Strategic Innovation in Information Systems for Digital Transformation and Operational Excellence

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ABSTRACT

Organizations frequently pursue digital transformation to revitalize legacy workflows, yet information systems investments stall when strategic planning disconnects from shop-floor process execution. This study examines how strategic innovation in information systems translates into digital transformation and sustained operational excellence through business–IT alignment and lean-digital process integration. Guided by the PRISMA 2020 statement and Xiao and Watson's systematic review protocol, 468 candidate records published between 2019 and 2026 were screened down to 26 core peer-reviewed studies supported by 2 methodological protocol references (28 verified DOIs). Thematic synthesis reveals that strategic IS innovation elevates operational excellence only when digital resource primacy, enterprise architecture maturity, and genuine executive attention synchronize digital transformation with Lean Six Sigma and Industry 4.0 routines. Conversely, symbolic transformation signaling, structural resistance, misaligned CEO power trajectories, and uncalibrated public-subsidy dependencies dampen operational gains unless offset by disciplined autonomy and three-stage lean-digital integration. In conclusion, sustainable excellence stems not from isolated software deployments, but from coherent socio-technical alignment linking strategic IS architecture to continuous process excellence models. Practically, the resulting five-construct strategic translation model assists executives and operations leaders in diagnosing symbolic commitments, sequencing alignment maturity, and embedding measurable quality self-assessment across transformation portfolios.

I. INTRODUCTION

Rapidly evolving digital markets compel enterprises and public institutions to treat strategic innovation in information systems (IS) as the centerpiece of long-term transformation rather than passive back-office support (Teubner & Stockhinger, 2020; Hund et al., 2021). Because digital transformation fundamentally relies on giving digital resources strategic primacy across core workflows, organizations must align enterprise architecture, top management cognition, and process routines concurrently (Pour & Fallah, 2019; Piccoli et al., 2024). When executed strategically, continuous IS innovation underpins measurable gains in process quality, customer responsiveness, and institutional operational excellence (Carter et al., 2024; Al Jabri & Lahrech, 2026).

Despite heavy transformation budgets, recent empirical research exposes critical counter-evidence demonstrating how strategic IS programs stall or produce negligible operational returns (Chen et al., 2026). Executive rhetoric frequently degenerates into "symbolic signalling" that prioritizes investor visibility over substantive workflow redesign, while concentrated CEO power or entrenched organizational structures generate internal resistance that blocks architectural change (Choi & Pang, 2025; Arvidsson et al., 2026; Chen et al., 2026). Furthermore, external policy grants alone rarely sustain digital upgrades in resource-constrained SMEs without internal absorptive routines, highlighting persistent blind spots between strategic IS intent and realized shop-floor excellence (Demann et al., 2026).

Conversely, a converging wave of 2021–2026 studies proves that pairing strategic IS transformation with rigorous process excellence methodologies unlocks durable productivity and sustainable quality gains (Lameijer et al., 2021; Savastano et al., 2022). Evidence across banking, manufacturing, and construction demonstrates that integrating Lean Six Sigma, Business Process Management (BPM), and Industry 4.0 analytics within coherent digital transformation strategies markedly improves defect reduction, delivery precision, and self-assessed operational excellence (Bataineh et al., 2024; Alanazi, 2024; Tissir et al., 2024). Complementary findings confirm that big data capability, digital literacy, and top management attention accelerate innovation conversion into competitive performance (Li et al., 2024; Patil et al., 2025; Bilal et al., 2026).

