International Journal of Business Marketing and Management (IJBMM)
Volume 11 Issue 5 Sept-Oct 2026, P.P.01-11
ISSN: 2456-4559
www.ijbmm.com

From Planning to Smart Logistics: Capability Layering in Vietnam's Logistics Ecosystem, 2017-2025

Pham Thi Mai Yen[1]
[1]*Dai Nam University, Hanoi, Vietnam*

Abstract : *This study explains how a national logistics ecosystem evolves when infrastructure, institutional, market, human, green, digital, and intelligent capabilities develop at different speeds. It analyzes all nine Vietnam Logistics Reports published from 2017 to 2025. A deductive-inductive codebook, normalized keyword-group frequencies, report architecture, and contextual reading are combined to identify continuity and turning points. The results reveal five cumulative phases: foundational coordination; market-facing specialization; efficiency, resilience, and workforce development; green-digital integration; and platform-oriented intelligence. Every rotating annual theme produces a corresponding salience peak, yet infrastructure and institutional concerns persist throughout the series. Digital salience also remains high in 2025 as smart-logistics attention rises, indicating layering rather than agenda replacement. The paper extends dynamic-capability reasoning from firms to a policy-coordinated ecosystem and specifies the platform conditions that connect digitalization to smart logistics. Policy and managerial implications emphasize interoperable data, complementary investment, green-digital use cases, workforce development, and implementation measures that include smaller providers and regions.*

Keywords - *capability layering, digital transformation, logistics ecosystem, smart logistics, Vietnam*

I. Introduction

Logistics has become a strategic national capability because it connects production, trade, consumption, and regional development. Its performance affects delivery reliability, inventory exposure, export competitiveness, and the ability of firms to participate in global value chains. The World Bank's Logistics Performance Index accordingly evaluates customs, infrastructure, international shipments, service competence, tracking and tracing, and timeliness as interdependent dimensions rather than reducing logistics to transport capacity [1]. This system view is especially important in emerging economies, where a modern port, highway, or warehouse may deliver less value than expected if customs procedures, inland connections, service providers, skills, or information systems remain weak.

Three changes have increased the analytical value of an ecosystem perspective. First, digitalization has expanded coordination from bilateral transactions toward platforms, real-time visibility, analytics, automation, and digitally mediated services [2]-[5]. Second, climate and resource constraints have broadened logistics objectives from cost and service toward emissions, energy use, circularity, and environmental accountability [6]-[9]. Third, pandemic disruption and subsequent volatility have shown that lean efficiency does not guarantee resilience. Visibility, flexibility, collaboration, and recovery capacity must be developed together, but their value still depends on physical and institutional foundations [10], [11]. These shifts make logistics transformation a problem of complementarity: the returns to one capability depend on the availability and alignment of several others.

Vietnam combines export-oriented manufacturing, growing e-commerce, major infrastructure investment, dense links to regional value chains, and active public coordination. Logistics development is therefore neither a purely firm-led process nor a simple outcome of public planning. It emerges from interaction among ministries, local governments, cargo owners, logistics service providers, ports, carriers, technology vendors, financial institutions, universities, and industry associations. The resulting configuration resembles an ecosystem in which autonomous actors must align around the value proposition of reliable, cost-effective, sustainable, and increasingly intelligent movement of goods and information.

The annual Vietnam Logistics Reports provide an unusually consistent documentary record of this transformation. From 2017 through 2025, the series retained a recurrent sectoral spine while rotating its thematic focus from action-oriented coordination to e-commerce, agricultural value, cost reduction, human resources, green logistics, digital transformation, free-trade zones, and smart logistics. Individual reports are frequently

used as sources of statistics or policy description. Their greater analytical value, however, lies in the sequence: repeated structures reveal persistent constraints, while changing thematic chapters show how the national agenda senses new pressures and legitimizes new responses.

Existing scholarship supplies strong explanations of digital supply chains, sustainable supply-chain management, resilience, and firm-level dynamic capabilities. It says less about the temporal order in which these priorities accumulate at the level of a national logistics ecosystem. Cross-sectional surveys can test relationships among capabilities at a point in time, but they are not designed to reconstruct how infrastructure, institutions, market specialization, workforce, sustainability, and data governance become connected over a decade. Likewise, citing one official report cannot distinguish a durable capability from a temporary policy emphasis.

This study addresses that gap through three research questions: i) how the substantive priorities of Vietnam's logistics discourse changed between 2017 and 2025. RQ2 asks which priorities persisted, intensified, or became integrated with newer themes; ii) what evolutionary model best explains the observed sequence. The study treats the nine reports as a complete longitudinal corpus and combines contextual document analysis with normalized counts for ten theoretically grounded keyword groups; iii) the quantitative indicators identify shifts in textual salience; qualitative reading explains what those shifts mean and prevents frequency from being treated as equivalent to implementation.

II. Literature Review and Analytical Framework

2.1 Logistics Ecosystems and Complementarity

An ecosystem is a configuration of interdependent actors whose combined activities create a value proposition that no participant can produce alone. Adner defines ecosystem structure through the positions, activities, links, and alignment required around a focal value proposition [12]. Jacobides, Cennamo, and Gawer emphasize complementarities, modularity, and coordination among organizations that remain legally and operationally autonomous [13]. These perspectives differ from a conventional industry view because they focus not only on competition among similar firms but also on whether heterogeneous contributions fit together.

