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An Integrated IT Governance and Project Management Framework for Resource-Constrained Universities in Timor-Leste

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***Abstract*—This study designed and validated an integrated information technology governance (ITG) and project management strategy for resource-constrained universities in developing countries. A mixed-methods approach combined a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)-guided systematic review, three criterion-based elite interviews at a private university in Timor-Leste, and expert validation to refine the model. The framework operationalized ISO/IEC 38500 principles as governance guardrails across the PMBOK 7th Edition performance domains, linking decision rights, escalation paths, and conformance duties to day-to-day delivery routines. Findings indicated that the integration clarified accountability, mitigated the mum effect through time-boxed escalation and red-flag protocols, supported phased low-bandwidth service deployment, and aligned institutional priorities with budget and capacity constraints. This study introduced a governance–execution fit mechanism that made governance actionable in resource-constrained higher education settings. It also provided policy recommendations for university leaders and regulators: formalize an IT Steering Committee (ITSC) by decree, embed ISO/IEC 38500 guardrails into portfolio and project life cycles, mandate lightweight governance artifacts (charters, responsible–accountable–consulted–informed (RACI) matrices, risk registers, and decision logs), and adopt phase-gated funding with targeted capability building. These measures strengthen feasibility, scalability, and strategic adoption across comparable contexts.**

***Index Terms*—IT governance, project management, ISO/IEC 38500, PMBOK 7th edition, higher education in developing countries.**

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I. Introduction

Information technology (IT) has become strategic to teaching, research, and institutional management in higher education; universities must adapt their governance and delivery so IT investments create value [1]. IT enables online learning, integrated services, and faculty development that enhance creativity and productivity in fulfilling the Tridharma of higher education [2]–[4]. Since the COVID-19 pandemic, institutions have emphasized flexible, context-specific IT strategies [5].

Effective IT governance (ITG) and project management align capabilities with institutional goals. Frameworks such as the Control Objectives for Information and Related Technology (COBIT) and ISO/International Electrotechnical Commission (IEC) standards provide oversight, while the Project Management Institute's (PMI) Guide to the Project Management Body of Knowledge (PMBOK Guide), Seventh Edition, structures project delivery. However, higher education institutions (HEIs) in developing contexts still face fragmented systems, low digital literacy, infrastructure gaps, and cultural resistance to digital learning [6]–[11]. The "mum effect", reluctance to report problems, impedes transparent risk escalation [7]; Indonesian work on the Initial FIT-HR model illustrates efforts to tighten IT-business alignment [12].

Universidade Oriental Timor Lorosa'e (UNITAL), a private university located in Becora, Dili, was established in 2002 [13] and operates under fiscal constraints, relying on external partnerships and development grants (e.g., World Bank, Asian Development Bank) that increasingly prioritize digital transformation [14], [15]. With ~62% of Timor-Leste's population under 30 [16], demand for digital education is rising. Connectivity improvements, particularly with Timor Telecom and Telkomcel, are concentrated in urban Dili [17], while cultural resistance and uneven digital literacy temper adoption.

Addressing this gap, the study makes a novel contribution by integrating the ISO/IEC 38500 and PMBOK 7th Edition frameworks. This approach has been rarely explored in prior research, particularly within the context of developing-country

universities. This integration provides a comprehensive framework that links ITG with project execution, offering both theoretical and practical value for resource-constrained HEIs such as UNITAL. At the policy level, the framework can inform national policy and accreditation strategies for the digital transformation of higher education in developing countries. This study applies a unified ISO/IEC 38500–PMBOK 7th Edition model tailored for under-resourced universities in developing contexts.

Prior research on ITG and project management in higher education often treats the domains separately, with governance studies emphasizing maturity assessments or policy structures. In contrast, project management studies focus on portfolio alignment or project typologies, with few demonstrations of how board-level principles translate into operational delivery, particularly in resource-constrained HEIs [18]. Evidence also suggests a bias toward developed contexts (e.g., Spain, Portugal), which limits the transferability of findings to under-resourced universities [19]. This study addresses the gap by operationalizing ISO/IEC 38500 through the PMBOK 7th Edition; embedding governance decision rights into delivery workflows and artifacts (charter, responsible–accountable–consulted–informed (RACI), risk, and decision logs); and tailoring the framework to UNITAL's constraints, including the "mum effect," bandwidth limitations, and cultural resistance. Table 1 summarizes the mapped research gap.

Table 1.
Summary of Research Gap

Prior Studies	Focus	Limitation	This Study Contribution
[1]	ISO/IEC 38500 and Design Science Research (DSR)	Conceptual model only; no integration with project execution frameworks (e.g., PMBOK).	Operationalizes ISO/IEC 38500 principles via PMBOK 7th Edition domains.
[8]	ISO/IEC 38500 and ITG Institutional Framework (ITGIF)	Broad survey-based maturity assessment; lacks execution-level mechanisms.	Links governance maturity with actionable delivery controls.
[20]	Rubric for IT project portfolios	Portfolio alignment evaluation; no prescriptive project execution guidance.	Provides an integrated governance and execution model.
[21]	Rubric for IT project alignment	Assessment-focused; lacks governance-to-execution mechanisms.	Develops workflows connecting governance and project delivery.
[22]	Strategic IT Project Portfolio Model (SITPP)	High-level project classification; limited detail on life cycle execution.	Embeds life cycle and risk management through the PMBOK 7th Edition's domain.
Overall gap		Developed-country settings and weak contextualization for resource-constrained HEIs dominate the literature.	Proposes a contextualized framework for UNITAL that addresses the mum effect, bandwidth limits, and cultural resistance

Digital transformation in HEIs extends beyond technology adoption to institution-wide change; however, only one in four HEIs has a digital strategy, and more than half pursue isolated initiatives [23]. Prior work identifies strategic drivers and readiness factors [15] but offers limited guidance on how project management practices operationalize governance principles, resulting in a governance–execution gap. HEIs frequently run fragmented initiatives with low strategic return [23], rely on self-report readiness tools [24], and lack clear guidance at the transformation–project interface [25]. This study designs and validates an integrated ITG and project-management strategy for resource-constrained HEIs, linking policy-level governance to execution and providing actionable guidance for leaders, with a framework suitable for adoption by regulators and accreditation bodies in developing-country contexts.

II. Literature Review

Effective implementation of IT in HEIs requires targeted technological investment, robust ITG, and structured project management. The ISO/IEC 38500 standard is widely adopted for ITG, providing oversight and decision-making principles [24], while the PMBOK 7th Edition offers a comprehensive approach to project delivery [26]. Despite extensive treatment of each framework in isolation, limited research examines their integration, particularly in resource-constrained universities in developing countries. This study reviews HEI literature on ITG and project management, identifies remaining gaps, and establishes the theoretical basis for an integrated model tailored to institutions such as UNITAL.