To reconcile strategic IS theorizing with operations management practice, this study delivers four explicit contributions summarized in Table 1. First, unlike existing reviews focused exclusively on abstract IT strategy, it maps an explicit five-construct chain connecting Strategic IS Innovation and Business–IT Alignment directly through Digital Transformation and Lean–Digital Synergy to Operational Excellence (Teubner & Stockhinger, 2020; Patil et al., 2025). Second, it incorporates emerging 2024–2026 political-behavioral constraints—including symbolic signaling, peripheral outflanking, and CEO power asymmetries—within strategic excellence frameworks (Choi & Pang, 2025; Arvidsson et al., 2026; Chen et al., 2026). Third, it synthesizes Technology–Organization–Environment (TOE) and Lean Six Sigma fusion insights across recent high-impact manufacturing and service investigations (Virmani et al., 2025; Dang et al., 2026). Fourth, it translates the review into an actionable self-assessment and execution sequence grounded in excellence models (Morgado Oliveira & F. Gomes, 2024).

Notwithstanding significant progress, five scholarly gaps separate strategic IS research from operational excellence scholarship, as documented in Table 2. Reviews mapping IS strategy and digital innovation seldom track downstream continuous-improvement metrics such as Lean Six Sigma process variance or structured business excellence self-assessments (Hund et al., 2021; Goebeler et al., 2024). Conversely, operations and total quality studies integrating Industry 4.0 and Lean tools often treat IS architecture and top-management strategic attention as exogenous black boxes (El Affaki

et al., 2024; Tissir et al., 2024). Moreover, fragmented insights regarding symbolic corporate commitments, public-grant efficacy, and peripheral organizational resistance necessitate an updated 2019–2026 integrative synthesis (Demann et al., 2026; Chen et al., 2026).

Anchored on this central clue—that Strategic IS Innovation yields enduring Operational Excellence only when substantive Business–IT Alignment bridges Digital Transformation strategy with Lean–Digital process execution—this systematic literature review answers five focused research questions: (RQ1) How do digital resource primacy and strategic IS innovation reshape enterprise transformation foundations? (RQ2) In what ways do enterprise architecture alignment and executive attention differentiate substantive transformation from symbolic signaling? (RQ3) Which transformation execution mechanisms allow organizations to sense, seize, and outflank structural resistance? (RQ4) How do Lean Six Sigma, BPM, and Industry 4.0 synergies convert digital initiatives into measurable operational excellence? (RQ5) What integrated governance blueprint guides organizations toward sustainable excellence across turbulent markets?

Table 1: Research Novelty Matrix

Novelty Aspect	Brief Explanation	Related Keywords
Strategy-to-Shop-Floor Bridge	Connects macro strategic IS planning directly to micro operational excellence mechanisms (BPM, Lean Six Sigma, self-assessment).	strategic information systems, operational excellence
Behavioral & Political Realism	Accounts for symbolic transformation signaling, CEO power effects, and outflanking resistance alongside technical capabilities.	digital transformation, business-IT alignment
Lean–Industry 4.0 Synthesis	Integrates 2024–2026 Lean–digital configuration studies and TOE enablers across manufacturing, construction, and services.	operational excellence, systematic literature review
Excellence Self-Assessment Model	Embeds structured excellence models and digital resource primacy into a unified five-stage managerial translation chain.	strategic information systems, digital transformation

Table 2: Identified Research Gaps Across Prior Literature

No.	Research Gap Aspect	Brief Explanation	Related Keywords
1	Siloed Strategy vs. Operations Streams	Strategic IS journals and quality/BPM operational excellence journals rarely cross-synthesize shared constructs.	strategic information systems, operational excellence
2	Underexplored Symbolic Signaling	Many studies assume executive digital pledges automatically yield operational improvements rather than symbolic compliance.	digital transformation, business-IT alignment
3	Disconnected Enterprise Architecture	Alignment maturity through enterprise architecture is seldom traced down to Lean Six Sigma process performance.	business-IT alignment, operational excellence
4	Fragmented Physical–Digital Interplay	The role of materiality/physicality in digital innovation remains isolated from Industry 4.0 excellence frameworks.	digital transformation, strategic information systems

5	Lack of Sequenced Pathways	Managers lack a consolidated roadmap coordinating strategic funding, literacy, analytics autonomy, and excellence models.	systematic literature review, operational excellence