Logistics is intrinsically ecosystemic. Cargo owners, freight forwarders, transport operators, ports, warehouses, customs authorities, technology providers, insurers, banks, local governments, and training institutions contribute different modules to the movement and visibility of goods. A deep-water port has limited systemic value without inland connections and synchronized procedures. Tracking technology provides incomplete visibility when partners use incompatible data definitions. Green vehicles cannot scale without charging or fueling infrastructure and suitable operating economics. Automation underperforms when workflows are unstable or workers lack the skills to manage exceptions. The unit of analysis must therefore include relationships among physical, institutional, organizational, human, environmental, and digital capabilities.

Complementarity also explains why national logistics transformation can be uneven. An investment may be technically successful within one organization yet generate little ecosystem value because adjacent actors do not adopt compatible routines. Conversely, shared standards or public digital infrastructure can increase the value of many private investments simultaneously. The key outcome is not uniform ownership or centralized control. It is sufficient alignment so that independently held capabilities interoperate around a common service outcome.

2.2 Dynamic Capabilities Beyond the Firm

Dynamic-capability theory explains how organizations sense changes, seize opportunities, and transform their resource base [14]. Sensing includes recognizing technological shifts, customer needs, regulatory pressures, and threats. Seizing involves investment choices and business models. Transforming requires reconfiguring assets, structures, routines, and relationships. At the firm level, these processes help explain why organizations facing similar conditions adapt differently.

Extending this logic to a national ecosystem requires caution. A country is not a unitary firm, and an annual policy report does not prove that organizations have implemented the capabilities it discusses. Nevertheless, public agencies and industry bodies can perform ecosystem-level functions that resemble sensing, seizing, and transforming. They can articulate shared problems, establish rules, sequence infrastructure, convene actors, support standards, develop human capital, and create demonstration environments. Policy discourse is therefore evidence of collective capability priorities, not evidence of uniform operational achievement.

This distinction supports the concept of capability layering. Transformation rarely removes the need for earlier capabilities. Digital freight matching still depends on roads, vehicles, contracts, and enforceable service obligations. Carbon accounting depends on data standards and measurement routines. Artificial intelligence

depends on digitized processes, sufficient data quality, and managerial capacity to use predictions. New capabilities are added to, recombined with, and sometimes constrained by an inherited base. Layering therefore predicts continuity beneath thematic change and offers a temporal mechanism through which ecosystem complementarity develops.

2.3 Digital Transformation and Smart Logistics

Digital supply-chain research links connected devices, platforms, analytics, and automation to visibility, coordination, responsiveness, and new service models [2], [3]. Digital transformation is broader than technology acquisition. It changes value creation, organizational structures, decision rights, capabilities, and relationships [4], [15], [16]. Big-data analytics can strengthen performance when organizations possess the dynamic capabilities required to translate data into action [17]. Blockchain may support provenance and traceability, but its value depends on governance, shared standards, trust, and viable interorganizational use cases [18]. These findings imply that isolated applications should not be confused with ecosystem transformation.

Smart logistics represents a further shift from recording and exchanging information toward prediction, optimization, assisted decision-making, and partially autonomous execution. Connected tracking devices can produce real-time operational data, but intelligence requires data integration, analytical models, reliable interfaces, and organizational responses [5]. A warehouse management system can optimize one facility; a smart logistics ecosystem must coordinate decisions across shippers, carriers, terminals, public authorities, and service platforms. The progression from digitization to digitalization and then to intelligence is therefore conditional rather than automatic.

Platform conditions become decisive at this stage. Common identifiers, electronic documents, application interfaces, access rules, cybersecurity, and dispute mechanisms determine whether data can move safely across organizational boundaries. Without these conditions, firms may build disconnected digital islands. With them, predictive capacity can be distributed across the network and smaller actors can access shared services that would be too costly to build independently.

2.4 Green Logistics and Sustainable Supply Chains

Sustainable supply-chain management integrates economic, environmental, and social objectives into interorganizational decisions [6], [7]. Green supply-chain practices include cleaner transport, energy-efficient warehousing, modal shift, reverse logistics, packaging redesign, load consolidation, and collaboration with suppliers and customers [8], [9]. These practices often require coordination beyond the boundary of a logistics provider because emissions and waste arise across routes, facilities, modes, and product life cycles.

Digital and green capabilities can reinforce each other. Route optimization, freight matching, sensor-based cold-chain control, energy monitoring, digital documentation, and carbon accounting may reduce both cost and environmental impact. Yet digital systems also consume capital, energy, and specialized labor. A credible green-digital transition therefore requires use-case selection, lifecycle assessment, data quality, and attention to distributional effects. The theoretical issue is not whether digitalization is inherently green, but under which complementary conditions it enables verifiable environmental improvement.

2.5 Resilience, Viability, and Human Capability in logistics ecosystems

Supply-chain resilience concerns preparation for, response to, and recovery from disruption. The viability perspective broadens resilience toward the long-term survival of interconnected supply networks under changing conditions [10]. Research following COVID-19 highlights visibility, collaboration, flexibility, redundancy, and digital capability, while warning that no single practice is sufficient [11]. Excess capacity without coordination may be wasteful; visibility without authority to act may not shorten recovery; diversification without reliable partners may create complexity rather than resilience.

Human capability connects every layer. Digital tools, sustainability measurement, risk analysis, cross-border compliance, and multimodal coordination require technical, analytical, and managerial skills. Training is therefore not a supporting activity that follows infrastructure and technology. It is a conversion capability that determines whether investment becomes operational performance. At ecosystem level, universities, professional associations, vocational providers, and employers collectively shape the quantity, quality, and portability of logistics skills.

