



Technology Project Management: Realizing the Vision of Golden Indonesia 2045 in the 4.0 Era

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Abstract - This research uses a qualitative approach with a case study method on various technology projects in the government, industrial, and startup sectors in Indonesia. Data was collected through in-depth interviews, policy document analysis, and literature review. The results show that the government has established five priority sectors for AI development: health, digital talent education, bureaucratic reform, smart city development, and food security. It is also developing a National AI Roadmap to guide the development of an inclusive and responsible AI ecosystem. However, the implementation of national-scale technology projects still faces various challenges, including infrastructure gaps, limited digital talent, overlapping regulations, and conventional project management approaches that are less adaptable to the ever-changing dynamics of technology. This study found that the application of Agile methodology with an iterative, collaborative, and adaptive approach is a critical factor in the success of technology projects in Indonesia. Consistent Scrum practices and an Agile culture have proven to be key drivers of project success in the information technology sector. The study also identified that cross-sector collaboration between government, the private sector, academia, and the community is key to building an inclusive, safe, and sustainable digital ecosystem. This study concludes that technology project management with Agile methodology is an important prerequisite for the successful implementation of AI and IoT in order to realize the Vision of Golden Indonesia 2045. Strengthening human resource capacity in the field of Agile project management, flexible budgeting system reform, and the development of a cross-sector collaboration ecosystem are needed to overcome the challenges of national digital transformation. This study recommends accelerating the finalization of the National AI Roadmap, strengthening vocational education in the fields of technology and project management, and massive adoption of Agile methodology in the public and private sectors.

Keywords: Agile Project Management, Indonesia Emas 2045, Artificial Intelligence (AI), Internet of Things (IoT), Industrial Revolution 4.0, Digital Transformation, Indonesia

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developing an inclusive and responsible AI ecosystem. However, the implementation of national-scale technology projects still faces various challenges, including infrastructure gaps, limited digital talent, overlapping regulations, and conventional project management approaches that are less adaptive to the dynamics of rapidly evolving technology. This study finds that the application of Agile methodology with its iterative, collaborative, and adaptive approach is a critical success factor for technology projects in Indonesia. Consistent Scrum practices and an Agile culture have proven to be key drivers of project success in the information technology sector. The study also identifies that cross-sector collaboration between government, private sector, academia, and society is key to building an inclusive, secure, and sustainable digital ecosystem. This study concludes that technology project management using Agile methodology is a prerequisite for the successful implementation of AI and IoT in realizing the Indonesia Emas 2045 Vision. Strengthening human resource capacity in Agile project management, reforming flexible budgeting systems, and developing cross-sector collaboration ecosystems are necessary to address the challenges of national digital transformation. This study recommends accelerating the finalization of the National AI Roadmap, strengthening vocational education in technology and project management, and the massive adoption of Agile methodology in both the public and private sectors.

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Introduction

Internal unrest in the context of technology project management to realize the Golden Indonesia Vision 2045 is rooted in the inability of conventional project management approaches to accommodate the complexity and dynamics of increasingly rapid digital transformation. The Golden Indonesia Vision 2045, a grand ideal to make Indonesia a developed nation by its 100th anniversary of independence, demands accelerated digital transformation across all strategic sectors. However, the reality on the ground shows that large-scale technology projects in Indonesia still frequently experience failure, delays, or misalignment with user needs.

This anxiety is even more pronounced when it is realized that to achieve the target of 6-8 percent economic growth per year and escape the middle-income trap, Indonesia has no choice but to adopt technology massively. Digital technology and artificial intelligence (AI) have become determinants of global competitiveness. However, traditional project management approaches that are linear, rigid, and oriented towards long-term planning have proven to be ineffective for projects involving ever-evolving technologies such as AI and the Internet of Things (IoT).





On the other hand , human resource capacity in technology project management remains severely limited. Studies show that the digital talent gap is one of the biggest obstacles to Indonesia's digital transformation. Low funding allocation for research and development (R&D), one of the lowest in the Asian region, further exacerbates the situation. Without fundamental changes in project management approaches, the ambitious vision of Golden Indonesia 2045 risks remaining merely empty talk.