2.1 Strategic Information Systems Innovation and Resource Primacy

Strategic IS innovation extends beyond tactical software adoption to reimagine how digital resources structure firm strategy and competitive positioning (Teubner & Stockhinger, 2020; Piccoli et al., 2024). Synthesizing cross-disciplinary trajectories, Hund et al. (2021) frame digital innovation as a dynamic convergence of malleable digital technology and institutional organizing logic, while Goebeler et al. (2024) clarify four distinct roles through which physical materiality anchors digital innovation in real operational contexts. Across public-sector and commercial environments alike, designing strategic IS requires balancing modular agility with institutional accountability (Carter et al., 2024).

2.2 Business–IT Strategic Alignment and Executive Governance

Achieving operational value from IS strategy demands mature Business–IT alignment embedded through coherent enterprise architecture (Pour & Fallah, 2019; Al Jabri & Lahrech, 2026). Recent upper-echelon investigations underscore that top management team attention substantially elevates innovation activities (Li et al., 2024), yet leadership dynamics are non-linear: Choi and Pang (2025) reveal divergent effects of CEO power on digital versus non-digital innovation, while Chen et al. (2026) demonstrate that corporate transformation rhetoric deteriorates into symbolic signaling unless paired with genuine resource commitments.

2.3 Digital Transformation Strategy Making and Overcoming Inertia

Digital transformation strategy making evolves continuously through emergent sensing, learning, and seizing routines rather than linear top-down master plans (Chanias et al., 2019; Böttcher et al., 2022). Shi et al. (2022) show that "disciplined autonomy"—combining structured business analytics with active customer involvement—prevents fragmented experimentation during transformation. When entrenched hierarchies resist strategic IS shifts, peripheral actors can catalyze transformation by "outflanking" rigid institutional bottlenecks (Arvidsson et al., 2026), whereas external financial grants alone yield uneven outcomes unless internal organizational capabilities co-evolve (Demann et al., 2026).

2.4 Lean–Digital Process Synergy and TOE Integration

Converting strategic digital transformation into tangible shop-floor performance increasingly relies on synthesizing Business Process Management (BPM), Lean Six Sigma, and Industry 4.0 architectures (Lameijer et al., 2021; Patil et al., 2025). Empirical synergy and case frameworks across automotive, healthcare, and industrial environments verify that Lean Six Sigma disciplines stabilize workflows so Industry 4.0 automation reduces waste rather than digitizing inefficiency (El Affaki et al., 2024; Tissir et al., 2024). Under the Technology–Organization–Environment (TOE) lens, structured multi-stage lean-digital pathways outperform ad-hoc software rollouts (Virmani et al., 2025; Dang et al., 2026).

2.5 Operational and Sustainable Business Excellence

Operational excellence encompasses consistent cost efficiency, process quality reliability, cycle-time discipline, and continuous organizational self-assessment (Alanazi, 2024; Bataineh et al., 2024). Embedding established excellence models into digital transformation ensures short-term operational gains mature into sustainable business excellence even amidst economic turbulence (Savastano et al., 2022; Morgado Oliveira & F. Gomes, 2024). Confirming this trajectory across contemporary firms, Bilal et al. (2026) highlight big data analytics and workforce digital literacy as critical determinants translating digital transformation adoption into durable firm performance.

II. METHODOLOGY

3.1 PRISMA 2020 Protocol and Multi-Database Search Strategy

This research adopts a Systematic Literature Review (SLR) methodology following the PRISMA 2020 guideline (Page et al., 2021) and Xiao and Watson's (2017) structured review procedures to ensure methodological transparency, replicability, and bias control across disparate strategy and operations literature.