2.6 Institutional Coordination in Emerging Economies

Logistics upgrading in an emerging economy combines market expansion with public coordination. Government influences infrastructure sequencing, customs modernization, land use, safety and environmental rules, competition, training, technology diffusion, and regional connectivity. Institutional fragmentation can weaken otherwise sound investments when agencies, provinces, or transport modes apply incompatible incentives and data requirements. The problem is intensified when many service providers are small and cannot individually finance advanced systems or participate in standard-setting.

The role of institutions is not to replace entrepreneurship. It is to reduce coordination failures, provide public or shared infrastructure, and create credible rules for complementary investment. This is particularly relevant in Vietnam, where logistics supports export manufacturing and domestic commerce while development responsibilities are distributed across central ministries, local authorities, state-linked infrastructure organizations, associations, and private firms. The annual report series can therefore be read as a record of which coordination problems were recognized and which capability responses became legitimate.

2.7 Analytical Expectations and Research Gap

Four gaps motivate the analysis. First, logistics research remains dominated by firm and supply-chain units, with fewer longitudinal studies of national ecosystems. Second, digital, green, resilience, workforce, and institutional capabilities are often examined in separate streams. Third, cross-sectional designs reveal association more readily than sequence. Fourth, official reports are commonly mined for isolated statistics rather than analyzed as a repeated documentary corpus.

The literature supports three analytical expectations. P1 states that national logistics development is cumulative: new priorities will be layered onto continuing physical and institutional requirements. P2 states that shocks will accelerate coupling among efficiency, resilience, digital visibility, and human capability. P3 states that movement from digital to smart logistics will require an intermediate platform-building process involving interoperable data, bounded spatial experimentation, standards, and coordination. These propositions guide interpretation; they are not statistical hypotheses about implementation outcomes.

III. Research Methodology

3.1 Research Design

The study uses retrospective longitudinal document analysis. Documents are socially produced records with their own purposes, audiences, and institutional positions; they must therefore be appraised rather than treated as neutral mirrors of reality [19]. Content analysis provides explicit procedures for unitizing text, constructing categories, recording evidence, and drawing replicable inferences [20]. Combining the two methods is appropriate because the research asks both what changed in the reports and how the sequence should be interpreted.

The design is qualitatively led and quantitatively supported. Normalized keyword-group counts identify temporal concentration and potential turning points. Report titles, chapter architecture, executive framing, and passages surrounding the coded terms supply context. Frequency is interpreted as textual salience, not as policy effectiveness, investment, adoption, or logistics performance.

3.2 Corpus and Documentary Provenance

The corpus contains every Vietnam Logistics Report from the series' inception in 2017 through 2025 [21]-[29]. The reports were issued under the Ministry of Industry and Trade and published by Industry and Trade Publishing House.

The annual report is the primary temporal unit. Chapters, section headings, thematic chapters, and term occurrences are secondary units. Completeness reduces within-series selection bias: no year or report was omitted because it did not fit the emerging explanation. The series is also structurally comparable. Most reports review the business environment, infrastructure, services, logistics in production and trade, supporting activities, and local development, while one or more chapters elaborate the annual focus.

3.3 Data Preparation and Unitization

Each PDF was converted to layout-preserving text. The text was normalized to Unicode NFC and lower case, and words were tokenized with Vietnamese diacritics retained. Front matter, tables, captions, body text, and references remained in the corpus because the aim was to measure whole-report attention. This choice may

repeat a thematic phrase in a title, table of contents, page header, and chapter heading; the same publication practice applies across years and is part of how thematic emphasis is communicated. Page counts were obtained from the PDF metadata, while token counts were computed after normalization.

The coding unit was an occurrence of a predefined word or phrase. Multiword phrases were evaluated before their component words, preventing double counting within a category at the same text position. Categories were intentionally non-exclusive because one passage may legitimately link, for example, digitalization with green logistics or human resources with resilience. The analysis therefore measures the salience of capability domains, not mutually exclusive topic shares.

3.4 Coding Framework

The initial codebook was derived from the literature and refined after reading the report structures. It contains ten domains: infrastructure and connectivity; policy and institutions; efficiency and cost; services and market specialization; human capital; resilience; green logistics; digitalization; spatial integration; and smart logistics. Table I provides representative anchors and the conceptual meaning of each category. Inflected Vietnamese forms did not require stemming because most anchors are nouns or stable phrases. English technical terms were retained where the reports use them.

Table I: Coding Framework and Illustrative Anchors

Category	*Illustrative anchors*	*Capability meaning*
Infrastructure	infrastructure; road; railway; seaport; airport; logistics center	Physical capacity and connectivity
Institutions	policy; institutions; law; regulation; customs procedure; standards	Rules, coordination, and public governance
Efficiency	logistics cost; cost reduction; efficiency; productivity; optimization	Operational performance and resource use
Services	logistics services; logistics enterprises; e-commerce; agriculture; 3PL/4PL	Market-facing specialization and providers
Human capital	human resources; training; skills; personnel; labor	Conversion of investment into operating capability
Resilience	recovery; resistance; disruption; risk; epidemic; adaptation	Continuity, response, and recovery
Green	green logistics; sustainable development; emissions; carbon; circular economy	Environmental performance and transition
Digital	digital transformation; digitization; data; automation; blockchain; IoT	Digital visibility, transactions, and coordination
Spatial integration	free-trade zone; regional linkage; economic corridor; border gate	Place-based coordination and regional connection
Smart logistics	smart logistics; AI; machine learning; big data; robot; autonomous	Prediction, optimization, and assisted autonomy

Note: Anchors are translated examples; categories are non-exclusive, and longer phrases take precedence over component words.