A. IT Governance (ITG) in Higher Education

ITG refers to the processes that ensure the practical and strategic use of IT in achieving institutional objectives. In higher education, ITG is essential for aligning technological initiatives with academic missions, improving service delivery, and ensuring regulatory compliance. The ISO/IEC 38500 standard has emerged as a widely adopted framework that provides six principles—responsibility, strategy, acquisition, performance, conformance, and human behavior —to guide IT oversight and decision-making [1], [10], [27].

These principles provide a strategic framework through which universities can formalize IT roles, enhance accountability, and integrate IT decisions into institutional planning. Previous studies emphasize that applying ISO/IEC 38500 in higher education enhances decision-making transparency and reduces the misalignment of IT with organizational goals [1], [9], [11], [20]. However, its implementation in resource-constrained environments remains limited, often due to weak leadership support, insufficient policy frameworks, and a lack of skilled personnel [8], [21].

B. Project Management in IT Implementation

Structured project management practices must support effective ITG, ensuring that IT initiatives are executed efficiently and align with institutional goals. The PMBOK 7th Edition framework, developed by the PMI, adopts a

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value-based and principle-driven approach, replacing rigid process models with flexible performance domains [26]. These domains, such as stakeholder engagement, team collaboration, planning, delivery, and uncertainty management, are particularly suitable for dynamic and resource-constrained environments like higher education.

Research has shown that applying PMBOK 7th Edition principles improves project success rates, enhances stakeholder communication, and strengthens alignment between IT projects and institutional strategies [11], [20], [22]. In universities with limited project management infrastructure, PMBOK 7th Edition offers a scalable methodology to guide project execution while maintaining consistency with broader governance frameworks [1].

C. Integration Gaps in Existing Studies

Despite widespread use of ISO/IEC 38500 for governance and the growing relevance of the PMBOK 7th Edition for execution, most studies treat the frameworks in isolation. Governance-focused work [1], [8] concentrates on structures, maturity, and alignment, but omits operational integration; portfolio-oriented contributions [20], [21] emphasize evaluation and alignment tools without prescriptive delivery mechanisms. A few studies have considered strategic IT alignment, but with limited attention to execution [22], and their findings largely stem from well-funded institutions in developed contexts, which limits their applicability to under-resourced settings. The resulting gap is a unified, end-to-end model that links strategic oversight to project-level delivery in resource-constrained HEIs, a space rarely explored and addressed here by this study.

III. Research Method

This study applies a mixed-method approach that combines a systematic literature review (SLR) with a qualitative case study at UNITAL. The SLR establishes the theoretical foundation and identifies gaps in prior studies, while the case study provides contextual evidence from resource-constrained HEIs. This combination ensures that the proposed framework is theoretically grounded and practically relevant.

A. Systematic Literature Review Procedures

This study applied the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis)-based SLR method [28] to establish a robust theoretical foundation to identify relevant models and gaps in integrating ITG and project management in higher education. To define the scope of the review, this study used the population, intervention, comparison, outcome, and study design (PICOS) framework, which is commonly applied in an SLR [29].

- Population (P): Higher education institutions, particularly in developing countries.
- Intervention (I): Application of ITG frameworks (ISO/IEC 38500, COBIT) and Project Management frameworks (PMBOK 7th Edition).
- Comparison (C): Studies addressing ITG or project management separately.
- Outcome (O): Evidence of integrated approaches, operational mechanisms, or alignment between governance and project execution.
- Study design (S): Empirical (case studies, surveys, mixed-methods, quasi-experiments), design-science artefacts with evaluation, and SLRs; peer-reviewed; 2019–2025.

1) Research strategy

This study employed database-specific search strategies in IEEE Xplore, Scopus, SpringerLink, ACM Digital Library, Emerald Insight, Google Scholar, and ScienceDirect to ensure comprehensive coverage. The database search covered records published between January 01, 2019, and March 15, 2025, with the final search performed on March 15, 2025. It also applied Boolean operators and truncations to capture variations of key terms related to ITG, project management frameworks, and HEIs.

Although the core concepts remained consistent across databases: "project management" AND ("IT governance" OR "ISO/IEC 38500" OR "strategic IT alignment") AND ("higher education" OR "universities" OR "HEIs") AND ("framework" OR "methodology" OR "implementation"), minor adjustments were made to comply with the syntax of each database. For example, the query used in IEEE Xplore and Scopus was: ("Project Management" OR "PMBOK*") AND ("Information Systems*" OR "IT Strategy" OR "Strategic IT alignment") AND ("Universities" OR "Higher Education Institution*" OR "HEI*") AND ("Framework" OR "Methodology" OR "Implement*")*. The search strategy employed similar structures to those used in Emerald Insight, Google Scholar, and ScienceDirect, incorporating filters such as content type (article) where available.

2) Eligibility criteria

This study established the inclusion and exclusion criteria per the PICOS framework to ensure consistency and transparency in the review process. The review included studies that (i) were published between 2019 and 2025, (ii) appeared in peer-reviewed journals or reputable conference proceedings, (iii) focused on HEIs or public-sector contexts transferable to higher education, (iv) explicitly addressed ITG, project management, or their integration, and (v) were written in English. The review excluded studies that (i) did not involve higher education or lacked relevance to institutional governance and project execution, (ii) were not published in English, (iii) comprised editorials, book reviews, dissertations, or grey literature, or (iv) focused solely on technical IT infrastructure without governance or project management implications.

3) Review process

This study followed the PRISMA 2020 protocol to ensure

transparency and replicability [28]. The identification stage yielded 851 records across Scopus, IEEE Xplore, SpringerLink, ACM Digital Library, Emerald Insight, Google Scholar, and ScienceDirect; after deduplication, title/abstract screening excluded studies not focused on IT governance or project management in higher education. The study assessed the full texts against predefined inclusion and exclusion criteria, identified five studies eligible for synthesis, and extracted data on governance focus, project alignment, operational mechanisms, and context. Fig. 1 presents the PRISMA flow diagram.

