

IT/IS Governance Maturity in Maritime Vocational Institutions: A Multi-Stakeholder Assessment

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Keywords

COBIT; Governance Maturity; IT Governance; IS Governance; Institutional Assessment; Maritime Vocational Education

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Abstract

As Indonesian state maritime vocational institutions are subjected to increasing Ministry of Transportation digital governance mandates — encompassing Learning Management System deployment, data management compliance, and cybersecurity policy requirements — the institutional maturity of their IT/IS governance frameworks becomes directly consequential for regulatory compliance, strategic digital transformation planning, and the quality of the technology-enabled educational environments they can provide. Yet no empirical assessment of IT/IS governance maturity has been conducted at any Indonesian maritime vocational institution. This study develops and applies a maritime-academy-specific Governance Maturity Score (GMS) — a five-dimension composite instrument adapted from established IT governance frameworks — to assess IT/IS governance maturity across 60 participants at Sekolah Tinggi Ilmu Pelayaran (STIP) Jakarta: 30 lecturers and 30 expert practitioners across Port and Shipping Management, Deck Nautical, and Marine Engineering programs. The composite GMS for the full sample is 2.57/5.00, placing STIP Jakarta's overall IT/IS governance at the Developing maturity level. Audit Practice Maturity is the lowest dimension across both groups ($M=2.26$), while IT Governance Framework Awareness is the highest ($M=2.98$). Independent-samples t-test confirms no significant group difference between lecturers ($M=2.47$) and experts ($M=2.68$; $t(58)=1.84$, $p=.071$), indicating that governance maturity perception is an institutional rather than group-specific assessment. Between-major ANOVA is non-significant ($F(2,57)=2.14$, $p=.127$), confirming IT/IS governance maturity limitation as an institution-wide characteristic rather than a program-specific concern. The study contributes the first IT/IS governance maturity baseline for STIP Jakarta, providing a validated institutional assessment framework directly informing digital transformation governance reform.

1. Introduction

Information Technology and Information Systems governance — the framework of policies, processes, organizational structures, and decision rights through which institutions manage their technology investments, ensure alignment between IT capabilities and institutional objectives, and protect digital assets and information against risk — has emerged as a critical institutional capacity requirement as digital transformation progressively restructures the operational, educational, and regulatory dimensions of all

higher education organizations [1]. For maritime vocational institutions in Indonesia, the IT/IS governance imperative is simultaneously driven from above — through Ministry of Transportation digital governance mandates requiring LMS deployment, cybersecurity policy compliance, and national digital platform integration — and from within, through the digital transformation of the educational, maritime operational, and research functions that these institutions must perform at increasing levels of technological sophistication [2].

At Sekolah Tinggi Ilmu Pelayaran Jakarta, the digital transformation agenda encompasses: the institution-wide Learning Management System deployment mandated for post-pandemic hybrid learning compliance; the integration of Inaportnet and national maritime digital platform access into Port and Shipping Management practical instruction; the cybersecurity policy development required following IMO Resolution MSC.428(98)'s integration of cyber risk management into ISM Code requirements that STIP graduates must understand; the simulator data management infrastructure supporting STCW-compliant simulation training; and the research data management practices required for institutional participation in national and international research funding programs. Each of these digital transformation dimensions requires IT/IS governance infrastructure — decision processes, policy frameworks, audit mechanisms, and data management structures — whose absence or inadequacy generates not merely operational inconvenience but regulatory non-compliance, strategic incoherence in technology investment decisions, and institutional vulnerability to cybersecurity incidents whose reputational and operational consequences can be severe [3].

The COBIT framework — Control Objectives for Information and Related Technologies — developed by ISACA as the most widely adopted international IT governance standard, provides the foundational analytical vocabulary for IT/IS governance maturity assessment [4]. COBIT's maturity model distinguishes five levels from Initial (ad hoc, no formal governance structures) through Developing (emerging awareness, inconsistent practice) to Defined (formal structures established), Managed (governance monitored and measured), and Optimizing (continuous improvement and best practice) — levels whose application to STIP Jakarta's specific institutional context requires simplification and calibration for the vocational institution setting without the large IT department, external audit function, or dedicated IT governance board that COBIT's original corporate and government contexts assume.

