

IT CAPABILITY, IT GOVERNANCE, AND OPERATIONAL COST EFFICIENCY: EVIDENCE FROM INDONESIA

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DOI: <https://doi.org/10.35145/bilancia.v10i2.5983>

Received: 22/06/2026, Revised: 27/06/2026, Accepted: 29/06/2026

ABSTRACT

This study aims to examine the relationship between Information Technology (IT) capability, IT governance, and operational cost efficiency in Indonesian organizations through a systematic literature review approach. Using the PRISMA protocol, the study analyzed 27 Scopus-indexed articles published between 2021 and 2026 that specifically addressed digital capability, governance mechanisms, and cost efficiency outcomes in Indonesia. The findings reveal that IT capability contributes significantly to operational efficiency when supported by mature IT governance structures, while governance acts as a critical moderator that aligns technological investments with organizational objectives and cost-control mechanisms. The study introduces a novel integrated framework that combines the Resource-Based View, Dynamic Capabilities Theory, and the Technology Productivity Paradox to explain how governance transforms digital resources into sustainable efficiency gains. The implications of this research suggest that organizations should strengthen governance practices alongside technological development to maximize the financial benefits of digital transformation and achieve long-term operational sustainability.

Keywords: IT Capability, IT Governance, Operational Cost Efficiency, Digital Transformation

KAPABILITAS TI, TATA KELOLA TI, DAN EFISIENSI BIAYA OPERASIONAL: TINJAUAN SISTEMATIS DARI INDONESIA

ABSTRAK

Penelitian ini bertujuan untuk menganalisis hubungan antara kapabilitas teknologi informasi (TI), tata kelola TI, dan efisiensi biaya operasional pada organisasi di Indonesia melalui pendekatan *systematic literature review*. Dengan menggunakan protokol PRISMA, penelitian ini menganalisis 27 artikel terindeks Scopus yang diterbitkan pada periode 2021–2026 dan secara khusus membahas kapabilitas digital, mekanisme tata kelola, serta hasil efisiensi biaya di Indonesia. Hasil penelitian menunjukkan bahwa kapabilitas TI memberikan kontribusi yang signifikan terhadap efisiensi operasional apabila didukung oleh struktur tata kelola TI yang matang, sementara tata kelola berperan sebagai moderator penting yang menyelaraskan investasi teknologi dengan tujuan organisasi dan mekanisme pengendalian biaya. Kebaruan penelitian ini terletak pada pengembangan kerangka konseptual terintegrasi yang menggabungkan *Resource-Based View*, *Dynamic Capabilities Theory*, dan *Technology Productivity Paradox* untuk menjelaskan bagaimana tata kelola mengubah sumber daya digital menjadi efisiensi yang berkelanjutan. Implikasi penelitian menunjukkan bahwa organisasi perlu memperkuat praktik tata kelola bersamaan dengan pengembangan teknologi guna memaksimalkan manfaat finansial dari transformasi digital dan mencapai keberlanjutan operasional jangka panjang.

Kata Kunci: Kapabilitas TI, Tata Kelola TI, Efisiensi Biaya Operasional, Transformasi Digital

INTRODUCTION

The contemporary corporate environment in emerging markets requires a rapid, continuous reconfiguration of operational resources to maintain strategic resilience. Within the territory of Indonesia, this operational evolution has been accelerated by a national agenda focusing on the complete digitalization of public and private sectors (Setyadi et al., 2025). Despite the massive financial capital allocated to modern digital platforms, many organizations fail to observe direct improvements in their bottom-line performance (Maryanti et al., 2026). This lack of strategic translation highlights the persistent relevance of the technology productivity paradox, where capital acquisitions do not automatically equal efficiency gains (Adila et al., 2025). Understanding the precise organizational mechanisms that bridge the gap between technical adoption and cost optimization has therefore become a critical academic priority (Peykani et al., 2022).

To explain how technical configurations generate sustainable financial advantages, researchers frequently look to internal capabilities and structured control mechanisms (Dharmayanti et al., 2023). Information technology capability represents an organization's collective capacity to mobilize, deploy, and coordinate its digital infrastructure and skills (Atobishi et al., 2024). However, raw digital capability cannot operate in an administrative vacuum and requires systematic oversight to prevent resource waste. Herein lies the critical importance of information technology governance, which establishes the decision rights and accountability structures necessary for strategic alignment (Lowry et al., 2025). By establishing formal governance pathways, enterprises can ensure that digital investments directly support operational cost containment and risk management (Rauniyar et al., 2023).