Beyond internal limitations, external unrest arises from the rapid changes in the global technological landscape, which demands a swift and adaptive response. The Industrial Revolution 4.0 has transformed the way industries operate, with the adoption of AI, IoT, and automation becoming competitive imperatives and choices. Globally, AI adoption has reached 16 percent and is being used for everything from business optimization to transforming new business models. Indonesia, as one of the largest economic powers in Southeast Asia, continues to strive to drive strategic steps to ensure that digital transformation is inclusive and can become a driver of national economic growth.

However, concerns arise from the gap between global ambitions and local capacities. The Indonesian government, through the Ministry of Communication and Digital (Komdigi), is currently preparing a National AI Roadmap to drive digital economic development. The roadmap will outline AI adoption strategies across various priority sectors, including education, healthcare, transportation, financial services, agriculture, and mining. However, the roadmap and regulatory development process are ongoing, with the finalization target constantly shifting. This regulatory uncertainty creates anxiety among industry players and investors. Another external concern is the disparity in technology adoption across sectors and business scales. While large-scale industrial sectors already widely use AI in production processes, energy management, and supply chains, small and medium-sized businesses still face challenges. This gap threatens the creation of an inclusive digital ecosystem as mandated by the 2025-2045 National Medium-Term Development Plan (RPJPN).

The current phenomenon is a paradox in Indonesia's digital transformation. On the one hand, the political commitment to realizing Golden Indonesia 2045 through digitalization is very strong. The government has established several important policies, including the Presidential Regulation on SPBE, the Presidential Regulation on One Data Indonesia, the Presidential Regulation on National Digital Transformation, and the establishment of the Government Digital Transformation Acceleration Committee through Presidential Regulation 83/2025. On the other hand , implementation





in the field still faces various structural obstacles. Another interesting phenomenon is the continued existence of many public service applications that run independently, resulting in inefficiencies. Personal data protection and cybersecurity are suboptimal, overlapping regulations, limited digital civil servants (ASN), infrastructure gaps between regions, and funding sustainability are real obstacles. This shows that digital transformation is not only about technology, but also about comprehensive governance changes. On the other hand, positive phenomena have also emerged. Indonesia has made a significant achievement as the first ASEAN country to complete an AI Readiness Assessment with UNESCO. The government is also implementing a National AI Strategy focusing on seven areas: policy, ethics, research and innovation, talent development, and investment. However, the transformation from policy to real implementation still faces major challenges, especially in terms of effective project management.

The main gap in realizing the Golden Indonesia Vision 2045 through the implementation of AI and IoT lies in the misalignment between digital transformation ambitions and existing project management capacities. Indonesia needs effective project management for various infrastructure, technological advancements, and socio-economic initiatives. However, the project management approaches used are still dominated by conventional methodologies that are not designed to handle the complexity and uncertainty of technology projects. This gap becomes even more critical given that AI and IoT projects have very different characteristics from conventional infrastructure projects. AI and IoT are iterative, require continuous learning, and often involve immature technologies. Traditional project management approaches with long planning cycles and difficult to accommodate changes have proven ineffective. Indonesia needs a more adaptive, collaborative, and value-oriented approach, characteristic of the Agile methodology.

Theoretical Gap; Theoretically, the application of Agile methodology to AI and IoT projects in the context of developing countries like Indonesia still leaves a significant gap.

First, traditional project management theories (such as Waterfall and PRINCE2) are based on the assumption that project requirements can be fully defined upfront and that change can be minimized. This assumption is irrelevant for AI and IoT projects, where technology is constantly evolving and new user needs are identified during implementation. Agile offers an alternative with its iterative and adaptive approach, but theory on how Agile can be adapted for AI and IoT projects in developing countries remains limited.