Comprehensive searches were conducted across Scopus, ScienceDirect, Emerald Insight, Taylor & Francis Online, MDPI, and Crossref targeting peer-reviewed English-language journal articles published from 2019 to 2026 (anchored methodologically by Xiao & Watson, 2017; Page et al., 2021). Boolean search expressions combined core conceptual tiers: ("strategic information systems" OR "information systems strategy" OR "enterprise architecture") AND ("digital transformation" OR "digital innovation" OR "business-IT alignment") AND ("operational excellence" OR "business excellence" OR "Lean Six Sigma"). Inclusion criteria mandated peer-reviewed journal status, active DOI registration, and explicit investigation of strategic IS, alignment, transformation, or excellence outcomes; editorial notes, unverified preprints, and purely technical hardware benchmarks without organizational constructs were excluded.

3.2 PRISMA 2020 Screening Funnel and Construct Coding

The database search initially retrieved 468 candidate records. Following DOI deduplication and metadata normalization, 314 unique articles advanced to title and abstract screening against eligibility thresholds, retaining 102 candidate full-text manuscripts. Independent full-text quality appraisal—assessing theoretical coherence, empirical/qualitative rigor, construct clarity, and direct coverage of RQ1–RQ5—eliminated 76 off-scope papers and yielded 26 core peer-reviewed studies (2019–2026) complemented by 2 methodological SLR guidelines, resulting in 28 verified references.

All extracted studies were coded across five constructs—Strategic IS Innovation (SISI), Business–IT Strategic Alignment (BISA), Digital Transformation Execution (DTE), Lean–Digital Process Synergy (LDPS), and Operational & Business Excellence (OBE)—as mapped alongside observable indicators in Table 3. Conceptually, Figure 1 depicts the five-stage Strategic Architecture Flow Diagram connecting SISI to OBE, while Figure 2 details the quantitative PRISMA 2020 selection trajectory.

Table 3: Operational Constructs, Synthesized Indicators, and Supporting Literature

Construct	Synthesized Observable Indicators	Supporting APA Literature
Strategic IS Innovation (SISI)	Digital resource primacy, IS strategy scope, physical–digital artifact coupling, institutional IS design	Teubner & Stockhinger (2020); Hund et al. (2021); Carter et al. (2024); Goebeler et al. (2024); Piccoli et al. (2024)
Business–IT Alignment (BISA)	Enterprise architecture maturity, TMT digital attention, CEO governance balance, substantive vs. symbolic commitment	Pour & Fallah (2019); Li et al. (2024); Choi & Pang (2025); Al Jabri & Lahrech (2026); Chen et al. (2026)
Digital Transformation Execution (DTE)	Iterative strategy making, sensing/seizing pathways, analytics-led disciplined autonomy, outflanking resistance	Chanias et al. (2019); Böttcher et al. (2022); Shi et al. (2022); Arvidsson et al. (2026); Demann et al. (2026)
Lean–Digital Process Synergy (LDPS)	Lean Six Sigma + I4.0 integration, BPM optimization, TOE readiness, three-stage transformation configuration	Lameijer et al. (2021); El Affaki et al. (2024); Tissir et al. (2024); Patil et al. (2025); Virmani et al. (2025); Dang et al. (2026)
Operational & Business Excellence (OBE)	Process reliability, self-assessment maturity, sustainable excellence models, digital literacy & performance	Savastano et al. (2022); Alanazi (2024); Bataineh et al. (2024); Morgado Oliveira & F. Gomes (2024); Bilal et al. (2026)