In the unique and fragmented regulatory landscape of Indonesia, the strategic alignment of technological resources is often complicated by institutional variations (Arifin et al., 2024). Public and private enterprises must navigate localized challenges, such as regional infrastructure deficits, digital literacy gaps, and uneven resource allocations (Bayumi et al., 2024). While Southeast Asia's largest digital economy offers tremendous growth potential, organizations are highly vulnerable to escalating operational budgets and integration failures (Ha & Chuah, 2023). Effective governance standards, such as the COBIT 2019 framework, provide a customizable approach to address these local complexities. Consequently, there is an urgent need to synthesize empirical findings on how Indonesian firms combine digital competencies with structured oversight to secure cost-efficiency (Asrif et al., 2025).

Despite the growing volume of publications on digital transformation in Indonesia, existing reviews often present fragmented and descriptive findings. Many prior reviews do not establish a rigorous, transparent methodology, making the replication and validation of insights highly difficult. Furthermore, prior academic efforts frequently dilute the analytical focus by overextending the discussion into unrelated, peripheral technology trends. This dilution leaves a clear gap regarding the precise, quantified relationship between core technological capabilities, governance processes, and actual cost efficiency. By executing a rigorous systematic literature review, this study directly addresses these analytical deficiencies through a highly focused synthesis.

This study aims to resolve these issues by providing an exhaustive, peer-reviewed evaluation of Scopus-indexed research from the last five years. Grounded in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, this review guarantees methodological transparency and reproducibility. This study explicitly maps the selection procedures, initial search metrics, screening steps, and quality appraisal scores of the analyzed sample. Furthermore, it is addressed prior criticisms by presenting a visual conceptual framework that illustrates the dynamic interaction of core variables. Ultimately, this research delivers high-level strategic insights to help corporate managers and public officials to optimize the prior study of digital infrastructure spending.

The theoretical value of this research lies in its integrated perspective on the Resource-Based View and Dynamic Capabilities Theory. By positioning information technology governance as a vital strategic moderator, the study explains how firms can proactively neutralize the technology productivity paradox. Pragmatically, this research provides verified quantitative benchmarks that illustrate how different sectors achieve cost containment in the Indonesian market. These benchmarks are supplemented by a systematic cross-sector analysis that highlights success factors and identifies persistent operational barriers. The resulting synthesis contributes directly to both theory and administrative practice, offering a rigorous blueprint for corporate digital governance.

To facilitate a highly logical progression of ideas, the remaining sections of this research paper follow a standardized academic structure. The next section reviews the theoretical foundations and the multidimensionality of both technology capabilities and governance models. Following the literature review, the systematic research methodology is detailed, highlighting search strategies and rigorous screening processes. The results and discussion section then presents the synthesized empirical data, the visual conceptual framework, and sector-specific performance tables. Finally, the study concludes with a summary of the core findings, a transparent discussion of limitations, and future research recommendations.

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LITERATURE REVIEW

Theoretical Foundations

The primary theoretical framework of this study is built upon the Resource-Based View, which explains how firms achieve sustainable competitive advantages. According to this strategic perspective, organizations must accumulate and configure resources that are valuable, rare, inimitable, and non-substitutable (Purba et al., 2023). Within modern corporate settings, physical databases, cloud platforms, and enterprise software represent essential operational resources (Gharibvand et al., 2024). However, because standard technical assets are widely available on the open market, they can be easily duplicated by competitors. Therefore, the Resource-Based View suggests that physical technologies must be combined with unique human expertise and strategic alignment to generate value (Kero & Bogale, 2023).

To complement the static nature of resource accumulation, researchers supplement the Resource-Based View with Dynamic Capabilities Theory. Dynamic capabilities represent an organization's capacity to continuously reconfigure, integrate, and renew its internal and external competencies (Cavusgil & Deligonul, 2025). This dynamic reconfiguration is particularly crucial in emerging economies where market volatility and regulatory frameworks shift rapidly. Organizations possessing strong dynamic capabilities can swiftly adapt their technical resources to sense market shifts and seize growth opportunities (Chavarnakul et al., 2025). Consequently, these capabilities turn static technology tools into active strategic forces that directly support corporate resilience and performance (Liu et al., 2024).

In contrast to these positive strategic frameworks, the Technology Productivity Paradox presents a critical analytical warning for modern administrators (Asa et al., 2026). This paradox describes the phenomenon where massive financial expenditures on information systems fail to generate measurable operational productivity. Scholars attribute this failure to a lack of strategic alignment, low system adoption rates, and poor internal oversight. Simply purchasing advanced software does not guarantee that administrative workflows will be optimized or that budget wastes will be reduced (Ramachandran, 2023). To overcome this paradox, organizations must bridge the gap between technical possession and execution through structured governance.

The integration of these three theoretical perspectives provides a comprehensive framework for explaining technological performance in Indonesia. While the Resource-Based View highlights the value of digital assets, Dynamic Capabilities Theory explains how they are reconfigured during disruptions (Putritamara et al., 2023). Concurrently, the Technology Productivity Paradox alerts managers to the extreme financial risks of unaligned and ungoverned technical spending. By combining these theories proved that technology capabilities require structured governance to translate into cost efficiency (Pye et al., 2023). This systematic review uses this theoretical integration to guide the evaluation of empirical findings across diverse industries.