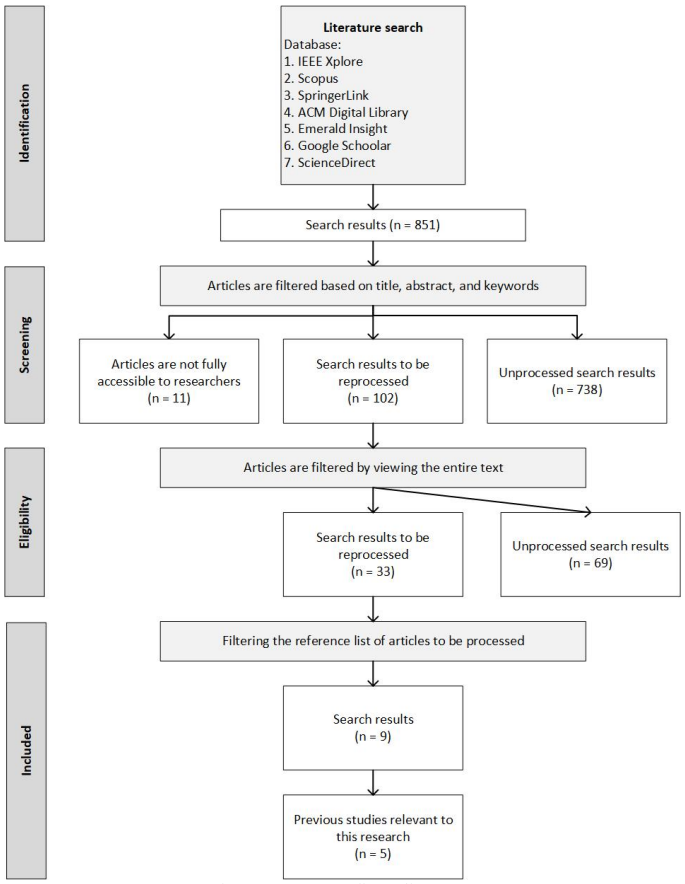

Fig. 1. PRISMA flow diagram.

B. Summary of Related Work

Using Fong's summary–critique–synthesis (SCS) framework [30], the review compared governance focus, portfolio alignment, operational integration, and institutional context across the selected studies [1], [8], [20]–[22]. Evidence shows broad use of ISO/IEC 38500 to assess governance maturity and strategic alignment in HEIs, yet integration with execution-level project management—particularly the PMBOK 7th Edition remains limited. Portfolio rubrics in [21] and [22] aid evaluation but stop short of prescribing specific delivery mechanisms. The literature is predominantly concentrated in developed-country settings (e.g., Spain, Portugal), which limits its transferability to resource-constrained environments; only a minority of studies from developing regions address the challenges of weak infrastructure, funding, and skills. To address these gaps, this study proposes an integrated model that links ISO/IEC 38500's strategic oversight with the PMBOK 7th Edition execution approach, identifying convergences and gaps in HEI ITG and project management frameworks (Table 2).

C. Research Design

This mixed-methods study develops a contextual model that operationalizes ISO/IEC 38500 across the eight performance domains of PMBOK 7th Edition for resource-constrained higher education institutions, combining a PRISMA-guided systematic review with a qualitative single-case study at UNITAL and expert validation. This design is suitable for generating context-aware insights and synthesizing existing governance and project management frameworks rather than testing predefined hypotheses [31]. The research design consisted of four interrelated stages: (1) conceptual grounding through an SLR, (2) data collection from institutional stakeholders, (3) synthesis and formulation of a draft model, and (4) validation and refinement through expert input. These stages ensured methodological rigor, traceability, and alignment with the governance challenges observed in developing-country university environments.

Figure 2 illustrates the four-step research design employed in this study, which begins with conceptual grounding and concludes with expert validation. Each stage reflects the logical flow of developing a context-specific ITG and project management model for HEIs in developing countries. Rather than constructing a new framework from scratch, the proposed model synthesizes two internationally recognized standards: ISO/IEC 38500 for ITG and the PMBOK 7th Edition for project management. The model development was grounded in a systematic analysis of relevant literature and refined through expert feedback to ensure contextual alignment and practical feasibility.

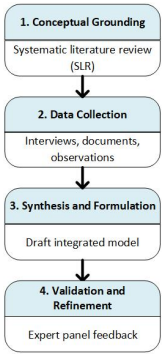

Fig. 2. Sequential stages of the research design process.

Table 2.
Comparative Analysis of IT Governance Models in Higher Education Institutions

Analysis	[1]	[8]	[20]	[21]	[22]
Summary	Proposes an ITG model (ITGM) for HEIs using DSR (Design	Examined ITG maturity across 40 HEIs in Latin	Presents a rubric to assess the alignment of	Identifies key alignment factors (e.g.,	Validates a rubric for evaluating the

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Analysis	[1]	[8]	[20]	[21]	[22]
	Science Research), addressing the limits of traditional frameworks in decentralized academic contexts.	America and Portugal. It focused on governance structures, stakeholder roles, decision-making processes, and strategic alignment.	IT projects with governance standards in universities.	communication, governance) shaping IT project success in HEIs.	alignment of IT projects with governance using surveys across Spanish universities.
Critique	Relies on expert input with limited empirical validation; lacks integration with project management.	While methodologically robust, the study did not explore integration with project management practices or frameworks, such as PMBOK, and lacked a focus on execution-level mechanisms.	It depends on subjective institutional evaluation and lacks guidance for improvement and project-level integration.	Conceptual only; not translated into actionable or scalable tools.	It relies on self-reported data and lacks follow-up mechanisms for institutions with low scores.
Synthesis	Helpful in developing context-aware models in developing countries, with potential extension to include execution monitoring.	Reinforces the importance of leadership, institutional commitment, and formalized governance bodies in embedding ISO/IEC 38500 principles within higher education settings.	It provides a maturity assessment tool, which is valuable for the initial diagnostic stages of governance adoption.	Provides strategic input for governance models, particularly in embedding alignment into project operations.	Functions as a diagnostic entry point; future models should link it with execution planning.
Framework /Model	ITGM, comprising the Structuring, Operationalization, and Monitoring blocks, is built upon ISO/IEC 38500 and guided by DSR.	ISO/IEC 38500 combined with an adapted ITGIF to assess governance maturity, strategic alignment, risk management, and value delivery in HEIs.	The CEPTIU rubric (Cartera Estratégica de Proyectos de TI para Universidades) comprises 16 elements, 21 benefits, and 6 ITG principles from ISO/IEC 38500 for evaluating university IT project portfolios.	The study developed the CEPTIU rubric as an evaluation tool to assess university IT project portfolios and adapted it to align with ITG principles based on ISO/IEC 38500.	Strategic IT Project Portfolio Model (SITPP), integrating ITG principles from ISO/IEC 38500 with strategic processes to support prioritization and execution of projects aligned with the university's business objectives.

D. Data Collection

This study used multiple qualitative techniques to develop a comprehensive, contextually grounded understanding of UNITAL's ITG and project management, drawing on four evidence sources: stakeholder interviews, institutional documents, insider knowledge, and expert focus group discussions.

1) Stakeholder interviews

This study conducted semi-structured interviews with three purposively selected key informants: academic leadership, ICT management, and a faculty representative, all of whom were directly involved in ITG and project execution. The interviews were conducted remotely (via WhatsApp, telephone, and e-mail) due to logistical constraints. Using the information power principle, a narrow, theory-driven aim (operationalizing ISO/IEC 38500 within the PMBOK 7th Edition for a resource-constrained HEI), a particular sample, and information-rich dialogues indicated that three interviews were sufficient [32], core themes recurred by the second interview, and the third provided confirmatory and negative-case evidence. Triangulation (systematic review and institutional documents), member checking, and an audit trail enhanced credibility, while the protocol upheld ethical standards through informed consent, voluntary participation, and guaranteed confidentiality and anonymity.

