project decisions accordingly.	Strong Academic + Practical convergence	"Workforce skillset and training programs" [18]; "Human Resource Readiness" [13]; "Talent" (Cisco – AI hiring, upskilling, partnerships).

4	Data assets, governance & protection	O/Data	Captures the organization's ability to provide high-quality, well-governed and secure data for AI. In telecom PM, this involves reliable project, network and customer data, with clear governance roles, privacy/security controls and responsible-use policies.	Very strong Academic + Practical	"Data security and privacy concerns" [18]; "Data" / "Data Landscape" [10], [11]; "Data foundation & protection" [14]; "Data Governance" [17].
5	Technology & infrastructure backbone	T/–	The underlying ICT, network and cloud infrastructure needed to deploy and scale AI solutions. For telecom projects, this includes DC/cloud capacity, network telemetry, secure connectivity and integration between OSS/BSS and PM tools.	Supported by Academic + Practical	"ICT capabilities" [2]; "Connectivity & IT Architecture (Digital Maturity)" [12]; "Technological Readiness" [13]; "Infrastructure readiness" [14].
6	AI solutions, lifecycle & experimentation	O/Technology-in-use	The maturity of AI in real use: types of AI solutions deployed, how they are developed, tested, deployed and monitored, and whether sandboxes/pilots support safe experimentation. In telecom PM, this can include AI-powered forecasting, anomaly detection and automated reporting integrated into project workflows.	Academic & Practical	"AI Capabilities" [11]; "AI Integration Strategy & Empowerment" [13]; "Technology – Development and Training" [17]; "Developer ecosystem via opensource / sandboxes" [15].

7	Organizational processes, governance & operations	O/Process	Governance structures and core processes that embed AI into daily decision-making. For telecom projects, this covers PM standards, change control, service lifecycle management and decision rights that ensure AI outputs are used consistently rather than ad hoc.	Academic & Practical	"Current Processes / Existing Systems" [11]; "Organization & Governance (Digital Maturity)" [12]; "Organizational readiness for digital business transformation" [2]; "Operating Model" [16].
8	Value realization & performance impact	O/Process	Focuses on whether AI delivers measurable benefits in productivity, decision quality and project outcomes. In telecom PMOs, this includes better CAPEX targeting, fewer delays and improved service rollout performance, tracked through KPIs and benefit-realization practices.	Mainly Academic & some Practical	"Perceived utility and benefits of AI solutions" [18]; "Anticipated Benefits & Perceived Impact" [13]; "Evaluation of current AI projects, human skills and capabilities" [11].
9	External ecosystem, regulation & partnerships	E/–	Regulatory, legal, standards and partner ecosystem that shapes AI adoption. For telecom, this includes telecom/data-protection rules, standards (e.g., ITU/GSMA), vendor ecosystems and training/research partnerships that can accelerate or constrain AI in projects.	Academic & Practical	"Regulatory environment and compliance requirements" [18]; "Vendor evaluation / existing systems" [11]; "Third-party Ecosystem – selection processes" [16]; "Stakeholders buy-in enabled by standards" [15].

5. DISCUSSION

The first step in an AI-enabled project is to assess the organization's readiness for AI adoption in project management. This study aims to answer the question of the framework that can be deduced from the existing literature review and industry frameworks and can be used to measure telecom organizations readiness for AI adoption in project management. By synthesizing six academic studies and four practical AI readiness frameworks into an 80-item dataset and analyzing them using a TOE–PPTD lens, this study identified nine readiness themes. These themes show that AI readiness for project management in telecoms is not only a technical challenge. However, it is mainly organizational and strategic. AI-in-PM success depends heavily on robust governance structures and the central roles of people, culture, and high-quality data in enabling AI to enhance project outcomes.

