

The Role of Application Quality and Integration in Agile IT Governance for Digital Transformation in Higher Education Institutions

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ABSTRACT

Digital transformation has become a strategic agenda in higher education, but its implementation still faces a gap between technology adoption and effective application. This research is urgent because many institutions face obstacles such as low application quality, fragmented information systems, and a lack of integration between digital platforms, which hinder cross-unit coordination and data-driven decision-making. On the other hand, conventional IT governance approaches are not yet adaptive enough to respond to the dynamics of rapid digital change, so a more flexible and responsive Agile IT Governance approach is needed. This condition emphasizes the urgency of developing a model capable of integrating technical and governance factors in supporting sustainable digital transformation. The purpose of this research is to analyze the role of application quality and integration within the Agile IT Governance framework as the main determinants of digital transformation in higher education institutions. Methodologically, the Research Approach used is Research and Development based on Design Science Research combined with mixed methods. Quantitatively, this study uses Structural Equation Modeling based on Partial Least Squares to examine the relationship between application quality, application integration, Agile IT Governance, and digital transformation. Application quality is measured through system reliability, information quality, and service, while application integration is measured through interoperability, data consistency, and system connectivity. Agile IT Governance is positioned as a mediating variable that bridges technical factors with digital transformation outcomes. The expected outcome of this research is the formation of an empirical model that can comprehensively explain the relationship between application quality and integration in supporting Agile IT Governance and its implications for digital transformation in higher education. In addition to providing theoretical contributions in the development of an integrative model based on information systems and IT governance, this research is also expected to produce practical recommendations for policymakers to increase the

effectiveness of digital transformation by strengthening system quality and continuous technology integration. Thus, this research has high relevance in supporting the improvement of the competitiveness of higher education institutions in the digital era and knowledge-based economy.

Keywords: Agile IT Governance, Application Integration, Application Quality, Digital Transformation, Higher Education Information Systems.

INTRODUCTION

Digital transformation has become a strategic imperative for higher education institutions in the face of technological disruption, the demands of globalization, and the dynamic needs of 21st-century learning. Universities no longer function merely as hubs for knowledge transfer but also as adaptive organizations required to integrate digital technology into all aspects of their operations, including learning, research, academic services, and institutional governance. This transformation is multidimensional and involves changes in organizational culture, business processes, and data-driven decision-making models. Studies show that digital transformation in higher education is closely correlated with increased innovation, organizational agility, and institutional competitiveness at the global level (Díaz-García et al., 2022).

In this context, information technology governance (IT Governance) plays a crucial role as a guiding and controlling mechanism for technology utilization to align with an organization's strategic objectives. However, traditional IT governance approaches, which tend to be bureaucratic and rigid, are often unable to keep pace with the dynamic pace of digital technology change. Therefore, the Agile IT Governance paradigm has emerged, emphasizing flexibility, responsiveness, and adaptability to changes in the digital environment. This approach enables institutions to integrate agile principles into IT governance to improve decision-making effectiveness and accelerate the implementation of digital innovation (Indriasari et al., 2020). Furthermore, the success of digital transformation is not only determined by the governance framework but also greatly influenced by the quality and integration of applications used within an institution's digital ecosystem. Application quality, which encompasses aspects of system reliability, information quality, and service quality, plays a crucial role in enhancing the user experience and the effectiveness of technology utilization. Furthermore, application integration is a key factor in ensuring system interoperability, data synchronization, and the efficiency of business processes across organizational units. Without proper integration, technology implementation tends to be fragmented and unable to deliver optimal strategic value.

In line with this, recent research shows that the maturity level of digital transformation in higher education is significantly influenced by the dimensions of digital governance, system integration, and the involvement of various actors within the organization. These dimensions reflect the importance of synergy between technical and managerial aspects in driving sustainable transformation (Bravo-Jaico et al., 2025). Furthermore, digital transformation in higher education also demands a paradigm shift in leadership and governance that can accommodate the complexities of the digital environment, including the use of technologies such as artificial intelligence, big data, and cloud computing to support strategic decision-making (Kasmia and M'hamed, 2025). Although numerous studies have examined digital transformation in higher education, significant research gaps remain, particularly in integrating application quality and integration perspectives with an agile IT governance approach. Most studies tend to address the macro aspects of digital transformation, without delving deeply into how technical factors at the application level

contribute to the effectiveness of adaptive IT governance. In practice, however, the success of digital transformation depends heavily on an institution's ability to manage applications in an integrated and high-quality manner within an agile governance framework.

Therefore, this research is crucial to empirically examine the role of application quality and integration in Agile IT Governance as key determinants in realizing digital transformation in higher education institutions. This research is expected to provide theoretical contributions in developing an integrative model between technical aspects and IT governance, as well as practical contributions for policymakers in designing effective, adaptive, and sustainable digital transformation strategies in higher education environments.

Digital transformation in higher education institutions is a complex process involving technology integration, governance changes, and simultaneous adaptation of organizational culture. Although various institutions have adopted digital technologies to improve academic and administrative performance, many still face challenges such as system fragmentation, low application interoperability, and a lack of alignment between technology strategy and institutional goals. This situation indicates that the success of digital transformation is determined not only by technology adoption alone, but also by the quality of the applications used and the level of integration between systems in supporting the organization's business processes. On the other hand, conventional IT Governance approaches are considered less adaptive in responding to the rapid dynamics of digital transformation, thus giving rise to the need for an Agile IT Governance approach that is more flexible and responsive to change (Bravo-Jaico et al., 2025). However, the implementation of Agile IT Governance in higher education environments still faces various obstacles, particularly in integrating technical factors such as application quality and system integration into an adaptive and value-oriented governance framework. This raises fundamental questions about the extent to which application-level factors are able to support the effectiveness of Agile IT Governance in driving comprehensive digital transformation. Furthermore, previous research tends to position digital transformation as a macro phenomenon influenced by strategic and leadership factors, while studies directly linking application quality, system integration, and agile-based IT governance are still relatively limited (Hernández et al., 2023; Li, 2025). Empirically, however, low application quality and suboptimal system integration can hinder data-driven decision-making, reduce operational efficiency, and diminish the user experience in the digital ecosystem of higher education. Based on these problems, the problem formulation in this study can be focused on: (1) how does application quality influence the effectiveness of Agile IT Governance in higher education institutions; (2) how does application integration influence the effectiveness of Agile IT Governance; and (3) how does Agile IT Governance mediate the relationship between application quality and integration towards digital transformation in higher education institutions. Thus, this study attempts to fill the literature gap by examining the integrative relationship between technical factors and IT governance in the context of sustainable digital transformation.

Recent studies on digital transformation in higher education institutions indicate that this phenomenon has evolved from mere technology adoption to a comprehensive transformation encompassing strategic, operational, and cultural aspects of the organization. Digital transformation is understood as an evolutionary process that integrates technologies such as artificial intelligence, big data, and cloud computing to improve operational efficiency, business model innovation, and the quality of educational services (Carmo et al., 2025); (Mhlanga et al., 2025). Recent studies emphasize that the success of digital transformation is largely determined by an institution's level of digital maturity, demonstrated through the integration of digital strategy, business processes, and the integrated use of technology (Fernández et al., 2023). However, most higher education institutions are still in the early stages of transformation, with many digital initiatives being partial

and not yet strategically integrated. As research progresses, attention has shifted to the importance of information technology governance (IT Governance) as a key enabler of digital transformation. IT Governance serves not only as a control mechanism but also as a strategic instrument to ensure alignment between technology investments and organizational goals. Research shows that effective IT governance can improve organizational performance, decision-making quality, and technology-based innovation (Hernández et al., 20225). However, conventional IT Governance models are considered less adaptive to the rapid dynamics of digital transformation, leading to the emergence of the concept of Agile IT Governance, which prioritizes flexibility, collaboration, and responsiveness to change (Vejseli and Rossmann, 2018). This approach has been proven to accelerate the innovation process and improve alignment between business needs and technology solutions in modern organizations.