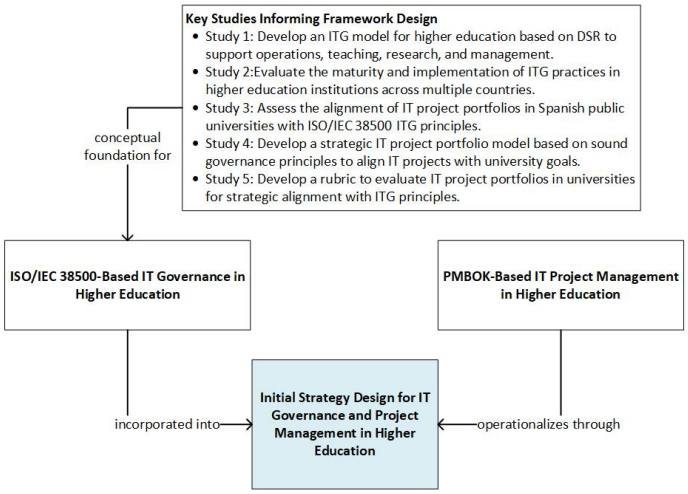

Fig. 3. Theoretical framework integrating ISO/IEC 38500 and PMBOK 7th edition for higher education.

2) Document analysis

Institutional documents, including policies, accreditation reports, and strategic plans, were reviewed to align the proposed framework with actual institutional practices. The document review provided additional evidence to support and triangulate the interview findings.

3) Insider contextual knowledge

Geographical constraints prevented direct on-site observations; however, a co-author, who serves as a UNITAL staff member, contributed insider perspectives on IT infrastructure, workflows, and administrative practices. This study triangulated these insights with interview data, institutional documents, and expert validation to mitigate potential bias.

4) Focus group discussions

This study organized structured focus group discussions (FGD) with external ITG and project management experts to validate and refine the proposed framework, incorporating critical perspectives beyond the case institution to ensure contextual relevance and broader applicability.

E. Data Analysis

This study employed purposive sampling to select key stakeholders at UNITAL, including academic leadership, the ICT team, and faculty, based on their roles, experience, and direct involvement in ICT operations, academic activities, and accreditation. Semi-structured interviews were conducted remotely (via WhatsApp, telephone, and email), each 45–60 minutes, with follow-up emails for clarification. Questions targeted four domains: (i) IT infrastructure, (ii) availability and adequacy of information systems, (iii) IT competencies, and (iv) governance, process management, and accreditation challenges.

Verbatim transcripts underwent member checking, enhancing credibility through triangulation with institutional documents, insider knowledge, and expert focus group input. The analysis employed thematic analysis, following Braun and Clarke's six-phase framework—familiarization, coding, theme development, review, definition, and reporting—to identify recurrent patterns in stakeholders' perspectives on IT governance and project management at UNITAL [33].

F. Theoretical Framework

Building on prior HEI ITG research [1], [8], [20]–[22], this study adopts ISO/IEC 38500 as the organizing frame for policy design and evaluation in academic institutions. The framework (Fig. 3) aligns board-level decision rights with the eight performance domains outlined in the PMBOK 7th Edition. It operationalizes the six ISO/IEC 38500 principles: Responsibility, Strategy, Acquisition, Performance, Conformance, and Human Behavior, through domain-specific artifacts (charter, RACI, risk and decision logs), triggers (escalation thresholds/Service Level Agreements(SLAs)), and Key Performance Indicators (KPIs) (issue age, escalation cycle time, low-bandwidth availability, adoption, variance).

IV. RESULTS

This section presents the core findings from stakeholder interviews, document analysis, and an SLR. The results highlight empirical conditions at UNITAL and synthesize key insights from prior research to support the development of the proposed integrated model.

A. Stakeholder Interview Findings

1) IT infrastructure limitations

a. Bandwidth constraints: Internet speeds are insufficient for institutional operations. For example, one ICT staff member noted, "The bandwidth is only 2 Mbps, which is insufficient for online learning."
b. Limited coverage: Network availability is restricted to a 20–30-meter radius, resulting in the disconnection of several faculties.

2) Lack of core information systems

a. Manual processes: The institution lacks an academic information system, so staff manually handle course registration and other processes.
b. Absence of e-learning tools: UNITAL lacks digital learning platforms to support remote or hybrid teaching.

3) Human Resource challenges

a. Underqualified personnel: Untrained staff are often assigned to technical roles despite lacking adequate training.
b. Insufficient capacity building: There is limited investment in IT training and skill development for academic and support staff.

4) Weak management support

Participants highlighted issues related to insufficient managerial support for IT initiatives:

a. No strategic IS/IT planning: No formal IT roadmap or governance document exists.
b. Low leadership involvement: Institutional leaders do not prioritize IT in strategic planning.

5) Inadequate documentation and accreditation

a. Missing SOPs and indicators: Standard operating procedures and documentation related to performance and quality assurance are incomplete.
b. Unprepared accreditation team: Staff involved in accreditation lack the experience and training to prepare supporting documents.

6) Fragmented data management

Student, alumni, and finance data are not integrated within a centralized information system, leading to inefficiencies and duplication.

B. SLR Output Summary

Five studies provide a multidimensional perspective ITG in HEIs, emphasizing alignment, governance maturity, and strategic control, but differing in terms of theory, context, and coverage of project management. Most originate from developed or well-funded settings, creating a contextual gap for under-resourced environments such as UNITAL. Table 3 summarizes core arguments, limitations, and integration opportunities, and the literature collectively supports a holistic model that links governance oversight with execution in developing-country HEIs.

Two studies explicitly adopt ISO/IEC 38500: [1] proposes a design-science ITG model for HEIs in Brazil focused on roles,

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Table 3.
Thematic Analysis of Reviewed Studies