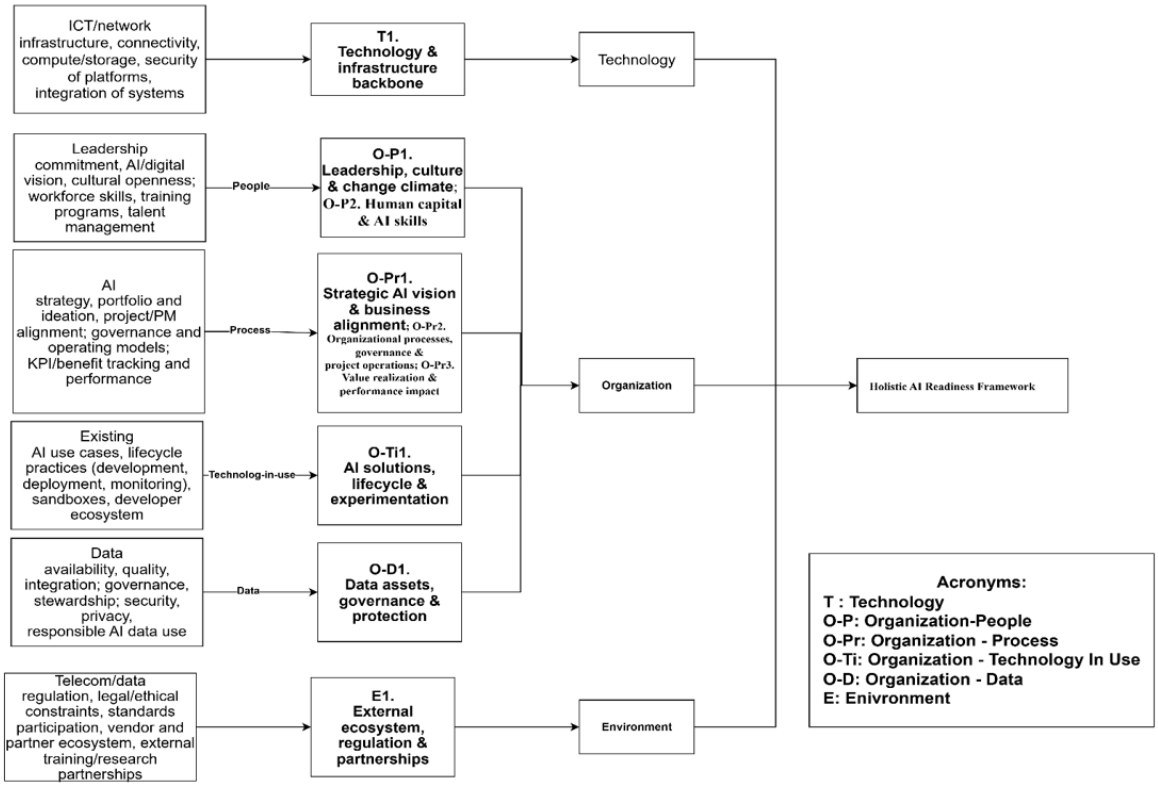

Figure 2. Holistic AI readiness framework through the TOE lens

5.1. Synthesis of key findings

Analyzing the 80 readiness factors, most of the focus is on organizational factors, comparable to less weight given to purely technical infrastructure or external environmental conditions. This pattern coincides with prior studies, confirming that success relies heavily on strategic alignment, leadership, and a flexible culture in which the human elements are needed for successful technology adoption [2], [18], [19]. In the present framework, three clusters stand out as particularly important.

First, strategic AI vision and business alignment, leadership, culture and change climate, and human capital and AI skills form a tightly coupled “people and leadership” core. It is important that AI consideration within the telecom organization strategy aligns with the business vision. This cannot be granted unless leadership support is ensured. Leadership support can be motivated by an innovative organizational culture and flexible change management within the organization. Conversely, strong leadership support ensures a supportive organizational culture and effective change management. Collectively, they suggest that AI readiness in project-based telecom organizations is less about technical pilots and more about embedding AI within strategic roadmaps, PMO portfolios, and day-to-day project decision-making.

Second, data assets, governance and protection, and technology and infrastructure backbone form the “enabling substrate” for AI. Considering that AI is all about data, reliable, accessible, and governed data is an intrinsic readiness factor. Telecom organization project management should assess their data assets supported by adequate computing, storage, and integration platforms. Feeding AI models with accurate and well-organized data through supported infrastructure ensures successful AI-enabled PM. Without these foundations, even well-designed AI use cases remain theoretical.

Third, AI solutions, lifecycle and experimentation, organizational processes, governance and project operations, and value realization and performance impact connect AI capabilities to project operations and outcomes. Both academic and practical resources emphasize that telecom organizations must establish processes for AI-PM solution selection, testing, deployment, and monitoring, and adjust project governance to incorporate AI outputs. Before and after comparisons must be established to measure whether AI actually improves performance metrics. This is supported by findings from project management and digital transformation studies that show that benefits realization, change management, and governance are critical to translating innovation into measurable value [12], [13].

Finally, external ecosystems, regulation, and partnerships confirm that AI readiness in telecoms is intrinsically embedded in a wider regulatory, vendor, and standards environment.

Telecom organizations are controlled by global and national regulations and laws. They must comply with data protection and sector-specific rules and rely on vendors and global standards bodies (such as the GSMA) for the

necessary platforms and best practices. In other words, AI readiness can be achieved by balancing a company's internal capabilities with external regulations.