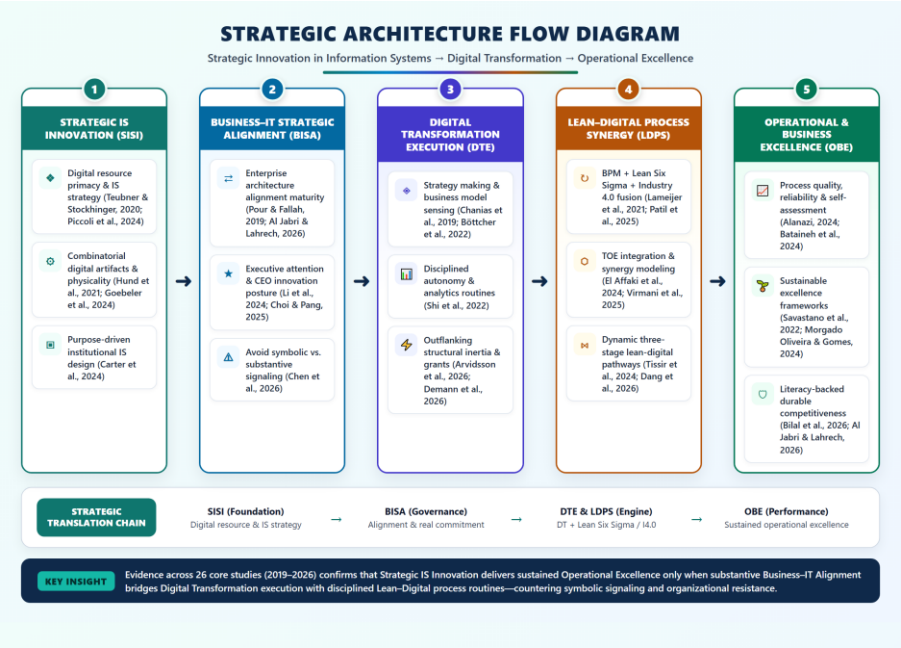

Figure 1: Strategic Architecture Flow Diagram Connecting Strategic IS Innovation, Alignment, Transformation, and Operational Excellence

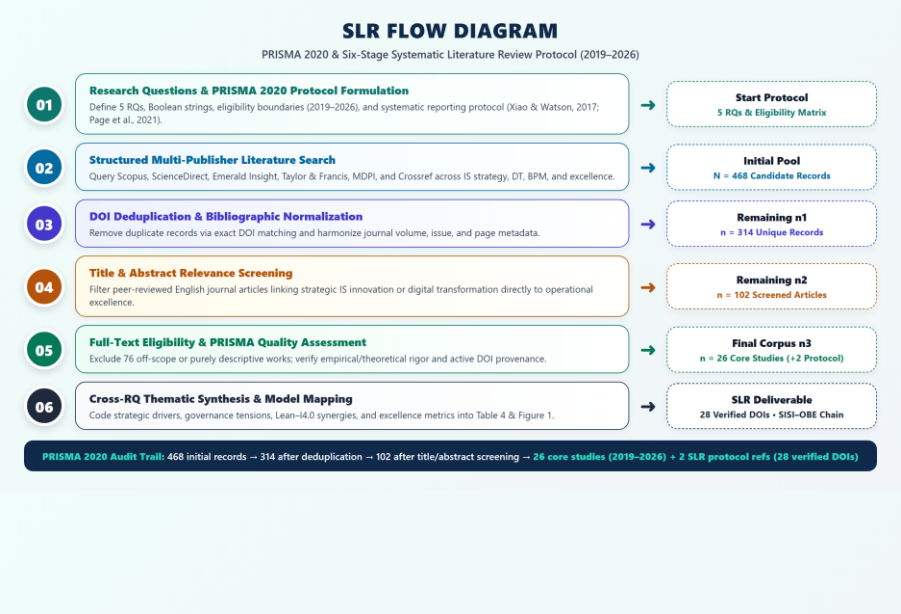

Figure 2: PRISMA 2020 Six-Stage Systematic Literature Review Protocol (2019–2026)

III. RESULTS AND DISCUSSION

4.1 Synthesis Matrix Across Research Questions (RQ1–RQ5)

Synthesizing the 26 core studies (2019–2026) demonstrates consistent empirical and theoretical convergence across all five research questions. Table 4 summarizes the thematic patterns, dominant theoretical frameworks, and representative peer-reviewed studies anchoring the Strategic IS–to–Operational Excellence translation chain.