The framework balances sensitivity and interpretability. Broad domains such as institutions use several recurrent governance anchors. Narrow domains such as smart logistics use specific technologies and application terms. Generic words with high ambiguity were excluded. For example, the single word meaning "environment" was not used as a green anchor because it frequently appears in "business environment"; only environmentally specific phrases were retained. Similarly, the single word "locality" was excluded from spatial integration because each report contains local case material.

3.5 Normalization and Analytical Procedure

Raw counts are affected by report length. For category c in year t, normalized salience was therefore calculated as:

$$S_{c,t} = (N_{c,t} / W_t) \times 10{,}000 \qquad (1)$$

where N is the number of non-overlapping category occurrences and W is the annual word-token count. S is interpreted as occurrences per 10,000 words. To describe the magnitude of a thematic shift, the focal-year value was also divided by the arithmetic mean of all preceding years. The multiplier is descriptive and should not be read as a significance test.

Analysis proceeded in five steps. First, annual titles, report structures, and dedicated thematic chapters were recorded. Second, the same codebook and preprocessing rules were applied to all nine documents. Third, yearly salience profiles were compared to locate peaks, persistence, and discontinuities. Fourth, concordance contexts and thematic chapters were read to distinguish substantive use from lexical noise and to identify relationships among capabilities. Fifth, phases were assigned only when the official focus, report architecture, normalized indicator, and contextual interpretation converged.

3.6 Trustworthiness, Reproducibility, and Limits of Measurement

Trustworthiness rests on four features. The corpus is complete and publicly identifiable; the codebook is disclosed at the anchor level; one transformation and counting procedure is used across years; and quantitative patterns are triangulated with qualitative evidence. Negative cases are retained. For instance, infrastructure does not decline monotonically as digital attention rises, and institutional salience peaks in 2022 rather than in the foundational year. These departures prevent the phases from being treated as a simple technological ladder.

The method also has clear limitations. Keyword dictionaries can miss synonyms and cannot by themselves determine whether a term is supportive, critical, proposed, or implemented. Report length, authorship, chapter allocation, and editorial practice vary. Because coding rules are deterministic rather than assigned by multiple human coders, an inter-coder coefficient is not applicable to the frequency calculation; interpretive phase construction nonetheless remains subject to researcher judgment. The study therefore reports transparent indicators, avoids causal claims, and treats phases as an explanatory reconstruction that requires validation against operational data.

IV. RESULTS

4.1 Recurrent Architecture and Rotating Attention

The report series combines continuity with deliberate thematic punctuation. A recurrent architecture keeps business conditions, infrastructure, logistics services, production and trade, supporting activities, and regional development visible across the period. Rotating themes then concentrate attention on a constraint or opportunity that has become strategically salient. This structure provides initial support for capability layering: the annual focus is added to a continuing sectoral base rather than replacing it.

The normalized results strongly validate the thematic signal. Services and market-specialization anchors reach 89.5 occurrences per 10,000 words in 2018 and 91.7 in 2019. Efficiency reaches 39.4 and resilience 30.5 in 2020. Human capital rises to 95.5 in 2021. Green logistics reaches 45.5 in 2022; digitalization reaches 59.6 in 2023; spatial integration reaches 34.5 in 2024; and smart logistics reaches 30.7 in 2025. Each value is the maximum for its category or is directly aligned with the report's official focus. Table II shows focal year intensity and the comparison with prior-year baselines.

Table II: Focal Capability Salience and PrecedingYear Baselines

Year	*Annual focus*	*Focal category*	*Rate*	*Prior mean*	*Multiple*
2017	Planning/action	Infrastructure	63.8	--	--
2018	E-commerce	Services	89.5	62.1	1.44
2019	Agricultural value	Services	91.7	75.8	1.21
2020	Cost reduction	Efficiency	39.4	17.2	2.29
2020	Disruption context	Resilience	30.5	2.5	12.41

Year	*Annual focus*	*Focal category*	*Rate*	*Prior mean*	*Multiple*
2021	Human resources	Human capital	95.5	33.3	2.86
2022	Green logistics	Green	45.5	2.0	22.93
2023	Digital transformation	Digital	59.6	11.0	5.44
2024	Free-trade zones	Spatial integration	34.5	5.5	6.29
2025	Smart logistics	Smart logistics	30.7	2.8	11.14

Note: Rate and prior mean are occurrences per 10,000 words. Prior mean is the arithmetic mean of every preceding year. Multiple = focal-year rate / prior mean. Values are descriptive, not significance tests.

The multipliers are especially informative for newer capabilities. Green salience in 2022 is 22.93 times its 2017-2021 mean; digital salience in 2023 is 5.44 times its 2017-2022 mean; spatial integration in 2024 is 6.29 times its earlier mean; and smart-logistics salience in 2025 is 11.14 times its 2017-2024 mean. These shifts are too structured to be explained by report length, because the indicators are normalized and the peaks coincide with dedicated thematic chapters.

4.2 Phase 1: Foundational Coordination in 2017

The 2017 report, "Logistics: From Planning to Action," establishes the sectoral problem as one of coordinated execution [21]. Infrastructure salience is already high at 63.8 occurrences per 10,000 words, while institutional salience is 34.3. The report maps policy, infrastructure, services, enterprise logistics, technology, human resources, communication, and international cooperation. Its contribution to the sequence is not a single new technology but the definition of the ecosystem itself: logistics performance depends on action across multiple public and private domains.