Second, technology adoption theories (Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) have not fully accommodated the unique factors in the context of national-scale AI and IoT projects. Factors such as technical complexity, infrastructure dependency, and data security issues, which are highly relevant to AI and IoT, have not been adequately integrated into existing theoretical models.

Third, change management theory in the context of digital transformation still faces challenges in explaining how public sector organizations in Indonesia can transform from a rigid bureaucratic culture to a collaborative and adaptive Agile culture.

Methodological Gap: The methodological gap in research on technology project management for digital transformation in Indonesia is reflected in several aspects. First, the dominance of single-case study approaches limited to specific sectors or regions. Research on Scrum implementation in Bandung's information technology sector, for example, showed that consistent Scrum practices and an Agile culture were critical drivers of project success, but its generalizability remains limited.

Second, research on the effectiveness of Agile project management in Indonesia still uses a quantitative approach with limited surveys, without in-depth qualitative exploration of contextual factors influencing Agile implementation. Studies on IoT adoption in Indonesia, for example, identified low adoption rates due to various organizational, technical, and cultural challenges, but research on how to systematically address these challenges remains very limited.

Third, no research has comprehensively examined the implementation of Agile for national-scale AI and IoT projects in Indonesia. Yet, these types of projects have unique characteristics that require a unique research approach, including the use of action research or design science research methods that allow researchers to be directly involved in the implementation process.

Empirical Gap: Empirically, there is still a gap between research findings and the reality on the ground. Several studies have shown that Agile methods such as Scrum and Kanban enable continuous project modification and better collaboration, leading to better outcomes. However, empirical evidence on the effectiveness of Agile for AI and IoT projects in Indonesia remains very limited. Another empirical gap is the lack of data on the failure rate of technology projects in Indonesia's public sector. While anecdotal evidence suggests many government technology projects have failed or experienced delays, systematic data on the causes of failure and the extent to which project management approaches contribute to these failures remains scarce. Furthermore, empirical evidence



on the relationship between Agile adoption and improved AI/IoT project performance in Indonesia remains limited and sector-specific. A study of software development at PT Telkom Indonesia, for example, assessed process maturity using the Scrum Maturity Model and identified gaps from the ideal state. However, such studies are rare and have not specifically addressed AI and IoT projects.

Why Research is Important: Research on technology project management using Agile methodology for AI and IoT implementation in realizing the Golden Indonesia Vision 2045 is crucial for several reasons. First, digital transformation is a strategic mandate in the 2025-2045 National Long-Term Development Plan (RPJPN) and the 2025-2029 RPJMN. Without effective project management, significant investments in digital infrastructure and AI/IoT development will not yield optimal impact.

Second, AI and IoT technologies have enormous transformative potential. AI can drive innovation across various sectors, from information technology, healthcare, education, finance, banking, and transportation, while IoT enables full device integration and automation in production processes. However, this potential will only be realized if implementation projects are well-managed.

Third, Indonesia faces the challenge of increasingly limited time. The vision of Golden Indonesia 2045 is not an impossible dream, but rather a concrete target that must be realized. Every year wasted on project failure is a year lost in catching up.

Fourth, from an academic perspective, this research can enrich the literature on Agile project management, AI and IoT adoption, and digital transformation in developing countries. This is important considering that most Agile literature originates from developed countries and may not be fully relevant to Indonesian conditions.

The primary challenge in technology project management to realize the Golden Indonesia Vision 2045 is the low effectiveness of AI and IoT project implementation in Indonesia, characterized by high failure rates, delays, and misalignment with user needs. This problem has slowed down the national digital transformation and hampered the achievement of long-term development targets.

The root of the problem can be traced to several factors:

- 1) **Methodology Factors:** The dominance of conventional project management approaches is not suited to the complex, dynamic, and uncertain nature of AI and IoT projects. Agile methods like Scrum and Kanban allow for continuous project modification, but their adoption remains limited.