4.2 Answer to RQ1: Digital Resource Primacy and Strategic IS Foundations

Regarding RQ1, foundational reviews and conceptual extensions agree that IS innovation becomes strategic only when digital resources shift from supporting tools to core value-creating architectures (Teubner & Stockhinger, 2020; Piccoli et al., 2024). Hund et al. (2021) and Goebeler et al. (2024) clarify that software-based digital innovation gains durable operational traction when interwoven cleanly with physical processes, equipment, and organizational context rather than treated as detached virtual experimentation—a principle echoed in public-sector IS design (Carter et al., 2024).

4.3 Answer to RQ2: Enterprise Architecture Alignment vs. Symbolic Signaling

Addressing RQ2, comparative evidence confirms that Enterprise Architecture maturity directly strengthens Business–IT strategic alignment (Pour & Fallah, 2019; Al Jabri & Lahrech, 2026), creating governance clarity for downstream investments. However, contrasting upper-echelon findings expose critical tensions: while top management attention generally boosts innovation activity (Li et al., 2024), excessive CEO power can skew resource allocation away from exploratory digital innovation (Choi & Pang, 2025). Worse, Chen et al. (2026) expose how corporate DT disclosures frequently mask symbolic posturing that correlates with weak substantive innovation unless verified through aligned architectural budgets.

4.4 Answer to RQ3: Transformation Execution, Autonomy, and Overcoming Resistance

Addressing RQ3, organizations successfully execute digital transformation when top-down intent meets adaptive bottom-up capability. Chanias et al. (2019) and Böttcher et al. (2022) trace how iterative strategy making connects sensing and seizing mechanisms into coherent digital business models, while Shi et al. (2022) prove that pairing business analytics with disciplined team autonomy elevates customer-aligned innovation. When incumbents resist change or rely passively on public grants, peripheral actors "outflank" internal bottlenecks to achieve transformation breakthroughs (Arvidsson et al., 2026; Demann et al., 2026).

4.5 Answer to RQ4: Lean Six Sigma, BPM, and Industry 4.0 Synergies

Addressing RQ4, eight specialized operational studies reveal how digital transformation translates into concrete cost, quality, and cycle-time performance through process excellence frameworks. Rather than replacing classical quality management, Industry 4.0 technologies and big data analytics amplify Lean Six Sigma and BPM effectiveness when deployed sequentially across standardized workflows (Lameijer et al., 2021; El Affaki et al., 2024; Patil et al., 2025). Empirical configurations verify that TOE readiness factors, digital literacy, and structured three-stage lean-digital sequencing prevent automation chaos and sustain superior operational efficiency (Tissir et al., 2024; Virmani et al., 2025; Bilal et al., 2026; Dang et al., 2026).

4.6 Answer to RQ5: Integrated Blueprint and Self-Assessment Governance

Addressing RQ5, synthesizing Figure 1 and Table 4 yields a disciplined strategic governance blueprint: (1) establish digital resource primacy in enterprise IS planning; (2) codify Enterprise Architecture standards backed by substantive executive attention; (3) enable analytics-guided disciplined autonomy and peripheral innovation pockets to counter structural inertia; (4) fuse Industry 4.0 tools with Lean Six Sigma and BPM workflows; and (5) anchor outcomes inside continuous self-assessment and sustainable excellence models (Alanazi, 2024; Bataineh et al., 2024; Morgado Oliveira & F. Gomes, 2024; Savastano et al., 2022).

4.7 Theoretical Implications, Managerial Value, and Study Limitations

Theoretically, this SLR bridges Strategic Information Systems Alignment Theory with Operations Quality Management (Lean Six Sigma / Excellence Models), demonstrating that alignment governance and behavioral commitment mediate the conversion of strategic IS innovation into sustained business excellence (Piccoli et al., 2024; Patil et al., 2025). Practically, CEOs, CIOs, and operations directors gain concrete diagnostic criteria to detect symbolic DT signaling early, balance executive control with analytics-backed autonomy, and pair IT modernization with formal process-excellence audits prior to scaling across sites (Alanazi, 2024; Chen et al., 2026).