No	Study Reference	Framework Used	Project Management Focus	Limitations	Country Context
1	[1]	ISO/IEC 38500 and DSR	Limited: The model focuses on governance structures and principles rather than execution-level project practices.	The study team did not empirically implement the model in a live institutional setting or integrate it with standard project management frameworks such as PMBOK.	Brazil (Developing Country)
2	[8]	ISO/IEC 38500 and ITGIF	The study did not explicitly address this aspect, as it focused on the structural and strategic levels of governance.	The study does not integrate project management frameworks, such as PMBOK, and limits its implementation aspects to perception-based evaluations.	Developing Countries (primarily Latin America, with one Developed Country – Portugal)
3	[20]	ISO/IEC 38500 and Rubric	High: Focused on project portfolio selection and prioritization within the governance framework.	Limited to the Spanish context; does not propose a transferable or formalized governance model; lacks integration with project execution frameworks.	Spain (Developed Country)
4	[21]	ISO/IEC 38500 and Rubric	Medium: Centers on project portfolio evaluation and strategic alignment, but does not prescribe or guide execution-level project management practices.	Context is limited to Spanish universities; the rubric focuses on assessment rather than a prescriptive governance model or execution framework, and there is no empirical linkage to project outcomes.	Spain (Developed Country)
5	[22]	ISO/IEC 38500 and SITPP	Medium to high: Emphasizes alignment and prioritization of projects, but does not provide detailed information on execution methods or life cycle management.	It focuses on strategic classification rather than execution processes, lacks a standardized governance framework such as ISO/IEC 38500 or COBIT, and has limited generalizability beyond Spanish institutions.	Spain (Developed Country)

alignment, and enablers, but remains conceptual and not integrated with operational frameworks like the PMBOK 7th Edition; [8] measures ITG maturity across 40 institutions in Latin America and Portugal using ISO/IEC 38500 and an adapted ITGIF, achieving broad benchmarking yet relying on perception-based surveys. Spanish university studies [20], [21] examine portfolio–governance alignment: one analyzes institutional mechanisms and prioritization criteria referencing ISO/IEC 38500 but lacks prescriptive governance models [20]; the other proposes a rubric to assess alignment [21]. A further contribution [22] classifies IT projects by alignment level without employing international standards, thereby offering limited insight into delivery practices.

Across the corpus, project management coverage remains partial, as none fully integrates the PMBOK 7th Edition, leaving the governance–execution interface underspecified. Three studies come from the Spanish system, while two reflect developing regions, providing some contextual breadth but underscoring the need for an integrated framework that links ITG to operational project execution in resource-constrained HEIs.

1) Adoption of ITG frameworks

Literature on HEIs widely adopts formal ITG frameworks to strengthen accountability, transparency, and decision-making. Studies [1], [8], [21] use ISO/IEC 38500 to assess governance maturity, specify roles and responsibilities, and align IT initiatives with strategy; although COBIT and Information Technology Infrastructure Library (ITIL) appear in broader discussions, ISO/IEC 38500 remains the dominant normative reference in higher-education contexts. Multivocal evidence nonetheless indicates weak or absent linkages between governance and delivery routines in digital initiatives, underscoring the need for mechanisms that translate decision rights into day-to-day project practices [23].

2) Limited integration of project management practices

Despite emphasizing governance and portfolio alignment, existing studies lack explicit integration with formal project management standards such as the PMBOK 7th Edition. While some papers address project prioritization and classification [20], [22], they do not link these mechanisms to execution-level frameworks. Institutional measurement relies heavily on self-assessment; although a data-informed framework with 72 indicators across seven dimensions has been proposed [24], these metrics rarely connect to governance guardrails or delivery routines in HEIs. This gap underscores the need for an integrated model that aligns ITG structures with project life cycle methodologies and assurance metrics, thereby strengthening implementation outcomes.

At the intersection of project management and digital transformation, the literature remains conceptually fragmented. A recent systematic review highlights four themes—methodologies and sociotechnical integration, interface misalignments, governance and leadership, and

sector-specific trajectories—underscoring the need to operationalize governance within project delivery [25].

3) Strategic alignment between IT and institutional goals

All studies consistently highlight strategic alignment as a critical success factor. They emphasize that institutions should design IT projects to support their missions, using rubrics, maturity assessments, or classification models to guide alignment [1], [8], [20]–[22]. Misalignment leads to fragmented governance, inefficient resource use, and diminished long-term impact. These findings support the rationale for integrated models that unify governance and project oversight, especially in resource-constrained environments. Environments.

4) Contextual challenges in developing countries

While most studies originate from developed contexts (Spain, Portugal), two studies provide insights from developing regions [1],[8]. These highlight critical barriers, including limited infrastructure, inconsistent IT policies, low digital literacy, and insufficient institutional support. These contextual constraints reflect the empirical realities observed at UNITAL, underscoring the need for governance models that are adaptable, scalable, and responsive to institutional capacity limitations.

This study proposes a unified framework integrating ISO/IEC 38500 with the PMBOK 7th Edition to address these shortcomings. This approach aligns strategic governance with practical project execution through a single, context-sensitive model that supports IT decision-making, implementation, and continuous improvement in developing-country institutions such as UNITAL.

C. Comparative Visualization

To maintain clarity between empirical and literature findings, this section provides a comparative visualization that highlights how stakeholder interviews and SLR results converge on common challenges and gaps. The interview data emphasize operational barriers, including bandwidth limitations, the absence of core academic and e-learning systems, the mum effect (reluctance to escalate problems), underqualified IT staff, weak management support, inadequate documentation for accreditation, and fragmented data management across institutional units.

In contrast, the SLR highlights the widespread adoption of ISO/IEC 38500 for assessing governance maturity and strategic alignment, the use of portfolio rubrics to evaluate IT projects [21], [22], the lack of integration with execution frameworks such as PMBOK 7th Edition, and the predominance of developed-country contexts (e.g., Spain and Portugal) with limited insights from developing regions. Both sources point to the same design imperative: a unified model that bridges strategic governance and project execution while addressing the contextual realities of resource-constrained HEIs. Table 4 summarizes this comparative analysis and sets the foundation for the synthesis presented in Section IV.D.

D. Synthesis and Proposed Integrated Model

Table 4 illustrates convergence between the empirical findings and the SLR: governance frameworks, particularly ISO/IEC 38500, provide strategic oversight but lack execution-level mechanisms. In contrast, institutions such as UNITAL face bandwidth limits, fragmented data, accreditation readiness challenges, and the "mum effect." Building on this convergence, this study proposes an integrated model that operationalizes ISO/IEC 38500 across the PMBOK 7th Edition performance domains, linking board-level decision rights to delivery artifacts, escalation triggers, and KPIs; Fig. 4 illustrates the model.

1) Adoption of ITG frameworks

ISO/IEC 38500 is the primary IT governance standard that aligns IT investments with an organization's strategy and objectives. It defines principles and a model to direct, evaluate, and monitor IT, thereby improving efficiency and business value. ISO and IEC developed the standard to guide responsible, transparent, and strategy-aligned governance across organizations. The standard specifies six core principles in the following sections [27].

Table 4.
Comparative Analysis of Interview and SLR Findings

Source	Key Themes	Common Design Imperatives
Stakeholder Interviews (Empirical Data)	1. Bandwidth limitations and limited network coverage 2. Lack of core academic and e-learning systems 3. Mum effect (reluctance to escalate problems) 4. Underqualified IT staff and limited training 5. Weak management support and absence of an IT roadmap 6. Inadequate documentation and accreditation processes 7. Fragmented data management across units	Establish governance mechanisms that connect strategic oversight with operational practices, ensuring accountability for IT adoption and accreditation readiness.
SLR Results (Literature Evidence)	1. Frequent adoption of ISO/IEC 38500 for governance maturity and strategic alignment 2. Portfolio rubrics used to evaluate IT projects [21],[22] 3. Lack of integration with project execution frameworks, such as PMBOK 4. The majority of studies from developed contexts (Spain, Portugal) have limited insights from developing countries (Brazil, Latin America)	Integrate governance oversight with project delivery frameworks to address gaps in execution and improve applicability in resource-constrained HEIs.
Synthesis	A unified framework that operationalizes ISO/IEC 38500 principles through PMBOK 7th Edition domains, designed to address specific challenges such as bandwidth limitations, the mum effect, cultural resistance, and accreditation processes in developing-country HEIs.	