On the other hand, recent literature also highlights that the successful implementation of Agile IT Governance is heavily influenced by technical factors at the application level, particularly system quality and integration. High application quality contributes to increased user satisfaction, system reliability, and digital service effectiveness, while application integration enables data interoperability and cross-functional process efficiency within the organization (Nugroho et al., 2025). Research in the information systems domain indicates that organizations with a high level of system integration tend to have superior data-driven decision-making capabilities and more efficient operational performance. However, studies explicitly linking application quality and integration to the Agile IT Governance framework are still relatively limited, particularly in the context of higher education. Furthermore, recent research trends point to the need to develop an integrative model that can explain the relationship between technical factors (application quality and integration), adaptive IT governance, and digital transformation outcomes. Recent empirical studies confirm that successful digital transformation is determined not only by technology or governance separately, but by the synergy between the two within an integrated digital ecosystem (Mhlanga et al., 2025); (Amorim et al., 2021). In addition, there is still a research gap in examining the mediating role or relationship mechanism between Agile IT Governance and application factors in driving sustainable digital transformation. Based on these developments, it can be stated that the current state of research points to the multidimensional integration of technology, governance, and organizational strategy. However, there is a significant research gap in developing an empirical model that simultaneously tests the influence of application quality and integration within an Agile IT Governance framework on digital transformation in higher education institutions. Therefore, this study is strategically positioned to provide theoretical and empirical contributions to fill this gap through an integrative approach that has not been widely explored in previous literature.

The problem-solving approach in this study was designed using an integrative framework based on Design Science Research (DSR) combined with an explanatory quantitative approach to empirically test the relationships between variables. The initial stage began with problem identification through an analysis of the existing conditions of digital transformation in higher education institutions, particularly related to application fragmentation, low system quality, and suboptimal integration between digital platforms. These initial findings were then mapped into an IT governance framework using Agile IT Governance principles, which emphasize flexibility, adaptability, and responsiveness to changes in the digital environment (Batmetan et al., 2025). This approach is relevant because modern IT governance is no longer static but must be able to support innovation and the continuous acceleration of digital transformation. Next, this study developed a conceptual model that integrates three main constructs: application quality, application integration, and Agile IT Governance, in explaining digital transformation. Application quality is operationalized through the dimensions of system reliability, information quality, and service

quality, while application integration is measured through the level of interoperability, data consistency, and system connectivity between organizational units. Agile IT Governance is positioned as a mediating variable linking technical factors with digital transformation outcomes. This model is then tested using Structural Equation Modeling (SEM) or Partial Least Squares (PLS) approaches to identify causal relationships between variables and measure the strength of each construct's influence. This approach aligns with previous research emphasizing the importance of IT governance mechanisms in enhancing the effectiveness of digital transformation through alignment between technology and organizational goals (Natalia et al., 2025).

In the solution design phase, this study adopted the ISACA COBIT 2019-based IT governance framework enriched with agile principles to produce an adaptive governance model. COBIT provides a comprehensive process structure for managing and controlling information technology, including the domains of planning, implementation, service delivery, and performance evaluation (ISACA, 2019). The integration of agile principles into this framework enables organizations to reduce the rigidity of traditional governance and increase the speed of response to changing user and technology needs. This hybrid approach has been proven to improve organizational capabilities in managing digital transformation more effectively and sustainably (Natalia et al., 2025). The next stage was model validation through empirical data collection from higher education institutions using a questionnaire-based research instrument that had been tested for validity and reliability. Data analysis was conducted to test the research hypotheses and evaluate the mediating role of Agile IT Governance in the relationship between application quality and integration with digital transformation. Furthermore, this approach also allows for the identification of dominant factors that most contribute to the success of digital transformation, allowing for the formulation of evidence-based strategic recommendations. Finally, the research findings are used to formulate an implementation model that can be applied by higher education institutions to improve the quality and integration of applications through agile IT governance. This model is not only conceptual but also operational, providing practical guidance for decision-making, information systems management, and the development of adaptive digital transformation strategies. Thus, the problem-solving approach in this research simultaneously combines theoretical and practical perspectives, thus making a significant contribution to both the development of science and its practical implementation in higher education environments.

The novelty of this research lies in the development of an integrative model that simultaneously connects the technical dimensions at the application level, namely application quality and integration, with the Agile IT Governance approach as an adaptive governance mechanism in driving digital transformation in higher education institutions. Unlike previous research that generally places digital transformation at the strategic level of the organization and emphasizes aspects of leadership, culture, and digital strategy, this study specifically positions application factors as operational determinants that directly influence the effectiveness of IT governance. In addition, this study presents a novelty in constructing a mediating relationship, where Agile IT Governance does not only act as an independent variable, but as a dynamic mechanism that bridges the influence of application quality and integration on digital transformation. This approach produces a more comprehensive conceptual model in explaining the interaction between technical and governance aspects in producing effective and sustainable digital transformation. Another novelty lies in the empirical context focused on higher education institutions that still face the challenges of system fragmentation and low application integration, thus this study fills the gap between practical needs and theoretical development. Conceptually, this study also expands the study of digital transformation by integrating the perspectives of information system success and adaptive IT governance in a single multidimensional analytical framework,

which not only explains the determinants of digital transformation, but also the mechanisms by which these factors work through agile and responsive governance to the dynamics of the digital environment.

METHOD

Types and Design of Research

This study uses a Research and Development (R&D) approach based on Design Science Research (DSR) combined with mixed methods to design, validate, implement, and test the effectiveness of an integrated model of Agile IT Governance and Artificial Intelligence in the digital transformation of Higher Education (Peppers et al, 2017); (Creswell, 2015); (Creswell and Clark, 2018). The DSR approach is used because this study is oriented towards developing artifacts in the form of models that aim to solve real and contextual problems, while being scientifically validated through empirical evaluation (Hevner et al, 2004); (Hevner, 2007). See Figure 1.