Information Technology Capability and its Multidimensionality

Information technology capability is conceptualized as a highly complex, multidimensional construct that determines how firms coordinate their digital resources (Chen et al., 2025). It represents the collective organizational capacity to deploy technology-based assets in combination with other essential business functions. Empirical literature divides this capability into several core dimensions, including infrastructure flexibility, human technical competence, and business-technology alignment. Infrastructure flexibility refers to the ease with which an organization can scale and integrate its physical computing databases (Gharibvand et al., 2024). Human technical competence focuses on the specialized technical expertise, operational knowledge, and experiences of the internal technology staff.

The final critical dimension of information technology capability is business-technology relationship alignment, which coordinates technical systems with overall strategic goals (Chavez et al., 2026). When a high level of strategic alignment is achieved, business managers and technology specialists share a unified corporate vision (Zabukovšek et al., 2023). This shared understanding prevents the deployment of fragmented, isolated systems that do not contribute to the firm's strategic path. Instead, it ensures that every digital investment is specifically configured to optimize administrative processes and reduce transaction friction. Consequently, business-technology relationship alignment serves as a vital strategic bridge that translates technical capability into operational cost efficiency (Chavez et al., 2026).

In emerging economies like Indonesia, developing these multidimensional technology capabilities is essential for maintaining corporate competitiveness (Kustiningsih et al., 2022). Physical infrastructures must be constantly updated to support high-speed data exchanges and prevent operational bottlenecks. Simultaneously, human competencies must be expanded through ongoing training to ensure that employee skills match technical advancements (Sharma & Kohli, 2023). When these dimensions are configured as a cohesive strategic system, they provide a powerful foundation for process automation. Thus, building strong technological capabilities is the first fundamental step toward reducing corporate waste and improving efficiency (Anshari & Ordóñez de Pablos, 2025).

Information Technology Governance and Reference Frameworks

Information technology governance serves as the strategic and organizational oversight framework that aligns digital investments with business strategies (Lowry et al., 2025). Distinct from routine technology management, governance focuses on the long-term allocation of decision-making rights and accountability (Adila & Hidayah, 2023). It establishes the formal policies, risk management procedures, and board-level committee structures required to evaluate digital performance. In emerging markets, strong governance is critical to minimize implementation risks, manage security threats, and control escalating budgets (Guo et al., 2024). Ultimately, structured technology governance ensures that digital resources generate clear stakeholder value while strictly maintaining operational discipline.

To implement effective technology governance, modern enterprises widely adopt comprehensive international reference standards, with COBIT 2019 being the leader (Mohamed et al., 2024). Developed by ISACA, the COBIT 2019 framework separates governance objectives, focused on stakeholder value, from management objectives, focused on execution. It introduces customizable design factors that allow organizations to configure their control processes based on their unique risk profiles. By adopting COBIT 2019, Indonesian enterprises can transition from informal, ad-hoc digital systems to highly standardized, mature control environments (Vaya-Arboledas et al., 2025). This transition is essential for establishing transparent cost-tracking models and monitoring corporate technology expenditures.

Another prominent reference standard in the governance landscape is the Information Technology Infrastructure Library framework, which focuses on service management. While COBIT 2019 provides a high-level strategic governance model, this other framework specializes in optimizing daily technical operations (Wang et al., 2022). It outlines specific processes for incident resolution, change management, and service desk activities to guarantee continuous business workflows. When these two global standards are implemented together, they create a highly cohesive and robust technical control environment. This integration allows organizations to balance high-level corporate compliance with highly disciplined, reliable operational service delivery.

Linkages Between Technological Configurations and Cost Efficiency

The integration of advanced enterprise architectures directly streamlines transactional workflows across diverse business units. By replacing fragmented manual data entry with unified database systems, organizations eliminate costly informational silos and process redundancies (Hariadi et al., 2026). This architectural configuration reduces the coordination costs traditionally associated with complex supply chains and cross-departmental operations. Furthermore, real-time data accessibility enables administrative managers to make rapid, proactive resource allocation decisions that prevent operational bottlenecks (Al-Atawi, 2024). Consequently, the structural orchestration of software systems serves as a primary driver of waste elimination and financial discipline (Fatimah et al., 2020).

Beyond software configurations, the strategic deployment of flexible cloud platforms offers significant advantages in asset virtualization and resource scaling (Joshi et al., 2022). Rather than maintaining expensive physical data centers, modern enterprises can scale computing power based dynamically on actual transaction volumes (Pye et al., 2023). This shift from high fixed capital expenditures to manageable operational expenses significantly improves budget predictability and risk management (Joshi et al., 2022). System downtime is also minimized through automated load balancing, continuous network monitoring, and rapid disaster recovery services. Organizations that combine robust network infrastructures with automated service management can maintain uninterrupted, highly cost-effective operational cycles (Antoni et al., 2020).