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- Responsibility: All members of the organization understand their position and responsibility in managing IT.
- Strategy: The use of IT must be aligned with business strategy and provide added value to the organization.
- Acquisition: Organizations must base IT investments on thorough analysis and clear benefits.
- Performance: Organizations must optimize IT usage to achieve the expected performance.
- Conformance: The organization must ensure IT management adheres to applicable laws, internal policies, and industry standards.
- Human Behavior: ITG must consider human aspects, including user competence and the social impact of technology.

2) Project management discipline (PMBOK 7th Edition) domains

The PMBOK 7th Edition, published by the PMI, is an international project management standard emphasizing project values and principles rather than rigid processes. PMBOK 7th Edition adopts a domain-based approach to project performance, replacing the previous process-based concept. The PMBOK 7th Edition outlines eight project performance domains described below [26].

- Stakeholders: Identifying and managing the expectations of project stakeholders.
- Team: Building an effective team and ensuring good collaboration.
- Development Approach and Life Cycle: Determining the appropriate project development method, such as Agile or Waterfall, is crucial for effective project management.
- Planning: Developing a strategy to achieve project goals by considering risks and resources.
- Project Work: Monitoring and controlling project activities to ensure progress and stay on track.
- Delivery: Ensuring that project results align with stakeholder needs and expectations.
- Measurement: Using key performance indicators KPIs to assess project success.
- Uncertainty: Managing risks and uncertainties that may affect the project.

3) Integrated IT governance and project management workflow

Figure 4 illustrates the integrated ITG and project management workflow. The visualization synthesizes findings from stakeholder interviews (Section IV.A), the SLR results (Section IV.B), and the comparative analysis (Section IV.C), demonstrating how ISO/IEC 38500 principles map onto PMBOK 7th Edition domains in a resource-constrained higher education context. An integrated model bridges governance and execution by aligning the six principles of ISO/IEC 38500 with the performance domains of the PMBOK 7th Edition. ISO/IEC 38500 sets board-level direction but does not prescribe specific delivery mechanisms [27]; the PMBOK domains provide operational practices for stakeholder engagement, planning, delivery, measurement, and risk management [26]. Responsibility is aligned with stakeholder accountability and escalation rights, while performance is tied to KPI thresholds. The frameworks create a governance–execution loop in which delivery results inform policy, enabling a context-sensitive approach for resource-constrained HEIs such as UNITAL.

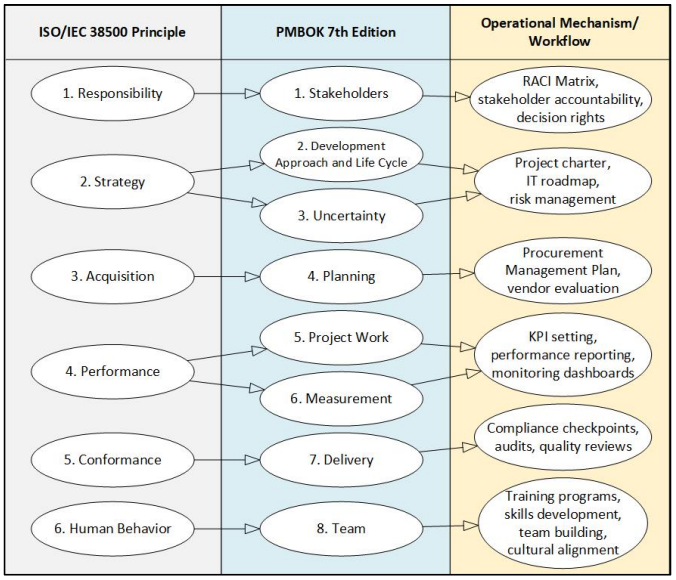

Fig. 4. Integrated IT governance and project management workflow.

V. DISCUSSION

This section interprets the results by explaining the causal mechanisms through which the proposed integration between ISO/IEC 38500 and the PMBOK 7th Edition improves ITG and project execution in resource-constrained HEIs. This study articulates why the integration works, addresses UNITAL's context-specific challenges, compares with prior studies identified in the SLR, and what implications follow for theory, practice, and policy. Table 5 summarizes how the study mapped UNITAL's current IS/IT conditions to governance recommendations, PMBOK 7th Edition domains, and relevant literature.

Table 5.
Thematic Analysis of Interviews at UNITAL

Current Condition of UNITAL IS/IT	Recommendation	PMBOK 7th Edition Practical Implementation	Discussion	Findings from Previous Literature
ISO/IEC 38500-Based (ITG:	**1) Responsibility**			