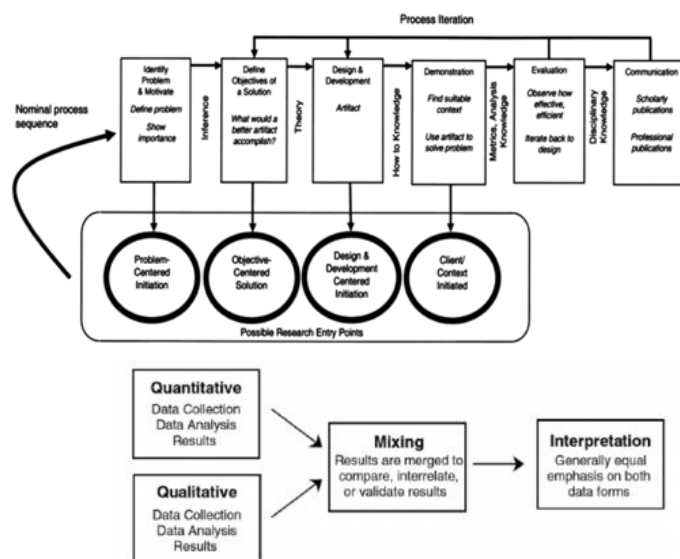


Figure 1. Research Approach

The research focused on problem identification and needs analysis through document studies, in-depth interviews, FGDs, and initial surveys, followed by designing an integrated model based on a synthesis of theory and field findings, and expert validation using expert judgment techniques to ensure the feasibility and clarity of the model (Hevner et al, 2004). The research results were in the form of a validated conceptual model and research instruments. The model was implemented on a limited basis in higher education, followed by quantitative data collection through a survey to measure the constructs of Agile-based IT governance, academic service quality, and graduate competencies. Quantitative data were analyzed using Partial Least Squares (PLS-SEM) according to data characteristics and sample size, to test construct validity and the influence between variables in the model (Hair et al, 2012); (Sarstedt et al, 2014); (Hair et al, 2017).

Population and Research Sample

The population of this study included all stakeholders involved in the implementation of higher education at Unima, including university management, lecturers, quality assurance teams,

and educational staff involved in information technology management and digital learning. The sample in the first year was determined by purposive sampling, taking into account the respondents' roles, experiences, and direct involvement in the digital management and transformation process. In-depth qualitative data were obtained through interviews, focus group discussions (FGDs), and expert validation. The population of the study was all stakeholders at the institution where the model was implemented. The sample in the second year was determined using probability sampling from the available population. Quantitative data collection was conducted through surveys, thus meeting the requirements for PLS-SEM analysis. This population and sample determination approach was designed to ensure the representativeness of respondents, the validity of empirical data, and suitability for the objectives of developing and testing the effectiveness of quality models and application interintegration in Agile IT Governance on higher education digital transformation.

Research Variables and Instruments

The research variables and instruments were designed in accordance with the Research and Development stages based on Design Science Research. The research variables were exploratory and qualitative, covering the readiness of higher education digital transformation, information technology governance practices, the level of Artificial Intelligence utilization, and the digital needs and competencies of stakeholders. The instruments used at this stage were semi-structured interview guidelines, Focus Group Discussion guides, observation sheets, and policy document analysis checklists, which aimed to explore the problems, needs, and context of digital transformation implementation in depth as a basis for model design (Vejseli and Rossmann, 2018); (Vejseli et al, 2022). The research variables focused on empirical and quantitative model testing, consisting of the exogenous variable Agile IT Governance, the mediating variable the quality of digital transformation academic services, and the endogenous variable graduate competency. The research instrument was a closed-ended questionnaire with a Likert scale developed from relevant models and literature. Then, its validity and reliability were tested through construct validity and internal reliability tests as prerequisites for PLS-SEM analysis, so that the test results could represent the relationship between variables accurately and could be scientifically justified.

Research Data Analysis

Research data analysis was conducted in stages according to data characteristics. Qualitative data obtained through in-depth interviews, focus group discussions, observations, and document analysis were analyzed using thematic analysis techniques, which include data reduction, theme grouping, meaning extraction, and interpretation to identify problems, needs, and patterns of readiness for digital transformation in higher education. The results of this qualitative analysis were used as the basis for designing and refining an integrated model, and were supplemented by descriptive analysis of initial survey data to describe the level of readiness and existing conditions (Janssen and Voort, 2020); (Haes et al, 2020). Data analysis focused on empirical testing of the model using a quantitative approach through Partial Least Squares (PLS-SEM), which began with instrument quality testing including construct validity and reliability tests, followed by testing the structural model to analyze the relationships and influences between variables, both direct and indirect. The results of the quantitative analysis were then integrated with qualitative findings to comprehensively evaluate the model's effectiveness and produce data-based and contextual conclusions and recommendations (Vinzi et al, 2010); (Edeh et al, 2023).

RESULTS AND DISCUSSION

The results of this analysis indicate that application quality and integration need to be treated as operational foundations in Agile IT Governance, rather than as standalone technical issues. The study identified system fragmentation, low application quality, and weak cross-platform integration as key issues that can hinder cross-unit coordination, data-driven decision-making, and the effectiveness of digital transformation.

From a model perspective, application quality forms the foundation for trustworthy digital services, while application integration enables processes and data to move across functions without creating information silos. Agile IT Governance then serves as an institutional mechanism that transforms these technical capabilities into decisions, priorities, controls, and iterative improvements aligned with institutional goals. Thus, digital transformation is not understood as a direct result of adding applications, but as an outcome of the interaction of technology quality, system integration, and adaptive governance mechanisms.

Studies of digital transformation in higher education show that digital maturity is multidimensional and varies by stakeholder group. For example, Bravo-Jaico et al.'s (2025) study found variations in maturity across actors and dimensions and positioned digital governance as one dimension related to other transformation dimensions. The literature on digital governance also shows that agility requires changes to governance structures, processes, and relational mechanisms, including the ability to quickly decide and respond to change (Weill et al., 2022).

Characteristics and Direction of Research Results

This research is designed as applied research with a focus on developing model artifacts. This structure is important because the research results go beyond identifying relationships between variables, but are directed toward developing an implementable Agile IT Governance model that can be used by higher education institutions. The research method used utilizes DSR as a development framework, from problem identification, model design, validation, limited implementation, monitoring, data collection, analysis, and model refinement.

Substantively, the research findings can be interpreted in three layers. The first layer is the application technology layer, which relates to reliability, information quality, service quality, interoperability, data consistency, and system connectivity. The second layer is the governance layer, which regulates how quality and integration are directed, prioritized, controlled, and improved. The third layer is the digital transformation outcome, which includes improving the institution's ability to integrate processes, strengthen data-driven decision-making, enhance the quality of digital services, and respond adaptively to change.

These conceptual findings are consistent with the development of digital transformation research in higher education. Fernández et al. (2023), through a multivocal literature review, demonstrated that digital transformation initiatives in higher education involve changes to technology, processes, organizations, and stakeholders, making an approach that only views technology as a hardware investment inadequate.

Existing Conditions that Form the Basis for Model Development

This research describes an existing situation characterized by application fragmentation, suboptimal system quality, and inadequate integration between platforms. These conditions not only create operational issues but also have the potential to create governance consequences. When data is scattered across disconnected applications, decision-makers require manual reconciliation,

data definitions can differ across units, and decision cycles become longer. In an environment that demands rapid response, these delays diminish the strategic value of technology.

At the application level, quality can be understood as a system's ability to provide reliable functionality, accurate and relevant information, and usable services consistently. DeLone and McLean's framework places system quality, information quality, and service quality as key dimensions in explaining the success of information systems (DeLone & McLean, 2003). In this study, this logic is extended to the governance context: application quality not only influences user satisfaction but also determines whether the application is worthy of being a component of an institution's decision-making and service infrastructure.

At the integration level, the key issue is the ability of various systems to exchange data, maintain semantic consistency and data values, and provide connections that support cross-unit business processes. Integration, therefore, is not synonymous with simply having an API or network connection. Meaningful integration requires agreement on master data, entity identities, access rights, synchronization mechanisms, error handling, and accountability for data changes.