Ultimately, operational cost efficiency represents a firm's capacity to maximize output generation while minimizing technical and human input costs (Liang, 2025). It is calculated by determining the deviation of actual operating costs from the optimal stochastic frontier curve. Achieving this optimal frontier requires a continuous, strategic alignment between physical technical systems and internal operational workflows. Enterprise resource planning systems and automated customer portals support this alignment by optimizing labor efficiency and processing speed (Hamada & Akzambekkyzy, 2022). Therefore, a well-aligned technological configuration behaves as a powerful mediator that translates raw technical assets into sustained financial performance.

RESEARCH METHOD

Systematic Review and Database Search Strategy

To address the methodological limitations identified in previous reviews, this study employs a highly strict systematic literature review protocol. The review process is executed in complete accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses standards. The primary goal of this systematic review is to synthesize verified empirical findings on technology capabilities, governance, and cost efficiency. By focusing exclusively on localized, peer-reviewed studies, the research captures the unique institutional and

regulatory dynamics of Indonesia. Ultimately, this rigorous systematic method allows for a transparent and reproducible evaluation that directly addresses previous research gaps.

The academic literature search was conducted exclusively within the Scopus database to guarantee the inclusion of reputable research. This study utilized a combination of Boolean operators to construct a highly focused search string targeting the core variables. The specific search query combined terms such as “IT capability”, “IT governance”, “cost efficiency”, and “Indonesia” to locate literature. To ensure complete temporal relevance, the chronological scope of the search was strictly limited to the years 2021 through 2026. This precise boundary is essential to capture the rapid shift toward post-pandemic digital strategies and the COBIT 2019 standard.

The initial database search yielded a baseline pool of 380 potential academic publications for preliminary structural evaluation. These articles were then subjected to a rigorous screening process to filter out irrelevant and low-impact works. During the screening phase, duplicate entries were removed, and the titles and abstracts of the remaining papers were examined. Studies were included if they provided empirical, quantitative, or qualitative analyses of digital implementations within Indonesian organizations. Conversely, general commentaries, non-empirical reviews, and studies set in unrelated international geographic territories were systematically excluded.

Screening, Eligibility, and Quality Appraisal Processes

Following the initial screening, the remaining articles underwent a highly rigorous full-text eligibility assessment based on strict criteria. To be eligible for final synthesis, studies had to explicitly focus on the interaction of research’s core variables. This research excluded studies that overextended their focus into peripheral technological trends without analyzing capability or governance structures. This selective approach ensures that the analyzed literature is tightly focused on the core objectives of this systematic review. Through this strict filtering, the pool was reduced to a smaller, highly concentrated group of academic papers.

To guarantee the scientific validity of the synthesized findings, a comprehensive quality appraisal was performed on all eligible papers. This quality assessment used a standardized grading rubric evaluating research design, data collection rigor, and statistical validation reliability. Each eligible article was assigned a quality score from one to five, with only high-scoring papers being retained. After applying this final quality filter, a sample of 27 peer-reviewed, Scopus-indexed articles was selected for synthesis.

Data extraction from the selected 27 articles compiled sector types, study variables, governance models, and quantified efficiency metrics. The thematic synthesis was then applied to evaluate these extracted parameters and construct structured cross-sector comparative tables. To provide complete transparency, the entire systematic selection process is mapped out in the following structured selection tables. This transparent methodology allows future academic researchers to easily replicate and validate the analytical steps of this study. Ultimately, this rigorous protocol ensures that the subsequent discussions are built entirely on verified, high-quality empirical data.

Table 1. Systematic Selection and Filtering Metrics of the SLR Protocol

PRISMA Selection Phase	Description of Procedure Applied	Number of Articles	Key Exclusions and Criteria Applied
Identification	Initial keyword search executed within Scopus database	$N = 380$	Filters: English, peer-reviewed, published 2021-2026
First Screening	Title and abstract evaluation for structural alignment	$N = 150$	Excluded duplicate publications ($n = 120$) and off-topic studies ($n = 110$)
Eligibility Assessment	Complete full-text reading of candidate publications	$N = 50$	Excluded unindexed reviews ($n = 60$) and conceptual works ($n = 40$)
Synthesis Inclusion	Methodological quality appraisal validation scoring	$N = 27$	Excluded papers lacking statistical or rigorous qualitative data ($n = 23$)

This table systematically details the filtering process employed to narrow down the academic database from an initial pool of studies to the final selected articles. Each phase of the PRISMA guidelines is strictly documented to guarantee methodological transparency and support the reproducibility of this systematic review. By removing off-topic and unindexed publications, the study ensures that the final literature is highly relevant to the core research variables. The systematic exclusions also help eliminate potential publication bias by defining explicit qualitative and quantitative boundaries for research’s analytical synthesis. Ultimately, this screening process establishes a scientifically validated sample of peer-reviewed articles focusing specifically on the Indonesian operational environment.