This foundational phase contains elements that remain visible throughout the series. Infrastructure never falls below 60.8 occurrences per 10,000 words, and institutional salience remains between 20.6 and 38.1. The base is therefore durable. Later reports may shift the foreground, but roads, ports, centers, rules, standards, and coordination continue to occupy substantial textual space.

4.3 Phase 2: Market-Facing Specialization in 2018-2019

The 2018 focus on logistics and e-commerce turns the ecosystem toward a rapidly expanding channel with distinctive fulfillment and last-mile requirements [22]. Services-category salience rises from 62.1 in 2017 to 89.5, 1.44 times the preceding baseline. The shift emphasizes how logistics assets and service models must adapt to smaller orders, faster cycles, consumer interfaces, and digital transactions. Human-capital salience also rises to 42.1, illustrating that market specialization creates skill as well as technology demands.

The 2019 report extends specialization to agricultural value creation [23]. Services-category salience reaches the corpus maximum of 91.7. Agricultural logistics links transport and warehousing to cold chains, quality preservation, traceability, consolidation, and market access. The key analytical change from 2017 is movement from generic enabling conditions toward sector-specific value propositions. Ecosystem capability is judged not only by the existence of infrastructure, but by its fit with the timing, quality, and coordination requirements of particular markets.

The phase supports complementarity rather than substitution. Infrastructure salience remains above 60 in both years, institutional attention continues, and workforce terms remain more frequent than in the opening year. E-commerce and agriculture therefore expose new interfaces among the existing layers. They make service design and demand specificity central without rendering foundational capabilities obsolete.

4.4 Phase 3: Efficiency, Resilience, and Workforce Development in 2020-2021

The 2020 report makes logistics cost reduction its central theme [24]. Efficiency salience more than doubles from the 2017-2019 mean of 17.2 to 39.4. More strikingly, resilience salience rises from a prior mean of 2.5 to 30.5, a 12.41-fold increase. The convergence reflects a year in which cost, continuity, disruption, risk, and adaptation could no longer be treated as separate managerial questions. Infrastructure salience also rises to 80.3, showing that operational resilience is discussed through physical capacity and connectivity as well as organizational response.

The 2020 profile qualifies a narrow interpretation of cost reduction. In a stable environment, lower cost might be pursued through utilization, consolidation, or process efficiency. Under disruption, the relevant objective becomes efficient continuity: the ecosystem must preserve flows, adapt routes and procedures, and recover without accepting structurally excessive cost. The textual coupling of efficiency and resilience is consistent with the proposition that shocks accelerate integration among capabilities.

The 2021 focus on logistics human-resource development adds the conversion layer required to operationalize adaptation [25]. Human-capital salience reaches 95.5, almost three times the mean of all preceding years and the highest value observed for any focal capability. Resilience remains elevated at 21.5, while digital salience increases to 14.0. The sequence is meaningful: after disruption exposes coordination and capability gaps, attention turns to the people who must redesign processes, manage exceptions, use information systems, and coordinate across organizational boundaries.

This two-year phase shows why human resources should not be classified as a peripheral support function. Skills mediate the relationship between investment and performance. A platform without data-literate staff, a risk plan without decision authority, or a multimodal facility without coordination competence provides incomplete capability. Workforce development becomes part of resilience and transformation, not merely a labor-supply issue.

4.5 Phase 4: Green-Digital Integration in 2022-2023

Green logistics becomes the dedicated focus in 2022 [26]. Green salience rises from an earlier mean of 2.0 to 45.5 occurrences per 10,000 words. Infrastructure reaches 90.7 and institutional salience reaches its series maximum of 38.1. The profile indicates that environmental upgrading is framed through enabling systems and governance rather than as a stand-alone operational practice. Cleaner transport, facilities, modes, energy, standards, and incentives must be coordinated across organizations and locations.

The 2023 report then centers digital transformation [27]. Digital salience rises to 59.6, more than five times its preceding mean and the highest value in the series. The report's recurring chapters continue to cover physical infrastructure, services, enterprises, and local development, while the thematic chapter addresses the use of data and technology. The ordering from green to digital does not imply that the environmental agenda is abandoned. Instead, it creates the conditions for convergence through route optimization, digital documentation, load matching, cold-chain monitoring, energy management, and measurement.

The numerical profile also demonstrates imperfect but increasing integration. Green salience falls from its thematic peak after 2022, while digital salience rises sharply in 2023. This shows that annual editorial attention remains concentrated. Yet the interpretive relationship between the two capabilities strengthens because digital visibility enables measurement and control across environmental use cases. The phase is therefore better described as green-digital integration than as two disconnected annual topics.

4.6 Phase 5: Spatial Platforms and Logistics Intelligence in 2024-2025

The 2024 focus on free-trade zones introduces a spatial and institutional platform for coordinated logistics development [28]. Spatial-integration salience reaches 34.5, 6.29 times the earlier mean. Infrastructure reaches its series maximum of 93.8, and institutional salience remains high at 32.6. These co-peaks are important. A free-trade zone is not simply a location; it combines physical connectivity, customs and regulatory arrangements, investment rules, services, land use, and data exchange within a bounded environment.

From an ecosystem perspective, the zone can function as an experimentation space. Actors can test electronic procedures, multimodal coordination, shared services, standards, and green requirements where institutional and physical boundaries are relatively clear. Successful arrangements may then diffuse beyond the zone. The 2024 phase therefore supplies part of the platform condition anticipated in P3: spatial concentration can make complex complementarities more governable.