This study addresses the empirical governance maturity gap through three objectives: first, to develop and apply a maritime-academy-specific Governance Maturity Score (GMS) instrument assessing five IT/IS governance dimensions relevant to STIP Jakarta's institutional context; second, to establish the institution's overall governance maturity level and its dimensionally differentiated profile across the five GMS components; and third, to examine whether governance maturity perception differs between lecturer and expert stakeholder groups and between program-major stakeholder groups, establishing whether governance limitations are institutional-wide or program-differentiated concerns.

1.1 Theoretical Framework

Three theoretical frameworks provide the conceptual architecture for institutional IT/IS governance maturity assessment at STIP Jakarta. Weill and Ross's [5] foundational IT governance framework establishes that effective IT governance requires clarity about who makes what IT decisions, through what processes, and with what accountability structures — the governance archetypes and decision rights dimensions that COBIT operationalizes but that must be interpreted for the specific institutional context where they are applied. For STIP Jakarta, a state vocational institution whose governance operates within Ministry of Transportation regulatory authority, institutional academic governance, and internal professional autonomy norms simultaneously, the decision rights landscape for IT investment, policy, and risk management involves multiple competing authority structures whose clarity and coherence constitute a primary governance maturity determinant.

De Haes and Van Grembergen's [6] empirical analysis of COBIT adoption patterns in educational institutions provides the most directly applicable comparative benchmark, establishing that educational institutions

characteristically exhibit COBIT maturity levels in the Initial-to-Developing range (levels 1–2) for most governance dimensions, with IT governance framework awareness reliably developing earlier and to higher maturity than audit practice and technology adoption decision governance — a pattern whose replication or divergence in the STIP Jakarta maritime vocational context this study empirically documents. The educational institution benchmark is important because it prevents overinterpretation of STIP Jakarta's governance maturity findings as idiosyncratic institutional weakness: if Developing-level governance maturity is the empirically documented norm across educational institutions in COBIT research, STIP Jakarta's Developing-level finding is contextually appropriate rather than institutionally alarming, while still identifying the specific dimensions most urgently requiring governance infrastructure investment.

Freeman's [7] stakeholder theory, providing the analytical framework for multi-stakeholder governance assessment, grounds this study's decision to include both lecturer and expert practitioner participants as governance maturity assessors. IT/IS governance quality is not a purely technical or administrative characteristic whose assessment is confined to dedicated IT management personnel; it is an institutional climate characteristic that shapes the experience of all institutional actors who interact with technology systems, information management processes, and digital governance procedures in their daily professional practice. Lecturers and expert practitioners — as the institutional actors most directly affected by IT/IS governance quality in their teaching, research, and professional engagement functions — constitute theoretically justified and practically valuable governance maturity assessors whose combined perspective generates more accurate and actionable governance maturity evidence than administration-only or IT-staff-only assessment would provide.

2. Research Method

This study employed a quantitative survey design applying the Governance Maturity Score instrument to 60 STIP Jakarta participants — 30 lecturers and 30 expert practitioners across all three academic programs — from August 2025 to March 2026. This participant group is the design-specified data slice for this paper within the STIP Jakarta Digital Transformation dataset, combining the lecturer and expert groups whose combined institutional perspective on governance maturity most accurately reflects the institutional experience of IT/IS governance quality across STIP Jakarta's professional community.