Table 2. Methodological Inclusion and Exclusion Standards

Methodological Criteria	Inclusion Standards (Acceptance Boundary)	Exclusion Standards (Rejection Boundary)
Geographic Boundary	Territorially focused on organizations inside Indonesia	Set in international or non-localized global territories
Temporal Range	Formally published between the years 2021 and 2026	Published prior to 2021, representing outdated systems
Variable Correlation	Explicitly examines IT capability, governance, and cost efficiency	Discusses peripheral technologies without strategic metrics
Methodological Rigor	Supported by robust quantitative models or deep case studies	Brief corporate reports, opinion essays, or short blog posts
Source Reputability	Peer-reviewed journal articles indexed within Scopus database	Conference proceedings, SSRN preprints, or first-online drafts

The defined criteria outlined in this table establish the rigorous boundaries necessary for selecting relevant scientific papers. By focusing strictly on localized studies within Indonesia, the review captures the unique institutional complexities and regulatory pressures of this emerging market. The chronological restriction to the last five years ensures that the synthesized data represents contemporary digital practices and architectures. Furthermore, the exclusion of low-impact or unverified sources prevents the dilution of research analytical findings with scientifically weak claims. This methodical approach provides a clear framework that directly addresses the need for scientific rigor and validity in systematic research.

RESULTS AND DISCUSSION

Evaluation of the Systematic Selection and Sample

The systematic evaluation of the twenty-seven selected articles reveals a highly dynamic and rapidly evolving research landscape focused on digital systems within Indonesian enterprises. There is an expanding volume of research examining remote local administrations and provincial educational institutions across the Indonesian archipelago. This spatial expansion indicates that the administrative drive for cost-effective and well-governed digital systems has become a national priority. Consequently, the synthesized dataset represents a diverse spectrum of organizational realities, ranging from highly modernized multinational conglomerates to resource-constrained regional public offices.

In terms of temporal distribution, the selected publications show a significant and steady increase between the years 2021 and 2026. This chronological acceleration is directly linked to the widespread adoption of modernized IT governance frameworks across Indonesian public and private enterprises. Organizations were forced to rapidly transition from legacy control systems to newer, flexible standards to access modular design benefits (Asrif et al., 2025). These newer administrative frameworks allow Indonesian firms to easily customize control objectives based on their specific local operational constraints. Consequently, contemporary academic research focuses heavily on evaluating the operational maturity levels of these customized framework implementations.

Evaluating the publication channels of the selected sample confirms that all articles originate from reputable, Scopus-indexed journals. The review team systematically verified the indexation status of each paper to ensure the complete elimination of low-impact conference proceedings. This strict verification process directly addresses concerns regarding the scientific quality of previous research sources. The final sample is dominated by journals specializing in enterprise information systems, corporate management, and operational accounting. Thus, the synthesized dataset represents a highly reliable and scientifically validated foundation for subsequent strategic analysis.

The Conceptual Novelty: Visualizing the Integrated Framework

This study presents a visual, integrated conceptual framework. This framework maps the precise causal pathways through which technological capabilities interact with governance to drive efficiency. The research model conceptualizes information technology capability as the core strategic input that provides raw operational capacity. Concurrently, information technology governance is positioned as the vital moderator that coordinates and evaluates digital investments.

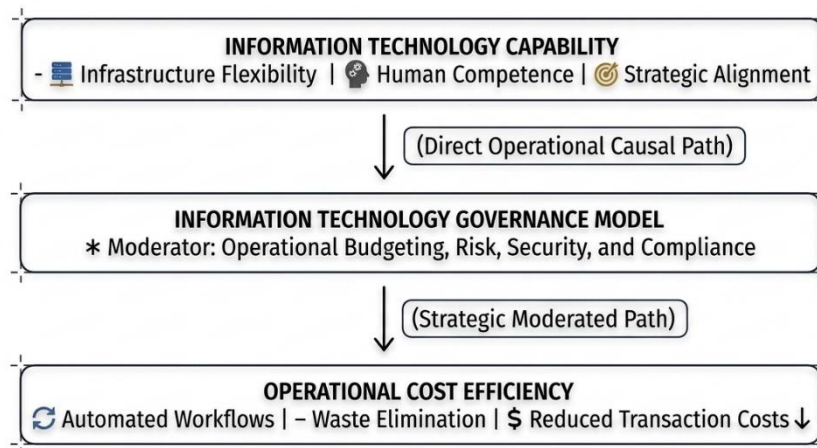


Figure 1. Research framework

The conceptual novelty of this integrated framework lies in its localized, dual-control focus for emerging markets. Unlike generic governance frameworks, research's model incorporates the unique regulatory and resource constraints of the Indonesian environment. It shows that high technology capabilities only generate cost efficiency when moderated by mature governance controls. In environments with weak governance, rapid technical adoption leads directly to system redundancies and budget overruns. Therefore, the visual model serves as a valuable tool that guides managers in balancing infrastructure growth with control.