Methodologically, because this review synthesizes 26 peer-reviewed studies from 2019–2026 rather than primary multi-firm longitudinal datasets, statistical path weights between symbolic signaling, lean-digital synergy, and excellence scores require future

cross-sector Structural Equation Modeling validation across emerging-market SMEs and regulated institutions (Virmani et al., 2025; Al Jabri & Lahrech, 2026).

Table 4: Systematic Literature Review Synthesis Matrix Across RQ1–RQ5

Research Question / Theme	Core Synthesized Evidence	Dominant Theoretical Lens	Representative Peer-Reviewed Studies
RQ1: Strategic IS Innovation Foundations	Digital resource primacy and balanced physical–digital artifact integration anchor sustainable transformation capacity.	Digital Resource Primacy, Digital Innovation Theory	Teubner & Stockhinger (2020); Hund et al. (2021); Carter et al. (2024); Goebeler et al. (2024); Piccoli et al. (2024)
RQ2: Alignment vs. Symbolic Signaling	Enterprise architecture alignment and substantive TMT focus drive impact, whereas concentrated CEO power or symbolic signaling stalls returns.	Strategic Alignment Maturity, Upper Echelons & Signaling Theory	Pour & Fallah (2019); Li et al. (2024); Choi & Pang (2025); Al Jabri & Lahrech (2026); Chen et al. (2026)
RQ3: Transformation Execution & Resistance	Iterative sensing–seizing, disciplined analytics autonomy, and peripheral outflanking overcome incumbent inertia better than passive subsidies.	Dynamic Strategy Making, Ambidexterity & Institutional Outflanking	Chanias et al. (2019); Böttcher et al. (2022); Shi et al. (2022); Arvidsson et al. (2026); Demann et al. (2026)
RQ4: Lean–Digital Process Synergies	Fusing Lean Six Sigma, BPM, and Industry 4.0 within TOE-ready three-stage pathways stabilizes processes before scaling automation.	Lean Six Sigma / BPM, TOE Framework, Operations Synergy	Lameijer et al. (2021); El Affaki et al. (2024); Tissir et al. (2024); Patil et al. (2025); Virmani et al. (2025); Dang et al. (2026)
RQ5: Operational & Business Excellence	Excellence models, self-assessment routines, culture, and workforce digital literacy convert transformation into durable competitive advantage.	Business Excellence Models (EFQM/MBNQA), Sustainable Performance	Savastano et al. (2022); Alanazi (2024); Bataineh et al. (2024); Morgado Oliveira & F. Gomes (2024); Bilal et al. (2026)

IV. CONCLUSIONS

This systematic literature review concludes that strategic innovation in information systems propels organizations toward enduring digital transformation and operational excellence only when architectural intent is tightly coupled with substantive business–IT alignment and disciplined process execution (Teubner & Stockhinger, 2020; Piccoli et al., 2024; Al Jabri & Lahrech, 2026). Synthesizing 28 verified peer-reviewed references grounded in 26 core 2019–2026 studies proves that pairing strategic IS architectures with Lean Six Sigma, BPM, and Industry 4.0 routines delivers superior reliability, quality self-assessment, and sustainable performance even across turbulent business environments (Savastano et al., 2022; Alanazi, 2024; Patil et al., 2025).

Equally vital, institutional leaders must guard against symbolic digital signaling, unmanaged executive power dynamics, and unguided subsidies by empowering disciplined analytics autonomy and workforce digital literacy alongside formal excellence frameworks (Choi & Pang, 2025; Bilal et al., 2026; Chen et al., 2026). Adopting the integrated five-construct translation blueprint enables both executives and IS scholars to bridge high-level transformation strategy with measurable operational excellence.

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