The 2025 report contains a dedicated chapter on smart logistics that addresses the Internet of Things, artificial intelligence, machine learning, big data, international experience, enterprise adoption, and recommendations [29]. Smart-logistics salience rises to 30.7, more than eleven times the earlier mean. At the same time, digital salience remains 54.8, only modestly below its 2023 peak of 59.6 and far above every year before 2023. Efficiency rises to 37.8, the second-highest value in the series.

This configuration provides the clearest evidence of layering. Smart logistics does not replace digital transformation; it intensifies the need for digital data and links intelligence to operational performance. The value of artificial intelligence depends on connected assets, structured data, interoperable systems, process maturity, and the authority to act on model outputs. The 2025 agenda is thus better interpreted as platform-oriented intelligence than as a technology list.

4.7 The Five-Phase Capability-Layering Model

Table III synthesizes the sequence. The phases are analytical periods, not claims that implementation changed on the first day of each report year. Boundaries mark shifts in dominant attention, while capabilities overlap and persist. The model moves from defining and coordinating the ecosystem, through adapting services to market value propositions, strengthening efficiency and adaptation, integrating environmental and digital objectives, and finally building spatial and data platforms for intelligence.

Table III: Five Phase Capability Layering Model

Period	*Phase*	*Capabilities foregrounded*	*Layering implication*
2017	Foundational coordination	System definition, infrastructure, institutions	Establishes the physical and governance base
2018-2019	Market-facing specialization	E-commerce and agricultural service fit	Adapts generic capacity to distinct value propositions
2020-2021	Efficiency and adaptation	Cost, resilience, and human capability	Couples continuity with skills and operating performance
2022-2023	Green-digital integration	Environmental objectives, data, and automation	Enables measurable multi-objective optimization
2024-2025	Platform-oriented intelligence	Spatial platforms, interoperability, and smart logistics	Connects places, data, governance, and prediction

Note: Periods represent dominant attention in the documentary record. They do not imply uniform implementation across firms, agencies, or regions.

Three cross-period patterns stand out. First, infrastructure and institutions form a continuing base. Their persistence rejects a replacement model in which digital technology makes physical and regulatory capacity less important. Second, shocks and thematic demands activate complementary layers. The 2020 disruption couples cost with resilience; the following human-resource focus addresses execution capacity. Third, newer capabilities become increasingly data dependent. Green logistics requires measurement, free-trade zones require interoperable procedures, and smart logistics requires digital foundations. The sequence supports P1, P2, and P3 while also showing that institutional and infrastructure intensity can re-emerge at later stages.

V. DISCUSSION

5.1 Theoretical Contribution: Capability Layering

The central contribution is a capability-layering explanation of national logistics evolution. Ecosystem research emphasizes alignment and complementarity [12], [13], while dynamic-capability theory explains sensing, seizing, and transformation [14]. The present findings connect these perspectives temporally. A national ecosystem senses changing demands through policy and industry discourse, seizes them through thematic prioritization and coordinated investment, and seeks transformation by adding or recombining capabilities. Because actors and assets are distributed, however, new layers cannot be deployed independently of earlier ones.

Layering differs from a stage model in three ways. It does not assume that every actor reaches the same level, that earlier problems are solved before a new theme appears, or that progress is irreversible. A small carrier, a major port, a customs agency, and a technology platform may occupy different capability positions in the same year. Infrastructure can return to the foreground when a spatial strategy such as a free-trade zone requires new connections. Institutional coordination can intensify when green standards or data access rules become more complex. The phases describe agenda evolution while preserving heterogeneity.

The numerical evidence strengthens this argument. The annual thematic categories produce pronounced peaks, but infrastructure remains within a relatively high band and digital salience stays near its maximum when smart-logistics salience rises. If transformation followed replacement, mature digital attention would be

expected to decline as intelligence became prominent. Instead, the underlying digital layer remains active. The same logic applies to physical and institutional capacity across the full period.

5.2 Shocks as Coupling Mechanisms

The 2020-2021 phase extends resilience research by showing how a shock changes the relationship among capabilities. The sharp co-movement of efficiency and resilience suggests that disruption reframes operational objectives. Cost is no longer only a steady-state optimization problem; it becomes linked to continuity, flexibility, visibility, and recovery. The subsequent human-resource peak indicates that organizations require people capable of using new tools and coordinating adaptive responses.

This finding refines the sensing-seizing-transforming sequence. A shock can make dispersed weaknesses simultaneously visible, accelerating collective sensing. Seizing still requires prioritization, standards, investment, and training. Transformation occurs only when new routines cross organizational boundaries. An annual report can reveal the sensing and agenda-setting components, but it cannot establish that operational transformation occurred. The distinction explains why documentary salience should be triangulated with adoption and performance data in subsequent research.

5.3 Green-Digital Convergence and Platform Conditions

The sequence from green logistics to digital transformation and smart logistics helps integrate literature streams that are often separated. Digital tools can support environmental outcomes, but only through defined use cases and measurable processes. Route optimization requires accurate network and demand data. Carbon accounting requires consistent boundaries and emission factors. Freight matching requires participation from enough shippers and carriers. Cold-chain intelligence requires reliable sensors, alerts, and operating responses. The complementarity is operational, not rhetorical.