Current Condition of UNITAL IS/IT	Recommendation	PMBOK 7th Edition Practical Implementation	Discussion	Findings from Previous Literature
Domain PMBOK 7th Edition: 1) Stakeholders				
• IT management responsibilities in UNITAL are still centralized among several individuals, without a precise distribution of authority. • The structure of responsibility in IT management remains unclear.	• Establish a clear responsibility structure and ensure stakeholders are involved in every stage of IT decisions. • Establish an ITG committee with defined roles and responsibilities. • Establish a more transparent responsibility structure at the departmental and individual levels.	RACI Matrix: Using RACI to define and communicate roles and responsibilities in IT management.	Stakeholder Management: The success of ITG depends on the involvement and clear responsibilities of all stakeholders. IT will be ineffective in supporting the organization's goals without a clear division of responsibilities.	Emphasized the importance of clear responsibility and stakeholder engagement for effective ITG. Effective governance requires the involvement of all relevant stakeholders in a clearly defined role [1],[8],[21].
ISO/IEC 38500-Based (ITG: 2) Strategy **Domain PMBOK 7th Edition: 2) Development Approach and Life Cycle** **3) Uncertainty**				
• There is no IT roadmap integrated with the university strategy. • UNITAL's IT strategy lacks alignment with the organization's overall vision and goals. • IT at UNITAL is inadequate in handling project uncertainties and risks.	• Develop an IT strategy that aligns with UNITAL's business plan and long-term objectives. • Align the IT strategy with UNITAL's organizational vision and mission and select an appropriate IT project development approach (e.g., Agile, Waterfall). • Create an IT strategy document that aligns with UNITAL's vision and objectives. • Implement an effective risk management strategy and respond to uncertainty with a mature contingency plan.	Project Charter: Develop a Project Charter to identify the project's objectives, key stakeholders, and IT project success criteria that align with the organization's objectives.	Aligned IT Strategy: It is essential to align the IT strategy with the organizational strategy to ensure that IT supports long-term business objectives. The proper development approach will also help achieve these objectives. Uncertainty and Risk Management: Every IT project faces uncertainty. Proper risk management will help mitigate the negative impact of uncertainty and ensure that the project stays on track.	Suggest aligning the IT strategy with the broader organizational goals to ensure long-term success and minimize potential misalignment. Strategic alignment between IT and institutional goals is a recurring theme across all studies, often necessitating formal planning and risk management structures [1],[8],[20],[21],[22].
ISO/IEC 38500-Based ITG: 3) Acquisition **Domain PMBOK 7th Edition: 4) Planning**				
• IT procurement lacks long-term needs evaluation. • UNITAL continues to acquire technology in an ad-hoc and unstructured manner.	• Develop IT procurement policies based on strategic needs and cost-benefit analysis. • Establish more systematic and explicit standards-based IT procurement procedures.	Procurement Management Plan: Prepare a clear Procurement Management Plan to procure IT hardware, software, and related services.	Defines make-or-buy criteria, evaluation weights privileging low-bandwidth readiness and total cost of ownership (TCO), and phase-gated contracts (pilot scale). Requires IT steering committee (ITSC) approvals, ≥3 competitive quotes, SLAs, vendor KPIs, and exit clauses to prevent lock-in, aligning spending with capacity constraints while safeguarding delivery predictability.	Several studies have identified unstructured IT acquisition as a common issue in developing countries; literature calls for procurement models aligned with long-term institutional goals [1],[8].
ISO/IEC 38500-Based ITG: 4) Performance **Domain PMBOK 7th Edition: 5) Project Work** **6) Measurement**				
• There are no established metrics for evaluating the effectiveness of IT systems. • IT performance monitoring and evaluation are carried out sporadically without clear indicators. • UNITAL does not yet have accountability for IT management. There is no systematic measurement of IT project achievements.	• Establish a KPI to assess IS/IT performance. • Implement an IT performance monitoring system based on measurable and relevant indicators. • Develop precise accountability mechanisms and implement objective performance measurement systems for each stage of the IT project.	Performance Reporting: Use Performance Reporting to report on project progress, including IT performance status against defined indicators.	Project Work Management: Effective IT project management requires precise performance monitoring. Without systematic measurement tools, evaluating whether the IT project is on track will not be easy. Measurement and Accountability: A clear accountability structure and a reliable performance measurement system enable transparent reporting of every IT project decision and result.	Organizations that use structured performance metrics and continuous reporting mechanisms can better track and improve IT project success [8],[20].

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Current Condition of UNITAL IS/IT	Recommendation	PMBOK 7th Edition Practical Implementation	Discussion	Findings from Previous Literature
ISO/IEC 38500-Based ITG: 5) Conformance Domain PMBOK 7th Edition: 7) Delivery				
• IT policies and procedures at UNITAL do not fully ensure that IT complies with applicable standards and regulations. • There are no periodic audits of IT systems.	• Implement regular internal IT audits to ensure regulatory compliance. • Develop policies that ensure compliance with applicable IT standards and regulations to maintain organizational integrity and ensure ongoing adherence to best practices.	Quality Management Plan: Prepare a Quality Management Plan to ensure IT delivery meets established standards and regulations.	Compliance with Regulations and Standards: Compliance with relevant regulations ensures that UNITAL IT operates efficiently, legally, and in an accountable manner. Delivering results that meet standards is crucial to maintaining the organization's credibility and reputation.	Compliance with international standards, such as ISO/IEC 38500, can enhance ITG and operational effectiveness [20],[21].
ISO/IEC 38500-Based ITG: 6) Human Behavior Domain PMBOK 7th Edition: 8) Team				
• Lack of user involvement in IS/IT development. • The IT team's management has not prioritized optimal skill development and collaboration.	• Involve stakeholders in every stage of IT project development. • Develop training and development programs to enhance the IT team's collaboration and skills, thereby improving overall team performance and effectiveness.	Team Building Activities: Using team-building activities and skills assessments to improve the team's ability to work effectively together.	Effective IT Team Development: Good collaboration and skill development of team members significantly contribute to the success of an IT project. With proper training, IT teams can be more responsive and efficient in completing projects.	Suggests that building a collaborative IT team with clear skill development plans significantly improves project outcomes. Team cohesion and involvement in the development process are essential for success [1],[22].

A. Why the Integration Works: Mechanism of Action

Actor-sensitive analyses link Digital Governance strongly with other institutional dimensions, indicating spillover beyond administrative functions into academic and societal interfaces [19]. The integration enhances traceability from governance decisions to project behaviors by operationalizing ISO/IEC 38500 guardrails across the PMBOK 7th Edition performance domains (Fig. 4; Section IV-D). Decision rights and escalation protocols drive stakeholder engagement routines and stage-gate reviews. Strategy and Acquisition guardrails shape development approaches and sourcing. Performance–conformance guardrails cascade KPIs and service-level thresholds, which are suitable for low-bandwidth contexts. These linkages improve delivery predictability and adoption under resource constraints.

A three-step governance–execution loop sustains alignment: (i) governance bodies define decision rights and guardrails; (ii) project teams instantiate them through artefacts and routines; and (iii) measurement and audits inform strategy refinements. The loop reduces coordination failures, shortens escalation latency, and mitigates governance drift. Examples (Table 4; Section IV-C) include responsibility→RACI, strategy→ charters/roadmaps prioritizing constrained portfolios, acquisition→gated procurement/POCs, Performance→KPI dashboards/targets, conformance→periodic compliance checkpoints, and human behavior→structured change management and capacity building—rendering governance decisions testable and auditable at the point of execution.

B. Addressing UNITAL's Context-Specific Challenges

1) The mum effect (reluctance to escalate problems)

The model embeds explicit risk thresholds and escalation timers (PMBOK 7th Edition: Uncertainty) mandated by responsibility and conformance principles. The model increases the cost of silence by specifying who must escalate issues, when escalation must occur, and to whom teams must direct the escalation (RACI and issue SLAs), while simultaneously fostering psychological safety through blameless reviews and documented post-mortems (PMBOK 7th Edition: Stakeholders/Team). Tracking the age of unresolved issues and the escalation cycle time closes the loop (PMBOK 7th Edition: Measurement), enabling the governing body to intervene proactively (Section IV.D).

2) Bandwidth limitations and unstable connectivity

Strategy and acquisition principles guide the development of approaches and life cycle options that remain feasible in low-bandwidth environments (PMBOK 7th Edition: Development Approach and Life Cycle; Delivery). Illustrative practices include offline-first workflows, asynchronous content delivery, lightweight user interfaces, and phased rollouts that are synchronized with infrastructure upgrades. The organization assesses performance using context-specific KPIs (e.g., uptime under limited bandwidth, data synchronization success rate), allowing governance bodies to adjust priorities and investments accordingly.