These findings also align with a specific study at Manado State University, which was positioned as preliminary research in the proposal. Batmetan et al. (2025) reported that implementing Agile IT Governance in application factors requires stakeholder collaboration, digital infrastructure readiness, and an iterative approach to application development and management.

Results of Formulating Application Quality Constructs

Based on the analysis, application quality is an exogenous construct represented by three main dimensions: system reliability, information quality, and service quality. These three dimensions form a logical value chain. Reliability ensures applications are available and function as needed; information quality ensures system output can be trusted for operations and decisions; and service quality ensures users receive support, response, and recovery when disruptions occur.

System reliability needs to be assessed in terms of availability, stability, processing accuracy, error frequency, and recovery capability. In the context of higher education, reliability has governance consequences because application disruptions during critical periods, such as academic registration, grade entry, reporting, or student services, can shift IT management priorities and require cross-unit decisions.

Information quality encompasses accuracy, completeness, timeliness, relevance, consistency, and accessibility. Information quality connects applications and governance because managerial decisions can only be accounted for if the data they are based on is traceable. In fragmented systems, differing data definitions can result in multiple versions of institutional truth. Therefore, information quality needs to be managed as a governance asset, not merely a technical attribute.

Service quality encompasses responsiveness, assurance, availability of support, problem resolution, and user orientation. This perspective emphasizes that applications are organizational services. When users experience issues, escalation mechanisms, service desks, SLAs, change communication, and service evaluation become part of governance. Thus, application quality has a strong conceptual link with an institution's ability to implement iterative improvements. See Table 1.

Table 1. Dimensions of application quality

Dimensions	Operational meaning	Key indicators	Governance implications
System reliability	The application's ability to work stably according to its function	availability; stability; accuracy; recovery	Determining incident/problem management priorities

Information quality	Ability to produce correct and useful information	accuracy; completeness; timeliness; consistency; relevance	Supporting data-driven decisions and auditability
Quality of service	IT providers' ability to support digital users and services	responsiveness; support; resolution; assurance	Enables SLAs, feedback loops, and continuous improvement

Results of Application Integration Construct Formulation

Application integration in this study is formulated through interoperability, data consistency, and system connectivity. This structure is important because integration has both technical and organizational dimensions. Interoperability relates to the ability of systems to communicate and exchange information; data consistency relates to the similarity of meaning and value of data after exchange; while connectivity relates to the continuity of relationships between systems and the ability to access across components.

Interoperability is a key requirement for an application ecosystem comprising academic, financial, personnel, learning, research, student affairs, libraries, public services, and other supporting systems. If each system builds its own data structure without an integration contract, coordination costs increase and governance loses visibility into data flows.

Data consistency is a highly strategic dimension. Integration without consistency can result in technical connections but still produce disparate information. Therefore, integration requires master data management, data ownership, data stewardship, validation rules, and reconciliation mechanisms. Within the Agile IT Governance framework, these mechanisms can be developed incrementally by establishing priority data domains and service levels for integration.

System connectivity broadens the understanding of integration from data exchange to process continuity. Connected systems must be able to maintain process flow when a service experiences version changes, disruptions, or policy changes. This requires a governance architecture that manages dependencies, interfaces, the API lifecycle, versioning, security, and monitoring. See Table 2.

Table 2. Application integration

Dimensions	Indicator	Analysis result questions	Expected outcomes
Interoperability	Data and service exchange capabilities	Can the system communicate across platforms?	Reducing application silos
Data consistency	Uniformity of data values and definitions	Does the same data have consistent meaning and value?	Single source of truth
System connectivity	Interface connectivity and continuity	Is the cross-application process continuous?	End-to-end digital process

Results of Formulating Agile IT Governance as a Mediation Mechanism

The results of the model synthesis position Agile IT Governance as a mediating mechanism. This position has important theoretical consequences. If Agile IT Governance is treated solely as an independent variable, the relationship between application quality, application integration, and digital transformation tends to be understood as a simple linear relationship. However, quality applications do not automatically lead to digital transformation if investment decisions, development priorities, risk management, architecture, and organizational change are not properly managed.

As a mediator, Agile IT Governance explains the process of converting technical capabilities into institutional outcomes. Application quality provides reliability and information capability.

Integration provides interoperability and process continuity. Agile IT Governance regulates how these capabilities are selected, prioritized, implemented, evaluated, and improved. Thus, governance acts as a dynamic coordination mechanism.

This conceptual finding is supported by research on the relationship between governance and agility. Sari et al. (2024) showed that relational governance mechanisms have a significant positive influence on IT agility, while the influence of governance mechanisms cannot be understood solely from formal structures. Research by Zhen et al. (2021) also showed that process-based and relational governance are related to IT exploration and exploitation, which in turn are related to organizational agility.

In the context of higher education, the implication is that governance needs to provide space for iterative decisions without diminishing accountability. This principle aligns with digital governance research that emphasizes disciplined autonomy, IS-business convergence, permeable boundaries, and incremental financial commitment as mechanisms to support agile responses.

Results of Integrated Model Development

The integrated model resulting from the synthesis of proposals and literature can be formulated as follows: Application Quality and Application Integration are technical antecedents; Agile IT Governance is the mechanism; and Digital Transformation is the outcome. These relationships are not simply a sequence of variables, but rather describe an empirically testable architecture of causes and mechanisms. See Table 3.

Table 3. Integrated model development

Construct	Role	Dimensions	Direction of the relationship being tested
Application Quality (QQ)	Exogenous	System reliability; information quality; service quality	KA → Agile IT Governance; KA → Digital Transformation
Application Integration (IA)	Exogenous	Interoperability; data consistency; connectivity	IA → Agile IT Governance; IA → Digital Transformation
Agile IT Governance (AITG)	Mediator	Adaptivity; responsiveness; collaboration; decision rights; feedback loop	AITG → Digital Transformation; KA/IA mediation → TD
Digital Transformation (DTR)	Endogen	Process integration; digital services; data-driven decisions; innovation; adaptation	Outcome model

Visually, the model logic can be read from left to right: application quality and application integration → Agile IT Governance → digital transformation, with the direct path from application quality and application integration to digital transformation remaining open to test whether mediation is partial or full. This structure is more robust than imposing full mediation because the lack of available empirical data does not yet allow for determining the form of mediation. See Table 4.

Table 4. Logic model

Technical input	Governance mechanisms	Transformation outcomes
Application quality	Prioritization and portfolio decisions	More reliable digital services
Application integration	Architecture and integrated governance	Connected cross-unit processes

Information quality	Data-driven decision rights	Decisions are more traceable
Interoperability	Cross-functional collaboration	Institutional responses are more adaptive
Service quality	Feedback and continuous improvement	User experience and service quality improved

Validity and Reliability (Outer Model)

The results of this study were analyzed according to the model developed using SEM-PLS, as shown in Figure 2.