The 2024-2025 transition adds a platform dimension. Free-trade zones and logistics centers can bundle infrastructure, procedures, services, and data governance within a bounded space. This reduces the number of interfaces that must be aligned during experimentation. Smart applications can then build on shared identifiers, electronic documents, real-time data, and clearer institutional responsibilities. The result supports P3: intelligence becomes scalable when physical places, digital platforms, and governance arrangements are designed together.

Platform development also creates risks. Dominant firms may control data access, small providers may face compliance costs, and incompatible local systems may reproduce fragmentation at a higher technological level. Cybersecurity, commercial confidentiality, liability, data portability, and fair access must therefore be treated as ecosystem-design issues. Technical interoperability without governance is incomplete; governance without usable interfaces is equally ineffective.

5.4 Implications for Emerging-Economy Logistics Policy

The findings suggest that policy portfolios should be assessed for complementarity rather than as lists of projects. Infrastructure appraisal should specify the digital systems, workforce, operating rules, environmental requirements, and local implementation capacity needed to realize network value. A logistics center should not be judged only by land, floor area, or nominal capacity. Its contribution depends on connection quality, service density, data exchange, utilization, and the ability to coordinate multiple modes and actors.

Second, green and digital programs should be joined around traceable use cases. Priority applications may include electronic documents, route and load optimization, cold-chain monitoring, energy management in warehouses, multimodal planning, and carbon measurement. Each use case should have an owner, participating actors, a data model, a performance baseline, and a pathway for scaling. This approach makes environmental ambition operational and prevents digitalization from being measured merely by software acquisition.

Third, capability inclusion deserves explicit attention. Smaller providers may lack capital, specialized staff, and bargaining power even when national policy promotes advanced logistics. Shared digital services, open standards, modular compliance tools, training, and access to experimentation environments can reduce the gap. Regional policy should also connect secondary logistics nodes to national platforms so that intelligence does not concentrate only in major gateways.

Fourth, implementation measurement must follow agenda measurement. Useful indicators include electronic-document adoption, interface compliance, shipment visibility coverage, training outcomes, energy and emission intensity, modal shares, platform participation by firm size, recovery time after disruption, and data-quality performance. Tracking these indicators would allow future reports to distinguish intention, pilot activity, diffusion, and realized outcomes.

5.5 Managerial Implications

Managers should treat smart logistics as an organizational sequence rather than a procurement category. A practical progression is to stabilize processes, define data ownership, digitize transactions, create end-to-end visibility, establish partner interoperability, and then introduce predictive or autonomous functions. Skipping foundational steps can produce impressive demonstrations with weak operational reliability.

Investment decisions should be evaluated at the use-case level. A technology should be linked to a decision, process owner, required data, partner interface, and measurable outcome. For example, an estimated-time-of-arrival model has value only if arrival data are accurate, downstream actors receive the prediction, and schedules or resources can be changed in response. A carbon dashboard has value only if measurement boundaries are credible and managers use the information to alter routes, modes, loads, energy consumption, or supplier choices.

Human capability must be developed alongside technology. Training should combine systems operation with data interpretation, exception management, cybersecurity awareness, sustainability metrics, and cross-organizational coordination. Firms also need governance routines for model monitoring, data quality, access control, and accountability. These capabilities convert digital tools into reliable service and reduce the risk that smart logistics becomes dependent on a few individuals or vendors.

VI. CONCLUSION

This study examined nine Vietnam Logistics Reports as a complete longitudinal corpus of 674,755 words in 9 reports. The evidence reveals five cumulative phases: foundational coordination in 2017; market-facing specialization in 2018-2019; efficiency, resilience, and workforce development in 2020-2021; green-digital integration in 2022-2023; and platform-oriented intelligence in 2024-2025. Normalized salience peaks align with every rotating annual focus, while infrastructure and institutional attention persist across the series.

The theoretical advantage of the capability-layering model is that it explains both change and continuity. Smart logistics is not the endpoint of a linear technology ladder. It is an additional capability that depends on physical connectivity, institutions, market services, skilled people, sustainability requirements, digitized processes, and interoperable data. The model also clarifies why external shocks can accelerate integration: disruption exposes multiple weak interfaces at once and makes coordinated adaptation more urgent.

The study has practical applications for policy design, investment appraisal, and enterprise transformation. It supports portfolios that connect infrastructure with data, skills, governance, and environmental performance; favors green-digital use cases with measurable baselines; and treats zones and logistics centers as potential experimentation platforms. For managers, it offers a sequence from process and data foundations to visibility, interoperability, prediction, and autonomy.

Several limitations define the boundary of the claims. The reports represent institutional discourse, not direct evidence that policies were implemented or that firms achieved the capabilities discussed. Keyword salience captures attention but not sentiment, quality, expenditure, diffusion, or performance. Annual publications vary in editorial practice and authorship, and phase construction includes interpretive judgment. The results are therefore explanatory and documentary rather than causal.

Future research should connect the identified phases to firm surveys, interviews, investment data, emissions and energy indicators, platform-adoption measures, and regional logistics outcomes. Comparative analysis across ASEAN report series could test whether capability layering is specific to Vietnam or a broader emerging-economy pattern. A second line of work should examine within-year co-occurrence networks to determine how green, digital, resilience, and workforce concepts are linked at paragraph level. Such extensions would move from the evolution of national attention to the diffusion and performance of ecosystem capabilities.

Acknowledgements

The authors would like to express their gratitude to Dai Nam University for supporting the team in completing this research.

REFERENCES

[1] World Bank, *Connecting to compete 2023: Trade logistics in an uncertain global economy* (Washington, DC: World Bank, 2023).