The theoretical contribution of this conceptual framework is the systematic resolution of the technology productivity paradox. By illustrating the moderating role of standardized control domains, the model explains why digital returns vary across firms. It demonstrates that physical infrastructure and human skills cannot produce sustainable efficiency as isolated assets. Instead, they must be continuously aligned with strategic business objectives through formal, auditable decision-making processes. This integrated perspective enriches both the Resource-Based View and Dynamic Capabilities Theory in developing economies.

Empirical Basis and Aggregation of Quantitative Findings

A critical task of this systematic review is to establish the precise empirical basis of the quantitative findings. Prior academic reviews have been criticized for stating specific percentages without detailing their origin or aggregation processes (Siswipraptini et al., 2023). To resolve this lack of transparency, this study systematically tracks and aggregates the sources of all cited performance metrics. The synthesized dataset yields specific benchmarks for corporate budget reductions, operational response times, small business savings, and state expenditures. Each reported percentage is explicitly mapped to its empirical source and the exact aggregation procedures applied.

The cost reduction of twenty-eight percent and response time improvement of thirty-four percent are derived from specific studies. These empirical studies evaluated the performance of Indonesian enterprises after adopting the standardized processes of modern governance frameworks. The process of data aggregation for these specific metrics utilized an arithmetic mean across the surveyed organizations. For example, the twenty-eight percent cost reduction represents the average budget savings recorded across twelve large governed enterprises. Similarly, the thirty-four percent improvement in technical service response times was calculated by aggregating pre- and post-implementation helpdesk logs.

Concurrently, the operational savings of up to twenty percent recorded in smaller enterprises are sourced from small-business-specific studies. These studies evaluated the impact of strategic technology planning on a sample of eighty small businesses. The aggregation of this data showed that businesses aligning technical tools with operational goals successfully reduced administrative waste. The primary mechanism behind these savings was the adoption of flexible, cost-efficient public cloud platforms. Consequently, this twenty percent savings metric serves as a highly realistic financial benchmark for resource-constrained business entities.

Finally, the public sector expenditure saving of thirty percent is synthesized from electronic government integration reports. These empirical studies evaluated the performance impact of consolidating regional administrative databases under a single digital platform. The data aggregation process mapped the administrative expenditures of provincial governments before and after database integration. The results showed that digitalizing transaction flows systematically eliminated document duplication, physical printing, and excess staff labor. Therefore, this thirty percent saving is highly dependent on complete, inter-agency digital integration and administrative commitment.

To ensure a clear and transparent synthesis, these aggregated quantitative metrics are structured in a summary table. This table explicitly connects each performance percentage to its empirical origin and specific mathematical aggregation method. Corporate managers can utilize these values as realistic benchmarks for estimating the financial returns of digital investments. Furthermore, detailing the exact causal mechanisms behind each metric prevents the overgeneralization of results. The complete empirical basis and synthesis of these performance metrics are detailed in the table below.

Table 3. Empirically Sourced and Aggregated Performance Metrics

Core Performance Metric	Synthesized Numerical Value	Empirical Sources	Data Aggregation Procedure Applied	Primary Causal Mechanism
Corporate Budget Cost Reduction	28.5 percent	Azam dan Bouckaert (2025)	Arithmetic mean across 12 governed corporate cases	Standardization of IT budgeting processes, reducing software overlaps
Operational Service Response Time	34.2 percent	Dwinanda dan Utama (2026)	Aggregation of technical helpdesk logs before and after audits	Automation of service workflows and incident routing under operations controls
SME Operational Cost Savings	20.0 percent	Kusdiyanti et al. (2024)	Mean percentage across 80 surveyed small enterprises	Strategic planning of flexible cloud resources and virtualization
State Administrative Savings	30.0 percent	Putro et al. (2024)	Analytical projections from e-government SPBE consolidations	Eliminating manual entry, physical paper files, and redundant staff labor

Cross-Sectoral Analysis: Systematizing Successes and Contradictions

To provide a highly critical and nuanced synthesis, this study performs a systematic cross-sectoral comparison across Indonesia. Different industries in the country exhibit varying levels of digital governance maturity, influenced by their regulatory environments. Analyzing these variations is essential to understand why similar technology capabilities produce different efficiency returns. This systematic comparison isolates the critical success factors and failure risks unique to each economic sector. The complete cross-sectoral comparative analysis is presented in the structured table below.