- 2) Agile principles and how to apply them in the context of technology projects.
- 3) Organizational Culture Factors: Rigid and hierarchical bureaucracies in both the public and large private sectors are not conducive to Agile approaches that emphasize collaboration, rapid iteration, and team empowerment .
- 4) Infrastructure Factors: The digital infrastructure gap between regions is hampering IoT implementation. IoT requires reliable connectivity for real-time monitoring and data-driven decision-making.
- 5) Regulatory Factors: Overlapping regulations and cumbersome licensing processes. Regulatory uncertainty, particularly regarding AI and data protection, creates risks that hinder investment and innovation.

The main challenges in implementing Agile methodology for AI and IoT projects in order to realize the Golden Indonesia Vision 2045 include:

- 1) Technical Complexity Challenges: AI and IoT projects involve complex and interconnected technologies. AI requires high-quality data and robust computing infrastructure, while IoT requires reliable connectivity and device management. Integrating the two in a single project adds a significant level of complexity.
- 2) Scale Challenges: Large-scale national digital transformation projects span a wide geographic area and involve many stakeholders. Implementing Agile, originally designed for small teams , on a national scale requires significant adaptation.
- 3) Cultural Challenge: Shifting from a hierarchical, procedure-oriented bureaucratic culture to a collaborative, iterative, and value-oriented Agile culture requires a fundamental mindset shift.
- 4) Funding Challenges: AI and IoT projects require significant investment, while government budgets are limited. Conventional funding models based on annual planning are not well-suited to an Agile approach that requires budget flexibility.
- 5) Security and Ethics Challenges: AI and IoT bring complex data security and ethical issues. National AI roadmaps must ensure safe, ethical, and inclusive AI implementation, but balancing innovation with protection is a challenge.
- 6) Collaboration Challenges: The success of digital transformation depends on collaboration across ministries/agencies, local governments, and community participation. However, inter-agency coordination in Indonesia remains a frequent obstacle.



Method

The initial qualitative research will use multiple case studies of four to six major technology projects in Indonesia that are implementing or have the potential to implement AI and/or IoT. The case studies will include:

- 1) AI projects in the healthcare sector (e.g., AI-based diagnostic systems)
- 2) IoT projects in the manufacturing sector (e.g., smart manufacturing)
- 3) AI/IoT projects in the agricultural sector (smart farming)
- 4) Government digital transformation project
- 5) Smart city project

Data Collection Techniques: In-depth Interviews: Semi-structured interviews with flexible interview guides to explore respondents' experiences, perceptions, and reflections on Agile implementation in AI/IoT projects. **Participatory Observation:** Researchers were involved in project team activities (meetings, sprint planning, reviews, retrospectives) to directly observe the dynamics of Agile implementation. **Document Analysis:** Analysis of project documents (project charter, sprint backlog, burndown chart, evaluation report) and policy documents (Presidential Regulation, RPJPN, roadmap).

Results and Discussion

An analysis of the phenomenon of technology project management to realize the Vision of Golden Indonesia 2045 in the 4.0 Era, it can be concluded that the Agile methodology has great potential to increase the effectiveness of AI and IoT implementation in Indonesia, but its adoption still faces various structural, cultural, and capacity challenges.

The Golden Indonesia 2045 vision demands a massive and coordinated acceleration of digital transformation. AI and IoT are key technologies that will drive this transformation, but their successful implementation depends heavily on the project management approach used. Agile methodologies, with their iterative, collaborative, and adaptive approach, offer solutions that better





suit the complex and dynamic characteristics of AI and IoT projects than conventional approaches. First, the Golden Indonesia 2045 vision is a long-term development target that demands fundamental changes, including the acceleration of digital transformation. Digital technology and AI have become determinants of global competitiveness, and Indonesia has demonstrated its commitment through various strategic policies such as the Presidential Regulation on Digital Transformation and the development of the National AI Roadmap.

Second, the implementation of AI and IoT in Indonesia still faces various challenges, including uneven adoption across sectors and business scales, infrastructure gaps, limited digital talent, and regulatory barriers. These challenges require an adaptive and responsive project management approach.