3) Cultural resistance and low digital literacy

The organization operationalizes the human behaviour principle through stakeholder engagement, targeted training, and champion networks (PMBOK 7th Edition, Stakeholders,

Team). Change plans incorporate role-specific communications, micro-credential training for lecturers and staff, and incentives for early adopters. Adoption and proficiency metrics (PMBOK 7th Edition: Measurement) provide leadership with evidence of persistent resistance, thereby enabling corrective actions such as additional coaching or interface simplification.

Prior reviews have shown that systematic change management practices are essential for overcoming project cultural resistance [18]. Consistent with these findings, the integrated model embeds the human behavior principle into project domains through structured training, stakeholder engagement, and change champion networks.

4) Weak management support and role ambiguity

The organization reduces ambiguity by linking responsibilities to concrete artefacts, including the ITSC charter, RACI matrices across projects, and decision logs (PMBOK 7th Edition, Chapter 7: Stakeholders; Chapter 9: Planning). This linkage institutionalizes sponsorship and clarifies decision rights, thereby addressing the gap identified in interviews (Section IV.A).

5) Inadequate documentation, accreditation readiness, and fragmented data

The organization translates conformance into delivery-embedded quality and compliance checkpoints (PMBOK 7th Edition: Delivery), supported by evidence artifacts such as SOPs, process maps, and audit trails that ensure alignment with accreditation requirements. Performance and measurement domains monitor data completeness, timeliness, and integrity across units, reducing fragmentation and enhancing readiness for external audits.

C. Critical Comparison with Prior Studies (SLR)

The SLR results (Section IV.B) indicate that many HEI studies apply ISO/IEC 38500 for maturity assessment or strategic alignment and use portfolio rubrics to classify projects; however, they rarely demonstrate execution-level operationalization through project management practices. The study model addresses this gap by specifying mechanisms and artefacts that implement governance principles in daily work (e.g., escalating SLAs to counter the "mum effect," offline-first delivery to mitigate bandwidth limitations, and change-champion networks to address cultural resistance).

In contrast to studies primarily situated in developed contexts (e.g., Spain, Portugal), our synthesis is explicitly sensitive to resource constraints, incorporating strategies such as phased adoption, minimal viable governance, and risk-based gating. Thus, the contribution extends beyond proposing another framework; it offers a governance-to-execution mapping demonstrably applicable in under-resourced HEIs.

D. Theoretical Implication

This study advances ITG scholarship by:

- Operationalizing principles into domains: demonstrating a systematic mapping from ISO/IEC 38500 principles to PMBOK 7th Edition domains, bridging the long-standing policy–execution gap.
- Specifying a feedback-control architecture: positioning measurement and audit as control signals that dynamically adapt governance decisions, thus shifting from a static to a dynamic view of governance.
- Contextualizing governance under constraints: theorizing how resource scarcity moderates governance design (e.g., favoring phased, risk-prioritized portfolios and lightweight delivery patterns).

These contributions yield testable propositions for future research, such as: P1—formal escalation thresholds reduce issue age and rework; P2—offline-first delivery improves service availability without proportional budget increases; P3—champion-based change programs increase adoption relative to training-only approaches.

E. Practical and Policy Implications

Embedding the framework into managerial routines requires explicit ties between governance guardrails and measurement. Incorporating data-informed readiness indicators into governance dashboards, aligned to strategy-to-delivery guardrails, helps convert isolated initiatives into a coherent digital strategy and targets capability building in resource-constrained HEIs [23]. Dashboards should integrate (i) KPIs for low-bandwidth service reliability, user adoption, delivery predictability, and conformance; (ii) SLAs with escalation thresholds; and (iii) a portfolio Kanban visualizing stage-gate status and risk exposure.

For university leaders, the framework operates as a playbook: constitute an ITSC and RACI structures; approve charters aligned with an IT roadmap; adopt gated procurement with proofs-of-concept; monitor a concise KPI set (availability under low bandwidth, adoption, data quality); enforce in-process compliance checkpoints; and institutionalize change management via champions, micro-training, and staged incentives.

For policy-makers and accreditation bodies, the workflow serves as a reference that links governance evidence (roles, decisions, compliance artifacts) to delivery outcomes (service levels, adoption, data readiness), enabling evidence-based accreditation and funding decisions.

F. Limitations and Boundary Conditions

The findings derive from a single, resource-constrained case (UNITAL) with a limited number of key informants. However, triangulation through documents, expert FGDs, and insider contextual knowledge enhances credibility; the scope for generalization remains bounded. The model also assumes a minimum level of institutional stability to sustain steering and measurement routines. Future research should conduct cross-case evaluations in diverse HEIs, incorporate quantitative effectiveness measures (e.g., before–and–after KPIs, escalation latency), and explore integration with emerging platforms (e.g., cloud services, Artificial Intelligence-enabled learning) under similar constraints.

VI. CONCLUSIONS

This study proposes an integrated IT governance (ITG) and

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project-management model that synthesizes ISO/IEC 38500 principles with PMBOK 7th Edition domains to close the governance–execution gap in HEIs. Evidence from UNITAL indicates gains in accountability, procurement discipline, accreditation documentation, and the mitigation of bandwidth constraints, cultural resistance, and the 'mum effect'.

Theoretically, the model operationalizes ISO/IEC 38500 through PMBOK 7th Edition domains, linking policy-level decision rights to execution-level artifacts, triggers, and KPIs, and contextualizes ITG for resource-constrained HEIs. Practically and in policy terms, the framework functions as a roadmap: establish an ITSC, formalize decision rights (RACI), adopt risk-based/gated procurement, and monitor context-specific KPIs. Regulators and accreditation bodies can incorporate these governance–execution requirements into standards and national digital strategies.

Limitations include the single-case design and a small set of key informants; triangulation with documents and expert input enhances credibility but constrains generalizability. Future research should test the model across multiple HEIs, quantify effects (e.g., KPI improvements, escalation latency), and examine integration with cloud platforms and Artificial Intelligence (AI)-enabled learning tools.

While this study offers valuable insights into integrating ISO/IEC 38500 and the PMBOK 7th Edition in the context of ITG in higher education, it also has some limitations. This study focuses on a case study of UNITAL, but it may not fully capture the diverse challenges other universities face, especially those in different geographic or economic contexts. Additionally, the study's reliance on qualitative methods, such as interviews and an SLR, may introduce biases in selecting experts and literature.

Future research could address these limitations by conducting comparative studies across multiple universities or exploring the model's applicability in different regional and institutional settings. This study can use quantitative methods to assess the model's effectiveness and evaluate its impact on IT project success. Future studies could also explore the integration of emerging technologies, such as AI and cloud computing, within the proposed governance model, further enhancing its relevance in the rapidly evolving landscape of higher education IT.

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