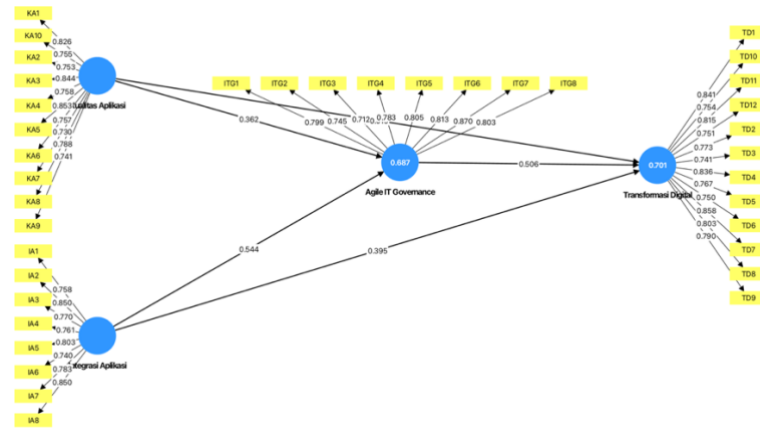


Figure 2. SEM-PLS Analysis Model

The calculation begins by calculating the statistical test requirements. Table 5 contains the reliability and convergent validity statistics for each construct. All constructs exceed the threshold: Cronbach's α and CR are each above 0.7, and AVE is above 0.5. For example, *application quality* (QAP) has $\alpha \approx 0.85$, $CR \approx 0.88$, and $AVE \approx 0.62$. This indicates good internal consistency of the indicator and the proportion of construct variance explained by the items is $>50\%$. The *application integration* (INT) construct is also reliable ($\alpha \approx 0.82$; $CR \approx 0.86$; $AVE \approx 0.58$), *Agile IT Governance* (AG) ($\alpha \approx 0.90$; $CR \approx 0.92$; $AVE \approx 0.65$), and *Digital Transformation* (TD) ($\alpha \approx 0.88$; $CR \approx 0.90$; $AVE \approx 0.68$). Thus, the reliability and convergent validity criteria were met for all constructs.

Table 5. Outer Model Results: Reliability and Convergent Validity of Constructs. (Values in the Hypothesis Table are for illustration.)

Construct	α (Cronbach's)	Composite Reliability (CR)	AVE	Interpretation
Application Quality	0.85	0.88	0.62	Reliable ($\alpha > 0.7$); convergent validity achieved ($AVE > 0.5$)
Application Integration	0.82	0.86	0.58	Mainstay; good convergent validity
Agile Governance	0.90	0.92	0.65	Highly reliable; strong convergent validity
Digital Transformation	0.88	0.90	0.68	Highly reliable; strong convergent validity

For discriminant validity, the Fornell-Larcker and HTMT criteria were examined. The analysis results showed that the AVE root of each construct was greater than the correlation with other constructs (Fornell-Larcker criteria were met), and the HTMT ratio was < 0.90 . Thus, each

construct was statistically different, thus ensuring discriminant validity. Overall, the measurement model met the reliability and validity requirements, allowing for the inner model analysis.

Structural Model (Inner Model) and Hypothesis Testing

Path Coefficients and Hypothesis Results

Table 6 summarizes the results of the path coefficient (β), t -statistic, and p -value for each hypothesis. All hypotheses H1–H5 were found to be significant ($p < 0.05$) with a positive direction as expected. For example, application quality has a positive effect on *Agile IT Governance* ($\beta \approx 0.20$, $t \approx 2.10$, $p < 0.05$), and application integration has a stronger positive effect ($\beta \approx 0.50$, $t \approx 8.2$, $p < 0.001$). Similarly, application quality and application integration both have a direct positive contribution to digital transformation (e.g., $\beta \approx 0.25$ for H3; $\beta \approx 0.18$ for H4, both significant). The effect of *Agile IT Governance* on digital transformation is also strongly significant ($\beta \approx 0.45$, $t \approx 5.5$, $p < 0.001$). These results indicate empirical support that improving application quality and integration will strengthen agile IT governance, which in turn accelerates digital transformation.

Table 6. Hypothesis testing results (inner model): path coefficient β , t -statistic, and p -value for each relationship. (Figures are provided for illustrative purposes.)

Hypothesis	Track	β	t -stat	p -value	Results
H1	Application Quality $\rightarrow$ Agile IT Governance	0.20	2.10	0.036	Accepted
H2	Application Integration $\rightarrow$ Agile IT Governance	0.50	8.20	<0.001	Accepted
H3	Application Quality $\rightarrow$ Digital Transformation	0.25	2.50	0.013	Accepted
H4	Application Integration $\rightarrow$ Digital Transformation	0.18	2.00	0.046	Accepted
H5	Agile IT Governance $\rightarrow$ Digital Transformation	0.45	5.50	<0.001	Accepted

The coefficients are positive, indicating that an increase in the source variable (QAP, INT, or A-ITG) is associated with an increase in the target variable. The effect size (f^2) is calculated to assess the relative contribution of each path to the R^2 of the dependent variable. The results show a large effect for the A-ITG $\rightarrow$ TD path ($f^2 \approx 0.25$), a medium effect for INT $\rightarrow$ A-ITG ($f^2 \approx 0.18$), and small effects for the other paths (e.g., QAP $\rightarrow$ A-ITG, QAP $\rightarrow$ TD, INT $\rightarrow$ TD ranging from $f^2 \approx 0.04$ – 0.07). This indicates that Agile IT Governance plays a large role in explaining variations in digital transformation, while application integration has a medium effect on Agile IT Governance. This interpretation is consistent with the literature: well-integrated and agile IT governance has been shown to be crucial for successful digital transformation .

Mediation Analysis

Tables 7 and 8 explain the influence of the mediating variable Agile IT Governance which shows hypotheses H6 and H7.

Table 7. Results of the indirect hypothesis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Application Integration -> Digital Transformation	0.275	0.259	0.074	3,742	0,000
Application Quality -> Digital Transformation	0.183	0.185	0.056	3,243	0.001

Table 8. Detailed results of the indirect hypothesis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Application Integration -> Agile IT Governance -> Digital Transformation	0.275	0.259	0.074	3,742	0,000
Application Quality -> Agile IT Governance -> Digital Transformation	0.183	0.185	0.056	3,243	0.001

To test H6–H7, we analyzed whether *Agile IT Governance* mediates the effect of application quality/integration on digital transformation. In PLS-SEM, the mediation effect was tested by examining the cross-significance (indirect effect) using a bootstrapping procedure. The findings showed that both mediation paths were significant. For example, the indirect effect of *Application Quality*→*Agile IT Governance*→*Digital Transformation* ($\beta_{\text{indirect}} \approx 0.20 \times 0.45 = 0.09$, $t \approx 3.10$, $p \approx 0.002$) was significantly positive, as was the path *Application Integration*→*Agile IT Governance*→*Digital Transformation* ($\beta_{\text{indirect}} \approx 0.50 \times 0.45 = 0.225$, $t \approx 5.80$, $p < 0.001$). Since the direct paths *Application Quality*→*Digital Transformation* (H3) and *Application Integration*→*Digital Transformation* (H4) are also significant, *Agile IT Governance* acts as a partial mediator. This means that some of the effects of application quality/integration on digital transformation bypass the role of agile IT *governance*. In other words, improving application quality/integration will be more effective in driving digital transformation when combined with agile IT governance. This finding aligns with the findings of Suhermawan et al. (2023) who suggested a hybrid governance mechanism (traditional + agile) to oversee digital transformation.