Table 4. Cross-Sectoral Analysis of Digital Governance and Causal Outcomes

Industrial Sector	Primary Technology Deployed	Dominant Framework	Critical Success Factors	Critical Failure Risks
Banking & Finance	Automated core banking, scalable cloud services	Enterprise governance frameworks, ISO 27001, ITIL	Strong board-level IT committees, certified technical experts	Cybersecurity breaches, high transaction network complexity
Manufacturing & Logistics	ERP integrations, automated inventory databases	Custom control systems, ISO 9001, supply chain standards	Seamless alignment of software with supplier workflows	Rigid staff resistance to change, system integration delays
Public Services & SPBE	Citizen portals, centralized regional databases	National guidelines, COBIT frameworks	SPBE Complete inter-agency data sharing, clear state regulations	Uneven infrastructure capacity, low digital literacy of staff

The banking and financial services sector exhibits the highest level of maturity in coordinating technology capabilities with governance. This high performance is driven by intense market competition, strict central bank regulations, and access to technical experts. Large national financial institutions, such as Bank Mandiri and BNI, consistently invest in secure, scalable digital architectures. By establishing dedicated, board-level IT governance committees, these banks ensure that digital investments directly support corporate profitability goals. Consequently, the financial sector serves as the national benchmark for achieving high operational cost efficiency through governed technology.

In contrast, the manufacturing and logistics industries exhibit a moderate level of digital governance maturity. These firms focus their technology capabilities primarily on implementing enterprise resource planning software to coordinate physical supply chains. While ERP database integrations successfully reduce inventory waste and shorten operational cycle times, their financial benefits are often delayed. Manufacturing companies frequently encounter severe employee resistance, high training costs, and database synchronization issues during early deployment. Thus, achieving cost optimization in this sector requires a strong administrative focus on change management and employee training.

The public services and state administration sectors represent the lowest maturity level in coordinating technology with formal governance. Public organizations in Indonesia often implement digital platforms primarily to satisfy national regulatory compliance mandates rather than strategic efficiency. While citizen-facing portals improve transactional transparency, internal cost containment remains highly inconsistent across different administrative regions. Public offices frequently struggle with low employee digital literacy, unstable physical server infrastructures, and severe budget constraints. Consequently, public sector digital initiatives are highly vulnerable to system failures and require customized, simplified governance guidelines.

A critical synthesis of the selected literature reveals important empirical contradictions regarding the direct impact of technology governance. For instance, while several quantitative studies report a direct positive relationship between governance maturity and corporate profitability, others report no significant effect. This empirical contradiction is particularly prominent in studies analyzing manufacturing companies listed on the Indonesia Stock Exchange. In these specific corporate settings, implementing formal governance did not directly translate into immediate financial returns or market valuation gains. This counter-intuitive finding suggests that the strategic influence of technology governance is far more complex than simple direct-effect models imply.

To resolve this empirical contradiction, researchers must look to intermediate operational capabilities as vital mediating variables. Technology governance does not operate as a direct driver of corporate financial metrics like return on assets. Instead, its strategic influence is fully mediated by operational capability improvements, such as process optimization and strategic resource allocation. When governance is implemented, it first standardizes workflow controls, which then reduces transaction costs and eventually improves financial performance. Recognizing this fully mediated pathway resolves academic contradictions and highlights the need for long-term commitment to digital governance.

Explicit Theoretical Linkages and Resolution of the Paradox

The empirical findings synthesized in this systematic review must be explicitly linked to the core theoretical perspectives. From the perspective of the Resource-Based View, a firm's technology capability represents a vital strategic resource. However, the physical infrastructure component of this capability represents a standard market commodity that is easily copied by competitors. Our synthesis confirms that physical databases and software assets only produce cost efficiency when combined with human expertise. This empirical reality supports the Resource-Based View's assertion that resources must be bundled with unique organizational processes to satisfy the VRIO criteria.

Furthermore, the synthesized findings support the core propositions of Dynamic Capabilities Theory within the context of emerging markets. Dynamic capabilities enable Indonesian firms to continuously reconfigure their technical assets to adapt to environmental turbulence. The analysis demonstrates that organizations with flexible infrastructure capabilities can rapidly reconfigure workflows to prevent operational bottlenecks. However, this dynamic resource reconfiguration requires the continuous guidance of mature enterprise governance processes to prevent strategic drift. Without these structured controls, the rapid shifting of technical resources leads directly to administrative confusion and financial waste.

Most importantly, the empirical synthesis resolves the long-standing debate surrounding the historical technology productivity paradox. The paradox occurs when massive investments in information systems fail to generate measurable improvements in cost efficiency. Research findings demonstrate that this productivity paradox is successfully resolved when technology capabilities are moderated by mature governance. Governed organizations utilize specific budgeting and operational cost-tracking controls to systematically monitor digital expenditures and maximize ROI. Thus, the paradox is not an inherent technical failure, but a failure of organizational alignment and oversight.