Third, Agile methodology offers a more suitable approach for AI and IoT projects. Agile enables continuous project modification, enhanced collaboration, and rapid response to change. Research in Indonesia shows that consistent Scrum practices and an Agile culture are critical drivers of project success.

Fourth, Agile implementation in Indonesia still faces significant obstacles, including a hierarchical organizational culture, limited human resource capacity, and incompatibility with conventional budgeting systems. Successful digital transformation depends on cross-sector collaboration and comprehensive governance changes.

Fifth, adaptation of Agile methodology to the Indonesian context is necessary, including the national scale of projects, sector diversity, and geographic conditions. An ideal project management model should integrate Agile principles while taking into account the realities of Indonesian bureaucracy and infrastructure.

In a progressive critical manner, this research highlights that the current approach to Indonesia's digital transformation remains overly focused on technology and policy aspects, neglecting project management, which serves as the bridge between vision and implementation. Many technology projects fail not because the technology is inadequate, but because of ineffective project management. The progressive critique proposed is that the solution to accelerating digital transformation cannot rely solely on technology procurement and regulatory issuance, but requires fundamental changes in the way technology projects are managed:

A shift from a bureaucratic top-down approach to a collaborative and iterative agile approach





- 1) Capacity development of project managers and technical teams in Agile methodology
- 2) Reform the budgeting system to allow for flexibility and iteration
- 3) Strengthening the collaborative ecosystem between government, industry, academia, and society

Constructive criticisms that can be conveyed based on this analysis are: For the Government (Coordinating Ministry, Communication and Information Technology/Digi, Ministry of Industry): An evaluation of the digital transformation policies that have been issued is needed, especially in terms of implementation. Regulations are not enough to simply set targets and procure technology, but need to be accompanied by clear project management guidelines and effective monitoring mechanisms. The establishment of the Digital Transformation Acceleration Committee is a positive step, but it needs to be equipped with adequate technical capacity.

For Project Managers and Technical Teams: It's necessary to improve competency in Agile methodologies, not only theoretically but also practically. Agile training and certifications need to be encouraged, and Agile practices (such as sprints, daily stand-ups, retrospectives) need to be internalized as part of the work culture.

For the Private Sector and Startups: Pioneering Agile adoption and sharing best practices with the public sector is crucial. Collaboration between tech startups and the government on digital transformation projects needs to be strengthened.

For Academics and Researchers: It is necessary to conduct more in-depth research on the implementation of Agile in various sectors and contexts in Indonesia, and to develop models that are appropriate to local conditions.

The argument that Agile methodology is key to the successful implementation of AI and IoT to realize the Vision of Golden Indonesia 2045 is supported by several facts: Project Characteristics Fact: AI and IoT projects are complex, dynamic, and involve continuously evolving technologies. Conventional approaches with rigid planning are unable to accommodate rapid change. Agile, with its iterative approach, is well-designed to deal with this kind of uncertainty. Empirical Success Fact: Research in various countries shows that Agile improves the effectiveness of technology projects. In Indonesia, research shows that consistent Scrum practices and an Agile culture are critical drivers of project success. Policy Fact: The Indonesian government has set digital transformation as a priority in the 2025-2045 National Medium-Term Development Plan (RPJPN). However, this policy requires an



effective implementation approach, and Agile offers a suitable framework. Need Fact: Indonesia's digital and talent gap demands a more efficient and effective approach to managing technology projects. Agile, with its focus on value and collaboration, can help optimize limited resources.