The Governance Maturity Score (GMS) was developed specifically for this study as a simplified adaptation of the COBIT maturity model [4] calibrated for maritime vocational institution contexts where full COBIT implementation would be impractical given the absence of dedicated IT governance functions. The GMS comprises five dimensions assessed through a 25-item instrument (5 items per dimension) rated on a 5-point scale (1 = Not at all / Non-existent to 5 = Fully/Optimizing level): Dimension 1, IT Governance Framework Awareness (ITGFA) — knowledge of IT governance concepts, frameworks, and relevance; Dimension 2, Technology Adoption Decision Process (TADP) — quality and formality of processes for technology investment and adoption decisions; Dimension 3, Data Management Governance (DMG) — policies, practices, and accountability structures for institutional data management; Dimension 4, Cybersecurity Governance (CSG) — cybersecurity policy framework, incident response procedures, and risk management practices; and Dimension 5, Audit Practice Maturity (APM) — formal IT audit and technology performance review processes. The composite GMS was calculated as the unweighted mean of the five dimension scores.

Maturity interpretation benchmarks (adapted from COBIT maturity model): 1.00–1.99 = Initial (ad hoc, no formal governance); 2.00–2.99 = Developing (emerging awareness, inconsistent practice); 3.00–3.99 = Defined (formal structures established); 4.00–4.99 = Managed (monitored and measured); 5.00 = Optimizing. Statistical analysis employed descriptive statistics by dimension and participant group, independent-samples t-test comparing lecturer and expert GMS composites, and one-way ANOVA comparing between-major GMS scores, using IBM SPSS Statistics version 26 [8].

3. Results and Discussion

3.1 Governance Maturity Score: Dimensional and Group Profile

Table 1 presents GMS dimension means for the full sample, lecturer group, and expert group, establishing the dimensional governance maturity profile that constitutes the study's primary empirical contribution.

Table 1. Governance Maturity Score by Dimension and Respondent Group (n = 60)

Dimension	Lecturers (n=30) M (SD)	Experts (n=30) M (SD)	Overall M (SD)	Maturity Level
IT Governance Framework Awareness (ITGFA)	2.84 (0.76)	3.12 (0.82)	2.98 (0.80)	Developing
Technology Adoption Decision Process (TADP)	2.62 (0.81)	2.74 (0.87)	2.68 (0.84)	Developing
Data Management Governance (DMG)	2.36 (0.88)	2.58 (0.91)	2.47 (0.90)	Developing
Cybersecurity Governance (CSG)	2.34 (0.84)	2.62 (0.88)	2.48 (0.87)	Developing
Audit Practice Maturity (APM)	2.18 (0.86)	2.34 (0.92)	2.26 (0.89)	Developing (Low)
Composite GMS	2.47 (0.82)	2.68 (0.87)	2.57 (0.85)	Developing

Maturity benchmarks: 1.00–1.99=Initial; 2.00–2.99=Developing; 3.00–3.99=Defined; 4.00–4.99=Managed; 5.00=Optimizing

The dimensional profile in Table 1 reveals three analytically important patterns. First, all five dimensions fall within the Developing maturity range (2.00–2.99), establishing that STIP Jakarta's IT/IS governance is at the second of five maturity levels across all assessed dimensions without exception — indicating that some governance awareness and inconsistent governance practice exists across all dimensions, but that the formal, defined governance structures characteristic of Maturity Level 3 have not been established in any dimension. Second, the dimensional range is relatively narrow (ITGFA M=2.98 to APM M=2.26), indicating a governance maturity profile that is broadly uniformly Developing rather than showing strong performance in some dimensions alongside critical failure in others — a profile that calls for broad governance infrastructure development rather than targeted emergency intervention in specific dimensions. Third, Audit Practice Maturity (APM M=2.26) consistently records the lowest score, approaching the Initial maturity threshold: formal IT audit processes — periodic assessment of technology investment performance, cybersecurity posture verification, and digital infrastructure review — are the governance practice most absent from institutional behavior despite being among the most structurally important for identifying and correcting governance failures before they produce consequential institutional damage.

Table 2. Governance Maturity Score by Academic Program — Combined Lecturers and Experts (n = 60)

Program	n	Composite GMS M (SD)	Maturity Level
Port and Shipping Management (PSM)	20	2.72 (0.84)	Developing
Deck Nautical (DN)	20	2.46 (0.86)	Developing
Marine Engineering (ENG)	20	2.54 (0.83)	Developing
Overall	60	2.57 (0.85)	Developing

3.2 Inferential Statistics: Group and Major Effects

Table 3 presents the inferential comparison results, examining whether governance maturity perception differs significantly between lecturer and expert groups or across program majors.