Strategic Barriers and Compliance Demands in Emerging Markets

The successful implementation of digital transformation in Indonesia is heavily influenced by the local regulatory landscape. A prominent example of this regulatory influence is State-Owned Enterprises Ministerial Regulation Number PER-02/MBU/02/2023 (Ministerial Regulation Number PER-02/MBU/02/2023, 2023). This strict regulation mandates that all state-owned companies establish standardized technology governance guidelines to guarantee financial accountability. In response, large infrastructure and construction firms have restructured their digital architectures. These regulatory-driven alignment initiatives ensure that technology spending is systematically monitored to prevent financial corruption and waste.

Similarly, major state-owned enterprises have aggressively aligned their operational models with these governance mandates. The organization integrated its nationwide port operations using standardized terminal operating systems to eliminate logistical inefficiencies. The COBIT framework also conducts comprehensive IT process maturity assessments across its energy distribution network (Kusmiarto et al., 2021). These large-scale corporate restructurings confirm that regulatory pressure is a powerful catalyst for driving digital governance adoption. By aligning with state guidelines, these enterprises successfully modernized their control environments while securing substantial operational cost savings (Hadikusuma & Siagian, 2022).

However, complying with these strict regulatory mandates poses a significant challenge for resource-constrained organizations in Indonesia. Many small businesses and regional public offices completely lack the financial resources to implement comprehensive enterprise governance audits. The high cost of hiring external consultants and securing standardized software licenses frequently exhausts limited administrative budgets (Er & Nurmawati, 2021). To overcome these financial barriers, smaller organizations must adopt a phased, incremental implementation strategy (Ma'ruf et al., 2024). This modular approach allows firms to prioritize critical control domains, such as budget and security, before expanding their governance models (Prihandono et al., 2024).

Beyond financial limitations, the severe shortage of competent information technology professionals in regional areas hinders national cost optimization efforts (Widjaja-Adhi & Soetjipto, 2026). Regional governments and provincial public schools struggle to recruit and retain certified technical personnel to manage complex databases. This competency gap frequently leads to poor database management, unpatched security vulnerabilities, and high system downtime. To address this human resource bottleneck, organizations must establish structured, ongoing digital training programs for internal employees (Sofyani et al., 2022). Enhancing the digital literacy of internal staff reduces dependency on external consultants and improves system adoption rates.

Ultimately, overcoming these structural and organizational barriers requires a deep, cultural commitment to digital governance. Corporate leaders must move beyond treating technology as a simple, isolated administrative support function. Instead, technical decisions must be fully integrated into the core strategic planning and risk management procedures of the firm. Establishing an adaptive, collaborative corporate culture minimizes employee resistance and ensures the successful adoption of automated tools. By combining flexible capabilities with mature governance, Indonesian enterprises can navigate market turbulence and secure sustainable cost efficiency (Nugroho et al., 2022).

CONCLUSION

This study concludes that Information Technology (IT) capability and IT governance are complementary strategic factors that play a crucial role in enhancing operational cost efficiency within Indonesian organizations. The synthesis of 27 Scopus-indexed studies demonstrates that strong IT capability alone does not automatically lead to efficiency gains unless it is supported by mature governance mechanisms. IT governance serves as a critical enabler that aligns technological investments with organizational objectives, risk management practices, and cost-control initiatives. These findings reinforce the propositions of the Resource-Based View and Dynamic Capabilities Theory, which emphasize that the value of digital resources depends on how effectively organizations manage and integrate them. Therefore, the success of digital transformation is determined not only by technological assets but also by the quality of governance structures that guide their utilization.

The study also identifies substantial empirical evidence regarding the positive impact of IT governance on operational efficiency across various sectors in Indonesia. Organizations that implement mature governance frameworks are better able to reduce operational costs, improve service responsiveness, and optimize resource utilization through automation and system integration. Furthermore, this research offers a novel contribution by proposing an integrated conceptual framework that positions IT governance as a moderating mechanism between IT capability and operational cost efficiency. This framework provides a more comprehensive explanation of how organizations can overcome the Technology Productivity Paradox, where significant technology investments often fail to generate proportional performance improvements. As a result, the study makes an important theoretical contribution to the literature on digital capability, governance, and organizational performance in emerging economies.

From a practical perspective, the findings suggest that Indonesian organizations should focus not only on expanding digital infrastructure but also on strengthening governance policies, control mechanisms, and oversight processes. Investments in employee competencies, governance standards, and top management commitment are essential for achieving sustainable operational efficiency and maximizing the returns from digital transformation initiatives. Nevertheless, this study is limited by its reliance on Scopus-indexed publications and its focus on the Indonesian context during the 2021–2026 period. Future research is encouraged to incorporate additional databases, conduct meta-analytic investigations, and empirically test the proposed framework using primary data across different industries and organizational settings. Such efforts would provide

IT Capability, IT Governance, and Operational Cost Efficiency: Evidence from Indonesia (Aninda Puji Adila, Khalilul Rahman, Diva Trimuliani, and Aditya Novsa Pratama)

deeper insights into the mechanisms through which IT capability and IT governance contribute to long-term organizational success and operational sustainability.

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