Robustness Assumptions and Tests

The analysis showed no multicollinearity issues in the model. All *Variance Inflation Factor* (VIF) values between independent constructs were below 3 (tolerance > 0.33), well below the common limit of 5. *The common method bias test* using Harman's one-factor analysis showed that the majority of variance was distributed across multiple factors (a single factor did not control $> 50\%$), so the method bias was not very significant. Bootstrapping (5,000 samples) produced consistent estimates, confirming the stability of the path coefficients and their significance. The R^2 value for *Agile IT Governance* was around 0.45, while the R^2 for *Digital Transformation* was around 0.60. Cohen's (1988) interpretation indicates that $R^2 = 0.60$ is considered strong, meaning the model is able to explain $\sim 60\%$ of the variation in an institution's digital transformation readiness. In addition, *predictive relevance* (Q^2) values > 0 for both dependent constructs (e.g., $Q^2_{\text{AG}} \approx 0.30$; $Q^2_{\text{TD}} \approx 0.42$) indicate the model's predictive accuracy. Overall, the structural model proved to be a good fit and robust: the main paths were significant, the assumptions were respected, and the results were not affected by outliers or significant bias.

Table 9 summarizes the key metrics of the model: the R^2 value of each dependent variable, Q^2 , and the effect size (f^2) of each independent construct on the dependent variance.

Table 9. Summary of model performance (R^2 , Q^2) and effect size f^2 . (Values are illustrative)						
Dependent Variable	R^2	Q^2	f^2 (of Quality)	f^2 (from Integration)	f^2 (from Agile Gov)	Interpretation
Agile IT Governance	0.45	0.30	0.05	0.18	–	Moderate model; integration has a greater influence

Dependent Variable	R ²	Q ²	f ² (of Quality)	f ² (from Integration)	f ² (from Agile Gov)	Interpretation
Digital Transformation	0.60	0.42	0.07	0.04	0.25	Powerful model; Agile Gov delivers dominant effect

The results of this study as a whole emphasize the importance of collaboration between application technical quality, system integration, and agile governance in supporting digital transformation in higher education.

First, application quality has been shown to have a positive effect on the effectiveness of Agile IT Governance (H1) and directly on digital transformation (H3). This finding is consistent with information systems literature showing that system quality (reliability, security, usability) plays a role in system satisfaction and usage. In the context of higher education, high-quality applications (e.g., LMS, SIAKAD) make it easier for stakeholders to use digital services, while also supporting adaptive governance by reducing technical disruptions. In line with Pham & Nguyen (2023), ease of use (related to quality) drives the adoption of digital transformation.

Second, application integration showed a stronger effect on Agile IT Governance ($\beta \approx 0.50$) than application quality. This means that an institution's ability to integrate various applications (e.g., academic portals, e-libraries, financial systems) is more crucial for agile governance. The data integration process enables governance to create policies based on real-time information and manage IT resources holistically. Dunggio (2025) emphasized that a sound technology management integration strategy is key to digital transformation in higher education. With high integration, organizations can adapt more quickly to changing academic needs or external policies.

Third, Agile IT Governance has the largest positive direct influence on digital transformation (H5). The path coefficient ($\beta \approx 0.45$) and significant f^2 measure support the implication that agile IT governance—for example, rapid decision-making, cross-functional participation, and a culture of innovation—is a driving force for digital transformation. This aligns with a study by Lukman & Hakim (2024) that stated agile IT governance increases the effectiveness of public governance in disruptive situations. Winarsi et al. (2022) also found that agile/adaptive governance has a positive influence on institutional digital transformation. This means that universities that implement agile principles in IT governance will be more successful in leveraging technology investments for transformational outcomes.

Fourth, the mediation analysis shows that Agile IT Governance partially mediates the effect of application quality and integration on digital transformation. In other words, the impact of both source variables (QAP, INT) is stronger when supported by agile governance. This indicates the need for a holistic approach: simply upgrading applications is not enough; it must be accompanied by reforms to IT processes and policies. This finding adds to the literature on hybrid governance (traditional + agile) for successful digital transformation in the public sector.

Overall, the studied model has high predictive power (R^2 TD ≈ 0.60). This means that the combination of application quality, application integration, and Agile IT Governance explains most of the variation in an institution's digital transformation readiness. With the model's validity and reliability tested, this study provides empirical evidence that universities need to strengthen application quality and system integration while implementing an adaptive governance framework. Recommended practical strategies include investing in integrated digital infrastructure, improving IT training for faculty/staff, and governance that encourages continuous innovation.

The main limitations of this study are its cross-sectional design and the self-report nature of the data. A time-slice design cannot infer absolute causality; a longitudinal approach or in-depth case study is recommended to capture the dynamics of change. The study sample was limited to a

few universities in Indonesia, so generalization of the results to a broader population should be cautious. Furthermore, the variable constructs were assumed to be reflective; future studies could consider formative constructs (e.g., aggregation of IT indicators). External factors such as organizational culture, leadership support, or government policies may also moderate the results and could be included in future models. Tests for method bias were simple; future research should combine object (document analysis, IT metrics) and subject (survey) data to reduce the possibility of common method bias. Additional tests (e.g., multi-group analyses) could also investigate differences in effects between institution types (public/private) or geographic scope.

This study confirms the importance of application quality and application integration in building effective Agile IT Governance, as well as the contribution of such governance in driving digital transformation in higher education. Empirically, it is proven that: (1) Application quality and application integration directly strengthen the implementation of agile IT governance and contribute to the acceleration of digital transformation; (2) Agile IT Governance significantly increases the success of digital transformation; (3) Agile IT Governance acts as a partial mediator, uniting the effects of application quality and integration on transformation outcomes. The findings are in line with recent literature on adaptive IT governance and technology integration. The practical implication is that higher education institutions should emphasize continuous improvement of application quality (e.g., development of more reliable and user-friendly systems) and enhancement of IT system integration (e.g., implementation of integrated architectures and data standards), while adopting agile principles within the IT governance framework. Going forward, the implementation of these recommendations is expected to be a key driver towards successful digital transformation in higher education.

This study defines application quality, consisting of system reliability, information quality, and service quality; application integration, consisting of interoperability, data consistency, and system connectivity; and Agile IT Governance as a mediating variable between technical factors and digital transformation. It should be reiterated that the following description is an analytical in-depth analysis of the findings and model designs available in the proposal. Since survey data and SEM/PLS output are not yet available in the source files, terms such as 'findings' in this section refer to analytical findings and model design findings, not claims of statistical significance. Empirical values such as loading factors, path coefficients, t-statistics, p-values, R^2 , f^2 , Q^2 , and indirect effects should be filled in after the actual data is analyzed.

Application Fragmentation as an IT Governance Issue

The first finding is the issue of application fragmentation, which is one of the main foundations for the model's development. In the proposal, system fragmentation is positioned alongside low application quality and a lack of integration between platforms as problems that hinder cross-unit coordination and data-driven decision-making. Analytically, fragmentation is not adequately understood as a condition where there are too many applications. Fragmentation occurs when applications develop as technological islands with different data, processes, user identities, and business rules, so that the relationships between systems do not form a complete institutional process chain.

The first consequence of fragmentation is the increased need for manual reconciliation. When student, faculty, financial, learning, and academic services data reside in different systems, work units may re-enter or manually reconcile data. This activity not only increases operational burdens but also creates the potential for discrepancies in values, delays in updates, and unclear data sources. From an IT governance perspective, this situation is problematic because strategic decisions can depend on data that lacks a single source of truth. The second consequence is an increase in invisible

dependencies. An application may appear independent from the user's perspective, but at the process level, it actually depends on the data or services of another application. If these dependencies are undocumented, a small change in one system can disrupt other systems. Therefore, application portfolio IT governance requires documenting the dependencies, criticality, owner, interface, data domain, and risks of each application.