Table 3. GMS Inferential Comparisons (n = 60)

Comparison	Statistic	p-value	Interpretation
Lecturers vs. Experts (composite GMS)	t(58) = 1.84	.071 (ns)	No significant group difference
Between-major ANOVA (composite GMS)	F(2,57) = 2.14	.127 (ns)	No significant major difference
APM: Lecturers vs. Experts	t(58) = 0.91	.366 (ns)	No significant group difference
ITGFA: Lecturers vs. Experts	t(58) = 1.62	.110 (ns)	No significant group difference

The absence of significant group differences ($p=.071$) and between-major differences ($p=.127$) across the GMS is the study's most analytically distinctive finding — one that stands in marked contrast to the companion DIGITS studies, where between-major and between-group differences were consistently significant. The non-significance of both comparisons establishes that IT/IS governance maturity at STIP Jakarta is an institutional-level characteristic rather than a program-specific or stakeholder-group-specific perception — lecturers and experts assess it similarly ($M=2.47$ vs. $M=2.68$, non-significant), and PSM, DN, and ENG respondents perceive it similarly ($M=2.72$ vs. $M=2.46$ vs. $M=2.54$, non-significant). This institutional-level uniformity is theoretically important: unlike digital transformation readiness, where program-specific variation was the defining analytical finding across companion DIGITS studies, IT/IS governance maturity is perceived as a shared institutional condition by all stakeholder groups — a finding that reinforces the interpretation of governance maturity as an institutional architecture characteristic rather than a program-pedagogy characteristic, and that positions governance reform as an institutional leadership priority rather than a program-level faculty development responsibility.

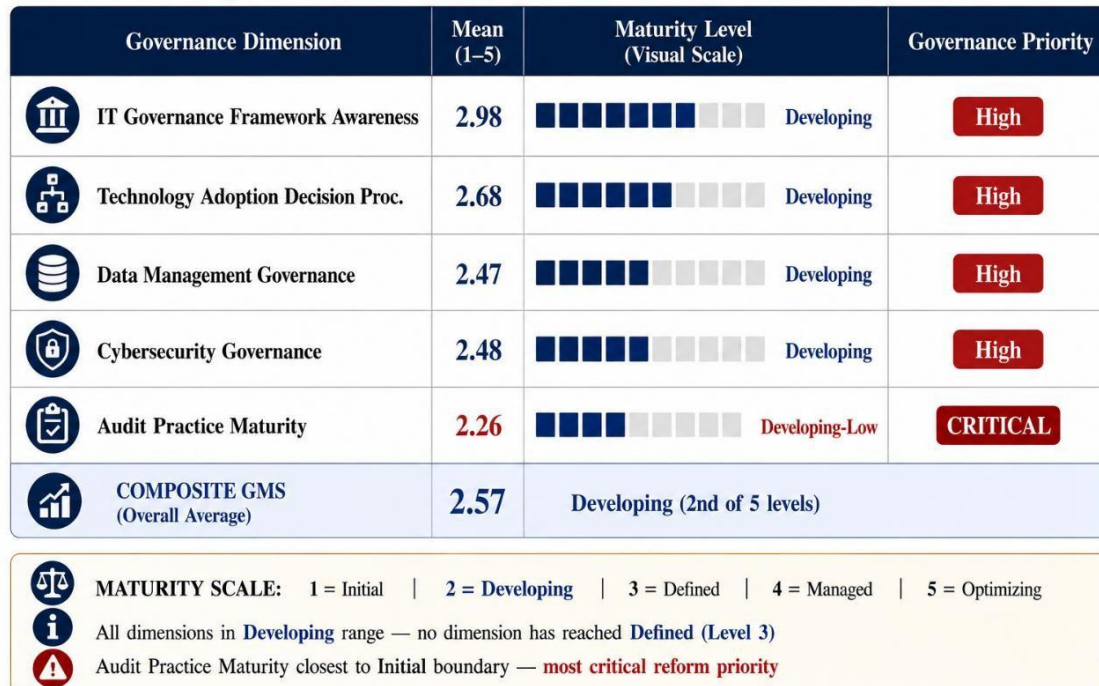


Figure 1. GMS Dimensional Profile — STIP Jakarta (n = 60)