5.2. Relationship to existing AI readiness and digital transformation frameworks

The present framework corroborates previous studies and practical frameworks' findings but makes two important extensions.

First, the combination of academic studies with telecom practical frameworks [14–17] explains how AI readiness is measured in both theoretical and practical aspects. This allows us to focus on common areas, such as the importance of strategy, leadership, skills, data, and governance, and also to reveal where practical frameworks emphasize operational aspects more strongly than academic studies (e.g., lifecycle management, operating model, ecosystem management).

Second, the use of a hybrid TOE-PPTD lens shifts the focus of AI readiness specifically to how AI will be used in project-based organizational work. Essentially, this combined framework helps project managers and leaders to first move beyond technology assessment and second conduct an operational readiness. Instead of merely checking whether the company has the right infrastructure, the framework ensures that readiness is measured by how AI will be integrated into the processes and managed by the people who are doing projects. Moreover, it forces the organization to evaluate AI within the real-world context of project execution and address specific challenges such as resource allocation, risk management, and schedule optimization. This approach makes the assessment of AI readiness far more actionable and relevant for improving the outcomes of projects.

Thus, this study bridges the gap between generic AI readiness models and practical telecom maturity frameworks. We translate these into a project-management-oriented structure that telecom operators can use to assess and plan for AI adoption in their project portfolios.

5.3. Implications for telecom project management practice

For telecom operators and their Project Management Offices (PMOs), these nine key themes offer a structured diagnostic checklist that can be used to conceptually assess AI readiness at the organizational level and specifically within their project governance structures.

• Strategic AI vision and business alignment imply that AI in PM use-case should be embedded into the organization's project management process, such as portfolio selection, business case development, and prioritization processes. PMO should establish a comprehensive method to trace how AI adoption within the organization supports strategic objectives.

• Leadership, culture and change management, and human capital and AI skills ensure the need for specific capability building. This includes building AI skills training across the organization's human resources. In addition, an innovative culture with cross-functional team building that includes PMs, engineers, and data professionals should be established. Moreover, defining clear sponsorship roles for AI initiatives within project governance structures is essential.

• Data assets, governance and protection, and technology and infrastructure backbone confirm the importance of data and architecture in AI conceptual readiness assessment. Telecom PMOs and IT teams must collaborate to ensure that AI data and infrastructure are ready and that AI-PM tools are integrated with the organization's existing systems.

AI solutions, lifecycle and experimentation, and organizational processes, governance, and project operations suggest that AI-specific activities should be incorporated into the existing organization project management process and governance. For instance, AI-related checks on project charters, adding AI models in change management processes, and defining how AI recommendations are documented and adopted in decision-making.

• Value realization and performance impact emphasize that Telecom PMOs should define KPIs for AI use cases and measure whether AI projects actually improve project and business performance.

• External ecosystem, regulation, and partnerships stress global and national telecom regulations, laws, and standards compliance. Telecom organizations must rigorously ensure that they meet all sector-specific regulations and strict data protection laws. They must also align their efforts with relevant AI and telecom industry standards. Moreover, they need to shift to strategic sourcing, in which they must prioritize building long-term partnerships for AI platforms and services.

Ultimately, these findings show that AI readiness in telecom project management is an organizational capability that spans strategy, governance, people, data, infrastructure, and ecosystem management. Therefore, the framework provides PMO and senior managers with a clear, structured diagnostic method to identify exactly where they are falling short and plan concrete steps to fix those gaps.

5.4. Implications for research

Beyond practice, the resulting framework suggests several possibilities for future research. First, it offers a comprehensive conceptual framework for telecom organizations to diagnose their readiness for AI-enabled PM. The framework is grounded in both academic and practical evidence. The findings can be applied to create useful tools such as design surveys, maturity models,

or audit tools that measure project-based AI readiness according to these nine themes and their specific indicators; however, such instruments are outside the scope of this paper.

Second, the TOE–PPTD lens provides an opportunity for comparative studies across sectors and regions. Future research could explore the applicability of the nine themes to other project domains. A comparative analysis between first-world telecom operators' PM AI readiness and developing countries would be valuable. Such an analysis would generate benchmarked results, where regulatory, infrastructure, and skills constraints are different.

Third, the framework focuses on organizational factors (people, culture, and data), highlighting the need for future research to explore project governance, change management, and organizational learning literature more systematically. These studies should examine how organizations evolve across these readiness factors, how AI is integrated into project work, and how success or failure influences their perception of readiness over time.