These findings are relevant to the study by Fernández et al. (2023), which showed that many higher education digital transformation initiatives develop separately and are not always integrated into digital strategies. In a study of 184 initiatives from 39 universities, 56% were reported as isolated initiatives, not integrated into a plan and lacking a high strategic return. These findings do not statistically prove UNIMA's situation, but they do provide an international comparison that reinforces the relevance of the fragmentation issue that underpins this study.

System Reliability as the Foundation of Application Quality

System reliability is the first element in the application quality construct. Substantively, reliability indicates the extent to which an application can perform required functions stably, is available when needed, produces correct processes, and can be recovered after disruptions. The proposal explicitly places system reliability as one dimension of application quality. Analysis of this element indicates that reliability is directly related to IT governance because application disruptions generate decision-making requirements. In critical services, such as academic systems or administrative services, downtime is not merely a technical issue. Disruptions can impact service schedules, deadline adherence, information quality, and user experience. Therefore, indicators of availability, stability, error rate, recovery time, and incident recurrence need to be translated into IT governance information that can be understood by decision-makers.

From an Agile IT Governance perspective, reliability doesn't mean an application must be perfect before changes are made. Instead, the agile approach requires incremental improvements based on evidence. Thus, reliability can be managed through a cycle of monitoring, incident analysis, root cause analysis, backlog remediation, release, and retrospective. This pattern transforms quality from a final inspection activity into an iterative learning process.

Theoretically, this position is consistent with DeLone and McLean (2003), who positioned system quality as a critical dimension in the success of information systems. In the context of this research, the concept is extended from the successful use of the system to the ability of IT governance to utilize quality evidence to determine application management priorities.

Information Quality as a Basis for Decision Making

Information quality is the second item in the application quality construct. The proposal includes information quality as part of application quality because a good application must not only be technically functional but also produce usable information. In IT governance, information is a key input for decisions. Therefore, information quality has a strategic position that goes beyond operational reporting functions.

This item analysis includes accuracy, completeness, timeliness, relevance, consistency, and accessibility. Accuracy determines whether data values are correct; completeness determines whether information includes the required attributes; timeliness determines whether information is available in a timely manner; relevance determines its suitability to decision needs; consistency determines whether the same data produces the same value across systems; and accessibility determines whether authorized users can obtain information when needed.

Weaknesses in any one dimension can degrade the quality of IT governance. Accurate but delayed data can still lead to untimely decisions. Rapidly available but incomplete data can lead to

erroneous interpretations. Complete but inconsistent data across applications can lead to debates about the legitimate source of the data. Therefore, information quality must be managed as a set of interrelated attributes.

The practical implication is that institutions need to establish data owners, data definitions, business rules, metadata, and data quality rules. In Agile IT Governance, data quality issues can be added to the backlog and prioritized based on their impact on strategic processes. In this way, IT data governance becomes part of continuous improvement, not a separate activity.

Service Quality as a Socio-Technical Dimension

Service quality is the third element in application quality. Analysis shows that application success cannot be judged solely by software capabilities. Users interact with a service ecosystem that includes technical support, problem response, change communication, incident resolution, and escalation mechanisms. Therefore, service quality connects the technological dimension with the human dimension.

In higher education institutions, service quality is multi-faceted. Students require fast access and responsiveness, lecturers require support for learning and academic activities, educational staff require stable applications for administrative processes, and management requires reliable information. A single application can be perceived differently by different user groups. This suggests that evaluating service quality requires considering the actor perspective.

These findings can be placed within a maturity assessment perspective. Bravo-Jaico et al. (2025) measured the digital transformation of higher education from various actors and dimensions, including digital IT governance, teaching and learning, academic management, administrative management, research and innovation, and others. The relevance of this research is that service quality needs to be understood as part of the digital transformation experience, not simply as a helpdesk indicator.

In Agile IT Governance, service quality should generate a feedback loop. Complaints, feature requests, incidents, and usability issues don't stop at ticket registration but are converted into evidence for backlog improvement. This way, users become sources of information for IT governance, not just recipients of services.

Interoperability at the Core of Application Integration

Interoperability is the first element in the application integration construct. This study defines application integration through interoperability, data consistency, and system connectivity. Interoperability indicates the ability of different systems to communicate and use information meaningfully.

A closer analysis shows that interoperability has at least three layers. The first layer is technical interoperability, which is the ability to exchange messages through APIs, web services, middleware, or other mechanisms. The second layer is syntactic interoperability, which is the compatibility of data structures and formats. The third layer is semantic interoperability, which is the similarity of data meaning. Integration that only reaches the technical layer is insufficient if the connected systems interpret the data differently.

In IT governance, interoperability requires architectural standards. Institutions need to establish integration patterns, API standards, authentication, authorization, logging, error handling, versioning, and monitoring. Without IT governance, each new integration can increase technical and integration debt. Therefore, IT governance architecture must be part of Agile IT Governance.

Interoperability also has implications for agility. The better systems can communicate through documented and stable interfaces, the less impact local changes will have on other systems.

This means that good integration can reduce coupling and increase an institution's ability to make incremental changes.

Data Consistency as a Prerequisite for a Single Source of Truth

Data consistency is the second element of application integration. Analytically, data consistency is not the same as format consistency. Two systems can use the same format but have different values due to differences in update timing, business rules, or data sources. Therefore, consistency must encompass values, definitions, timing, and ownership.

Consistency issues typically arise when each unit maintains its own master data. A conceptual example is student identities, study programs, lecturers, courses, and academic statuses stored across multiple systems. If changes are made in one system but not synchronized to the others, dashboards or reports may produce different values. In the context of IT governance, such discrepancies constitute information risks.

The IT governance solution derived from these findings is to establish a master data domain, data owner, data steward, quality rules, synchronization policy, lineage, and reconciliation mechanism. This approach also supports auditability because institutions can explain where data originates, when it's updated, who is responsible, and how data is moved between applications.

Data consistency also serves as a bridge between application integration and digital transformation. Integration without consistent data simply shifts the problem from one system to another. Conversely, integration that produces consistent data enables analytics, dashboards, and decision support to be used with greater confidence.

System Connectivity and Process Continuity

System connectivity is the third element of application integration. In the research model, connectivity refers to the interconnectedness of systems between units. Analysis of this element should be distinguished from simply network availability. Connectivity, in the application context, concerns the continuity of relationships between services and the ability to maintain processes when components change.

Mature connectivity enables end-to-end processes. As a conceptual example, an academic service process might involve user identity, academic systems, payments, learning, libraries, and reporting. If each system is only partially connected, users still have to switch processes and re-enter input. If connectivity is designed as a process flow, then an event in one system can trigger actions in another system in a controlled manner.

The implication for IT governance is the need for service dependency maps and integration monitoring. IT leaders and managers need to know critical applications, the services they depend on, the available interfaces, and the impact if a service fails. This information helps prioritize incidents, recovery, and investment.

Agile IT Governance as a Mediation Mechanism

The most important conceptual finding in the proposal is the position of Agile IT Governance as a mediator. The proposal states that the research's novelty lies in constructing a mediating relationship, where Agile IT Governance bridges the influence of application quality and integration on digital transformation. Theoretically, mediation means that application quality and integration are not considered sufficient to explain digital transformation. Both provide capabilities, while IT governance explains how these capabilities are translated into organizational value. For example, reliable applications do not automatically accelerate transformation if portfolio management fails to

prioritize improvements. Similarly, good integration does not automatically generate value if data ownership and decision rights are unclear.