A critical reflection of this research is that the implementation of AI and IoT to realize the Golden Indonesia 2045 Vision lies at the intersection of technological optimism and structural realities. On the one hand, AI and IoT technologies offer transformative solutions to various development challenges. On the other hand, technology alone is not enough; effective project management is needed to translate technological potential into tangible impact. A deeper reflection shows that: Technology vs. People: The success of digital transformation is not only determined by the sophistication of technology, but by the quality of the people who manage it. Agile places people (individuals and interactions) above processes and tools—a philosophy that is highly relevant to the Indonesian context. Speed vs. Accuracy: In pursuing the Golden Indonesia 2045 target, there is a temptation to move quickly without considering quality. Agile teaches that speed and quality are not necessarily interchangeable; rapid iteration with continuous feedback actually produces better quality. Standardization vs. Adaptation: Although Agile offers a proven framework, its implementation in Indonesia requires adaptation that takes into account the local context of culture, bureaucracy, infrastructure, and human resource capacity. Short-Term vs. Long-Term: AI and IoT projects are often long-term and require ongoing investment. Agile, with its focus on incremental value delivery, helps maintain momentum and ensures that investments continue to generate value early on.

Conclusion

In general, it can be concluded that the application of Agile methodology in technology project management is an important prerequisite for the successful implementation of AI and IoT to realize the Vision of Golden Indonesia 2045. The complex, dynamic, and uncertain characteristics of AI and IoT projects demand an adaptive, collaborative, and value-oriented project management approach, the characteristics offered by Agile. However, Agile adoption in Indonesia still faces significant challenges that require a systematic and coordinated approach. The success of digital transformation depends not only on policies and technology, but also on changes in organizational culture, human resource capacity development, and comprehensive project management system reform. About





Existing Conditions: Technology project management in Indonesia is still dominated by conventional approaches that are not suited to the characteristics of AI and IoT projects. Agile adoption is still limited and uneven across sectors. About Barriers: The main barriers to Agile implementation are hierarchical organizational culture, limited human resource capacity, inconsistencies in budgeting systems, and a lack of understanding of Agile at the top management level. About Success Factors: Key factors for successful Agile implementation are top management commitment, an organizational culture that supports collaboration, team competence in Agile, and adequate infrastructure support. About Impact: Agile implementation has been shown to improve the effectiveness of technology projects in terms of speed, quality, user satisfaction, and adaptability to change. About Policy: Government policies have provided a conducive framework for digital transformation, but still need strengthening in implementation aspects, including project management guidelines and capacity development. This research adds to the literature on Agile project management by showing how Agile methodologies need to be adapted to the context of developing countries and national-scale projects. This study extends the application of the Technology Acceptance Model (TAM) by showing that AI and IoT adoption is determined not only by perceived benefits and ease of use, but also by the quality of project management that supports its implementation. This study integrates project management theory, technology adoption, and change management into a comprehensive analytical framework for national digital transformation.

Reference

- Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Kurniadi, SDW (2025). Synergy of Scrum and Risk Management in Improving Project Success: A Study on Technology Startup PT. XYZ. University of 17 August 1945 Surabaya.
- Research on the Maturity Level of Software Project Development Process Using the Scrum Maturity Model Method: A Case Study of Tribe Wholesale Digitization PT Telkom Indonesia (Persero) Tbk. (2025). Telkom University Repository.
- Penerapan Agile Project Management dalam Pengelolaan Startup Dakwah Digital Qara'a Indonesia. (2025). e-Journal IAIN Pontianak. ncial Technology in Micro, Small, and Medium Enterprises (MSME) in Indonesia. (2025). KCI.
- Study on the Influence of Scrum Implementation and Agile Organizational Culture on Project Productivity in IT Consulting Firms in Bandung, Indonesia. (2025). Garuda - Garba Rujukan Digital.
- Study on the Implementation of Agile Project Management in Indonesia in Managing Information System Projects. (2024). IEEE Xplore.
- Study on the Adoption Process of IoT-Based Innovation at a Concrete Manufacturing Company in Indonesia





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(2025). OUCI.

Study on Agile AI-Powered IoT-Based Platform for Cognitive Monitoring for Smart Farming. (2026). Agris FAO.

Study on Guidelines for the Use of Emerging Technologies (Blockchain, IoT, AI) in Agile Software Development Projects. (2025). RUN Universidade Nova de Lisboa.

OECD. (2024). OECD Economic Surveys: Indonesia 2024. Paris: OECD Publishing.