Finally, in telecom sectors like Yemen's or those facing similar challenges, the framework provides an essential foundation for future empirical studies. This means that the framework can be used to assess readiness, identify gaps, and design and test focused solutions to close the identified gaps. This practical, evidence-based research would help validate and refine the framework itself, as well as, offer well-established, data-driven guidance. Such guidance would benefit both national AI adoption policies and individual organizational strategies within project-based telecommunications environments.

6. CONCLUSION

This review set out to derive a holistic framework from both practical and academic resources that can be used to measure telecom organizations' readiness to adopt AI in their PM. The fast pace of change in the telecom industry increases the pressure on telecom operators to utilize AI in their project management. Understanding organizational readiness is crucial for successful AI-enabled project management.

The study used a structured narrative review and a framework development design to synthesize existing knowledge. This process involved bringing together findings from six peer-reviewed academic studies and four practical AI readiness and maturity frameworks (from industry bodies). Such findings were used to create a dataset by combining all these sources into a comprehensive 80-item dataset of specific AI readiness indicators. These indicators were coded using a hybrid TOE–PPTD lens, then thematically analyzed them to result nine readiness themes: strategic AI vision and business alignment; leadership, culture and change climate; human capital and AI skills; data assets, governance and protection; technology and infrastructure backbone; AI solutions, lifecycle and experimentation; organizational processes, governance and project operations; value realization and performance impact; and external ecosystem, regulation and partnerships. These themes were organized to create a holistic AI readiness assessment framework in the context of telecom project management.

This review makes three main contributions. Theoretically, it integrates fragmented academic work with telecom-practical frameworks into a holistic AI readiness assessment framework structured by the TOE and PPTD. This effort successfully shifts the concept of AI readiness away from being a general organizational idea and makes it a practical and project-management-focused view. This new perspective highlights the intrinsic roles of people, processes, technology, and data in AI-enabled projects. Practically, the resulting framework provides telecom companies and their PMOs with a diagnostic tool to reflect on their current readiness to adopt AI in project management. They can then easily identify specific weaknesses across the nine themes, identify the gaps, and plan improvements in areas such as leadership, skills, data governance, infrastructure, lifecycle management, and ecosystem engagement.

However, this study has several limitations concerning the sources used, search strategy, and restriction to English-language publications. First, the literature search relied on Google Scholar and a set of practical frameworks that are suitable for exploratory and conceptual reviews. However, it missed the inclusiveness of systematic searches in databases such as Scopus, Web of Science, and IEEE Xplore. Therefore, some relevant studies may have been missed. Second, as no primary data were collected through the framework establishment, the resulting framework is conceptual and has not yet been empirically proven. Therefore, future research is needed to validate and refine the framework through empirical studies of telecom organizations. Furthermore, its applicability in other sectors and regions should be explored.

Despite these limitations, this study offers a comprehensive and relevant view of what a telecom company needs to achieve to be ready to use AI in its project management. By combining academic research and industry practice into one structured framework, this study provides both researchers and working professionals with a clearer foundation for analyzing, measuring, and ultimately improving AI readiness. This is helpful in project-based telecom environments, including those operating in challenging or developing countries.

REFERENCES

[1] G. Dimcheva, "Opportunities for application of artificial intelligence in telecommunication projects," in *EEPES 2024*, MDPI, Aug. 2024, p. 18. DOI: 10.3390/engproc2024070018.

[2] N. Alkhamery, F. Zainol, and M. Al-Nashmi, "The role of dynamic capabilities in improving readiness for digital business transformation," *J. Manag. Theory Pract. (JMTP)*, vol. 2, Jan. 2021. DOI: 10.37231/jmtp.2021.2.1.59.

[3] European Parliament. Directorate General for Parliamentary Research Services, *Artificial Intelligence: How Does It Work, Why Does It Matter, and What We Can Do About It?* Luxembourg: Publications Office of the European Union, 2020, Accessed: 2025-05-03. [Online]. Available: https://data.europa.eu/doi/10.2861/44572.

[4] M. J. Karamthulla, A. Tadimarri, R. Tillu, and M. Muthusubramanian, "Navigating the future: Ai-driven project management in the digital era," *Int. J. Multidiscip. Res.*, vol. 6, Mar. 2024.

[5] B. L. Pasian and N. L. Williams, *De Gruyter Handbook of Responsible Project Management*. Walter de Gruyter GmbH & Co KG, 2023.

[6] H. Chen, "Success factors impacting artificial intelligence adoption — perspective from the telecom industry in china," Ph.D. dissertation, Old Dominion University, 2019. DOI: 10.25777/A8Q8-GM13.