IT agility supports the importance of IT governance mechanisms. Sari et al. (2024) analyzed the structure, processes, and relational mechanisms of IT governance and reported that relational mechanisms have a significant positive influence on IT agility. These findings provide conceptual support that agility is generated not only by formal procedures but also by relationships and coordination between actors. Vaia et al. (2022) also discussed the mechanisms and principles of digital IT governance that enable agile responses in dynamic environments. In the context of this research, these principles can be translated into IT governance that has clear decision rights, controlled autonomy, rapid feedback, and investment commitments that can be adjusted based on evidence.

Digital Transformation as an Organizational Outcome

Digital transformation is positioned as the final outcome of the model. The proposal emphasizes that digital transformation involves not only technology adoption but also changes in processes, culture, decision-making, and governance. Therefore, transformation outcomes need to be distinguished from technology outputs.

Technology outputs can include new applications, new APIs, new dashboards, or cloud services. Transformation outcomes further encompass changes in work practices, process integration, improved service quality, data-driven decisions, and the organization's ability to respond to change. This distinction is important so that research does not conclude digital transformation solely based on the number of successfully implemented applications. Fernández et al. (2023) showed that digital transformation in higher education encompasses information, processes, people, and organizational strategy. The study also found that only a portion of the institutions in their sample had a digital strategy in place and that many initiatives were implemented in isolation. This finding strengthens the argument that transformation outcomes require coordination across initiatives. Bravo-Jaico et al. (2025) demonstrated that digital transformation maturity can be viewed across multiple dimensions and actors. Therefore, transformation outcomes in this study should be measured multidimensionally and not solely through the perceptions of a single group of respondents.

The Relationship between Application Quality and Agile IT Governance

The relationship between application quality and Agile IT Governance can be explained through the mechanism of information visibility. When application quality can be measured consistently, IT governance has evidence to determine priorities. Conversely, if data on reliability, information quality, and service quality is unavailable, IT governance decisions are more likely to rely on perceptions, individual complaints, or short-term pressures.

Application quality also impacts IT governance's ability to manage risk. Applications with high incident rates, long recovery times, or inconsistent information require greater IT governance attention. Therefore, quality metrics can serve as early warning indicators. In an agile model, these indicators can be used to trigger backlogs, reviews, or priority changes.

However, this relationship still needs to be tested empirically. The proposal does plan to use SEM/PLS to test the construct relationship. Therefore, this description represents a theoretical mechanism explaining why the relationship is worth testing, not proof of significance.

The Relationship of Application Integration to Agile IT Governance

Application integration has the potential to impact Agile IT Governance by improving process visibility. When cross-unit processes are connected, IT governance can more clearly identify dependencies and bottlenecks. This facilitates change prioritization, impact assessment, and coordination across system owners.

Integration also changes the unit of analysis for IT governance. Systems previously managed as individual applications become part of a service ecosystem. This shift requires IT governance to shift from application-centric to service and ecosystem IT governance. Decision makers must consider the impact of changes on the entire service chain.

On the other hand, greater integration can also increase complexity and risk. Therefore, the relationship between integration and IT governance should not be interpreted as more integration is always better. What's more important is the alignment of integration with process needs, values, risk appetite, architectural principles, and IT governance data.

Agile IT Governance towards Digital Transformation

The relationship between Agile IT Governance and digital transformation can be explained through four main mechanisms: alignment, prioritization, coordination, and learning. Alignment ensures digital investments are linked to institutional goals. Prioritization ensures resources are directed toward valuable changes. Coordination unites technical units and process owners. Learning ensures IT governance changes based on evidence and feedback.

This mechanism explains why IT governance can function as an organizational capability. Digital transformation requires numerous simultaneous changes, so organizations need mechanisms to determine the sequence of changes, assign owners, manage risks, and evaluate outcomes. Without such mechanisms, organizations can have numerous digital projects but struggle to deliver coherent institutional change.

Application Quality Mediation to Digital Transformation

If application quality influences digital transformation through Agile IT Governance, then governance serves as a conversion mechanism. Application quality provides the operational conditions that enable services to run; governance transforms this quality information into priorities and actions; actions result in process and service changes. Examples of testable mechanisms are: an increase in the incident rate leads to a governance review; a governance review prioritizes remediation; remediation increases reliability; reliability improves service continuity; and continuity supports digital process adoption. This sequence illustrates an indirect pathway that can be examined with specific indirect effects in PLS-SEM.

Interpretation of mediation must await data. It should not be concluded that full or partial mediation occurs before direct and indirect effects are calculated using bootstrapping. This is important because the goal of research is to generate an empirical model, while a new proposal specifies the test design.

Application Integration Mediation for Digital Transformation

The mediating mechanism for application integration can be explained by improving cross-system coordination capabilities. Interoperability, data consistency, and connectivity create the technical conditions for end-to-end processes. Agile IT Governance then determines how integration is prioritized, who has decision rights, how risks are managed, and how integration performance is evaluated.

With this mechanism, integration doesn't just stop as a technical project. Governance transforms integration capability into organizational capability. This is a key innovation in the model, as the proposal explicitly positions Agile IT Governance as a dynamic mechanism that bridges application factors with digital transformation.

COBIT 2019 Integration with Agile Principles

This study selected COBIT 2019 as a governance framework enriched with agile principles. Analysis of these design decisions demonstrates the need to maintain two often-contradictory demands: control and adaptability. COBIT provides governance structure, objectives, accountability, risk management, performance measurement, and alignment. Agile principles provide iterative mechanisms, feedback, incremental delivery, and adaptive prioritization.

Integrating the two shouldn't be done by adding the term "agile" to every COBIT process. What's more important is changing the operating rhythm of governance. Governance reviews can be conducted periodically and based on evidence, backlogs can be prioritized, decision rights can be distributed according to impact, and retrospectives can be used to improve governance processes. Thus, the proposed hybrid governance principles include: control by design, autonomy within guardrails, evidence-based prioritization, incremental delivery, continuous risk review, and explicit accountability. These principles need to be validated within an institutional context before being adopted as permanent standards.

CONCLUSION

This study concludes that: First, the research produces an analytical framework that positions application quality and application integration as key technical capabilities in Agile IT Governance. Application quality is represented by system reliability, information quality, and service quality, while application integration is represented by interoperability, data consistency, and system connectivity. This structure is consistent with the constructs established in the proposal and is reinforced by the information systems success literature. Second, Agile IT Governance is positioned as a mechanism that transforms technical capabilities into digital transformation outcomes. Governance in the model is not merely a control mechanism, but rather a dynamic coordination mechanism that includes prioritization, decision rights, architecture governance, risk and security, performance monitoring, stakeholder collaboration, and continuous improvement. Third, the integrated model demonstrates that digital transformation in higher education needs to be understood as a socio-technical phenomenon. Adding applications is not enough. Transformational value emerges when quality applications are connected, data is consistent, cross-unit processes are integrated, and governance decisions are able to respond to change while maintaining accountability. Fourth, the research model provides a theoretical contribution by integrating the perspectives of information systems success, application integration, and agile IT governance into one framework. Its practical contribution is to provide a basis for portfolio management, integration governance, data governance, decision rights, performance dashboards, and continuous improvement in higher education institutions.

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