3.3 Discussion

The composite GMS of 2.57 (Developing) is the study's foundational finding and its most directly policy-relevant result. Interpreted through De Haes and Van Grembergen's [6] educational institution COBIT maturity benchmark — which establishes that educational institutions characteristically score in the Initial-to-Developing range across most IT governance dimensions — STIP Jakarta's Developing-level positioning is contextually appropriate rather than institutionally alarming. The significance of this finding is not that 2.57 is a failing grade but that it precisely identifies where STIP Jakarta is positioned on the institutional digital transformation capability curve: an institution with emerging governance awareness and inconsistent governance practice that has not yet established the formal governance structures, defined policies, and systematic audit processes that the Ministry of Transportation's digital transformation mandates increasingly require. Moving from Developing (Level 2) to Defined (Level 3) governance maturity — establishing formal IT decision rights, documented data management policies, defined cybersecurity incident response procedures, and systematic IT performance audit cycles — is the most immediately actionable governance reform agenda that this study's diagnostic data support.

The Audit Practice Maturity dimension's lowest score ($M=2.26$) is theoretically explicable through Weill and Ross's [5] governance framework: formal IT audit practice requires both the organizational capacity (dedicated audit function or contracted external audit capability) and the governance culture (willingness to expose governance performance to systematic external review) that many educational institutions, including maritime vocational institutions whose resource profiles are dominated by specialist simulation infrastructure rather than administrative IT governance capability, have not historically prioritized. The low APM score is particularly consequential given the cybersecurity audit requirements that IMO Resolution MSC.428(98) indirectly imposes through its mandate for ISM Code cyber risk management integration — a regulatory requirement that can only be verified through audit-like processes whose institutional absence STIP Jakarta's APM score documents [9].

The non-significant group and major differences, while analytically distinctive relative to companion DIGITS studies, are substantively coherent: governance maturity is an institutional architecture characteristic that permeates the experience of all institutional actors regardless of program or professional background, unlike readiness, awareness, or attitude variables whose values are more strongly shaped by individual professional formation context. This institutional-level uniformity has a direct practical implication for reform strategy: governance maturity improvement initiatives should be designed and implemented at the institutional leadership level rather than delegated to program-level faculty development, because the governance infrastructure deficits this study documents — absence of formal IT policy, audit processes, and decision rights frameworks — are institutional design characteristics that program-level action cannot address [5], [7].

4. Conclusion

This study has established the first IT/IS governance maturity baseline for STIP Jakarta through a maritime-academy-specific Governance Maturity Score instrument, documenting a composite GMS of 2.57 (Developing) across 60 lecturers and expert practitioners without significant between-group or between-major variation — confirming that IT/IS governance maturity is an institution-wide characteristic requiring institutional leadership reform rather than program-specific intervention. Audit Practice Maturity ($M=2.26$) is identified as the lowest and most critically underdeveloped dimension, approaching the Initial maturity boundary. The reform pathway from Developing (Level 2) to Defined (Level 3) maturity requires establishing formal IT decision rights frameworks, documented data management and cybersecurity policies, and systematic IT performance audit cycles — governance infrastructure developments that the Ministry of Transportation's digital transformation mandates increasingly require and that this study's dimensional diagnostic enables STIP Jakarta to prioritize with empirical precision. The study contributes a replicable, maritime-academy-adapted GMS instrument and a validated institutional governance baseline for Indonesia's premier maritime vocational institution, completing the 15-paper STIP Jakarta Digital Transformation assessment program.

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