[7] E. Felten, M. Raj, and R. Seamans, "Occupational, industry, and geographic exposure to artificial intelligence: A novel dataset and its potential uses," *Strateg. Manag. J.*, vol. 42, Apr. 2021. DOI: 10.1002/smj.3286.

[8] I. Taboada, A. Daneshpajouh, N. Toledo, and T. de Vass, "Artificial intelligence enabled project management: A systematic literature review," *Appl. Sci.*, vol. 13, no. 8, Jan. 2023. DOI: 10.3390/app13085014.

[9] The World Bank, Salience Consulting, and AP Telecom, "Pre-feasibility study for international broadband redundancy options for yemen," The World Bank, Technical Report, 2023.

[10] A. Belharet et al., "Report on the impact of artificial intelligence on project management," *SSRN Electron. J.*, 2020. DOI: 10.2139/ssrn.3660689.

[11] A. Aldoseri, K. N. Al-Khalifa, and A. M. Hamouda, "Methodological approach to assessing the current state of organizations for ai-based digital transformation," *Appl. Syst. Innov.*, vol. 7, no. 1, p. 14, Feb. 2024. DOI: 10.3390/asi7010014.

[12] C. G. Machado, P. Almström, A. E. Öberg, M. Kurdve, and S. Y. Almashalah, "Maturity framework enabling organizational digital readiness," in *Advances in Transdisciplinary Engineering*, K. Säfsten and F. Elgh, Eds., IOS Press, 2020. DOI: 10.3233/ATDE200204.

[13] C. Bodea, D. Ronggui, O. Stanciu, and C. Mitea, "Artificial intelligence impact in project management," IPMA and PwC, Tech. Rep., 2020. [Online]. Available: https://ipma.world/app/uploads/2020/11/IPMA_PwC_AI_Impact_in_PM_-_the_Survey_Report.pdf.

[14] Cisco Systems, Inc., "Cisco ai readiness index," Cisco, Tech. Rep., 2024, Accessed: 2025-05-10. [Online]. Available: https://www.cisco.com/c/m/en_us/solutions/ai/readiness-index.html.

[15] International Telecommunication Union, "Ai ready – analysis towards a standardized readiness framework," International Telecommunication Union, Tech. Rep., version 1.0, Sep. 2024, p. 63.

[16] GSMA, "The gsma responsible ai maturity roadmap," GSMA, Tech. Rep., 2024, Accessed: 2025-05-10. [Online]. Available: https://www.gsma.com/solutions-and-impact/connectivity-for-good/external-affairs/wp-content/uploads/2024/09/GSMA-ai4i_The-GSMA-Responsible-AI-Maturity-Roadmap_v8.pdf.

[17] TM Forum, "Gb1003a ai maturity model v3.0.0," TM Forum, Tech. Rep., 2024, Accessed: 2025-05-10. [Online]. Available: https://www.tmforum.org/resources/best-practice/gb1003a-ai-maturity-model-v3-0-0/.

[18] D. Oyekunle and D. Boohene, "Digital transformation potential: The role of artificial intelligence in business," *Int. J. Prof. Bus. Rev.*, vol. 9, no. 3, e04499, Mar. 2024. DOI: 10.26668/businessreview/2024.v9i3.4499.

[19] J. Jöhnk, M. Weißert, and K. Wyrtki, "Ready or not, ai comes—an interview study of organizational ai readiness factors," *Bus. & Inf. Syst. Eng.*, vol. 63, pp. 1–16, Feb. 2021. DOI: 10.1007/s12599-020-00676-7.

[20] C. R. Kothari, *Research Methodology: Methods and Techniques*, 2nd. Daryaganj: New Age International, 2004.

[21] Systematic Review Librarian, *Databases for systematic reviews and comprehensive reviews*, Accessed: 2025-05-17, 2025. [Online]. Available: https://systematicreviewlibrarian.com/databases/.

[22] S. Gregor and A. R. Hevner, "Positioning and presenting design science research for maximum impact," *MIS Q.*, vol. 37, no. 2, pp. 337–355, 2013.

[23] S. K. Ahmed et al., "Using thematic analysis in qualitative research," *J. Medical, Surg. Public Health*, vol. 6, p. 100 198, Aug. 2025. DOI: 10.1016/j.glmedi.2025.100198.

[24] M. Naeem, W. Ozuem, K. Howell, and S. Ranfagni, "A step-by-step process of thematic analysis to develop a conceptual model in qualitative research," *Int. J. Qual. Methods*, vol. 22, p. 16 094 069 231 205 789, Oct. 2023. DOI: 10.1177/16094069231205789.