[2] G. Büyüközkan and F. Göçer, Digital supply chain: Literature review and a proposed framework for future research, *Computers in Industry, 97*, 2018, 157-177. doi:10.1016/j.compind.2018.02.010.

[3] H. Al Mashalah, E. Hassini, A. Gunasekaran, and D. Bhatt (Mishra), The impact of digital transformation on supply chains through e-commerce: Literature review and a conceptual framework, *Transportation Research Part E: Logistics and Transportation Review, 165*, 2022, 102837. doi:10.1016/j.tre.2022.102837.
[4] G. Vial, Understanding digital transformation: A review and a research agenda, *Journal of Strategic Information Systems, 28(2)*, 2019, 118-144. doi:10.1016/j.jsis.2019.01.003.
[5] P. Helo and V. V. Thai, Logistics 4.0 - digital transformation with smart connected tracking and tracing devices, *International Journal of Production Economics, 275*, 2024, 109336. doi:10.1016/j.ijpe.2024.109336.
[6] C. R. Carter and D. S. Rogers, A framework of sustainable supply chain management: Moving toward new theory, *International Journal of Physical Distribution & Logistics Management, 38(5)*, 2008, 360-387. doi:10.1108/09600030810882816.
[7] S. Seuring and M. Müller, From a literature review to a conceptual framework for sustainable supply chain management, *Journal of Cleaner Production, 16(15)*, 2008, 1699-1710. doi:10.1016/j.jclepro.2008.04.020.
[8] Q. Zhu and J. Sarkis, Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises, *Journal of Operations Management, 22(3)*, 2004, 265-289. doi:10.1016/j.jom.2004.01.005.
[9] J. Sarkis, Q. Zhu, and K. H. Lai, An organizational theoretic review of green supply chain management literature, *International Journal of Production Economics, 130(1)*, 2011, 1-15. doi:10.1016/j.ijpe.2010.11.010.
[10] D. Ivanov and A. Dolgui, Viability of intertwined supply networks: Extending the supply chain resilience angles towards survivability, *International Journal of Production Research, 58(10)*, 2020, 2904-2915. doi:10.1080/00207543.2020.1750727.
[11] M. M. Queiroz, D. Ivanov, A. Dolgui, and S. F. Wamba, Impacts of epidemic outbreaks on supply chains: Mapping a research agenda amid the COVID-19 pandemic through a structured literature review, *Annals of Operations Research, 319*, 2022, 1159-1196. doi:10.1007/s10479-020-03685-7.
[12] R. Adner, Ecosystem as structure: An actionable construct for strategy, *Journal of Management, 43(1)*, 2017, 39-58. doi:10.1177/0149206316678451.
[13] M. G. Jacobides, C. Cennamo, and A. Gawer, Towards a theory of ecosystems, *Strategic Management Journal, 39(8)*, 2018, 2255-2276. doi:10.1002/smj.2904.
[14] D. J. Teece, Explicating dynamic capabilities: The nature and microfoundations of sustainable enterprise performance, *Strategic Management Journal, 28(13)*, 2007, 1319-1350. doi:10.1002/smj.640.
[15] P. C. Verhoef, T. Broekhuizen, Y. Bart, A. Bhattacharya, J. Q. Dong, N. Fabian, and M. Haenlein, Digital transformation: A multidisciplinary reflection and research agenda, *Journal of Business Research, 122*, 2021, 889-901. doi:10.1016/j.jbusres.2019.09.022.
[16] A. Hanelt, R. Bohnsack, D. Marz, and C. A. Marante, A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change, *Journal of Management Studies, 58(5)*, 2021, 1159-1197. doi:10.1111/joms.12639.
[17] S. F. Wamba, A. Gunasekaran, S. Akter, S. J. Ren, R. Dubey, and S. J. Childe, Big data analytics and firm performance: Effects of dynamic capabilities, *Journal of Business Research, 70*, 2017, 356-365. doi:10.1016/j.jbusres.2016.08.009.
[18] S. Saberi, M. Kouhizadeh, J. Sarkis, and L. Shen, Blockchain technology and its relationships to sustainable supply chain management, *International Journal of Production Research, 57(7)*, 2019, 2117-2135. doi:10.1080/00207543.2018.1533261.
[19] G. A. Bowen, Document analysis as a qualitative research method, *Qualitative Research Journal, 9(2)*, 2009, 27-40. doi:10.3316/QRJ0902027.
[20] K. Krippendorff, *Content analysis: An introduction to its methodology*, 4th ed. (Thousand Oaks, CA: Sage, 2018).
[21] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2017: Logistics - from planning to action* (Hanoi: Industry and Trade Publishing House, 2017) (in Vietnamese).
[22] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2018: Logistics and e-commerce* (Hanoi: Industry and Trade Publishing House, 2018) (in Vietnamese).
[23] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2019: Logistics for enhancing agricultural value* (Hanoi: Industry and Trade Publishing House, 2019) (in Vietnamese).
[24] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2020: Reducing logistics costs* (Hanoi: Industry and Trade Publishing House, 2020) (in Vietnamese).
[25] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2021: Logistics human resource development* (Hanoi: Industry and Trade Publishing House, 2021) (in Vietnamese).
[26] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2022: Green logistics* (Hanoi: Industry and Trade Publishing House, 2022) (in Vietnamese).
[27] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2023: Digital transformation in logistics* (Hanoi: Industry and Trade Publishing House, 2023) (in Vietnamese).
[28] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2024: Free trade zones* (Hanoi: Industry and Trade Publishing House, 2024) (in Vietnamese).
[29] Vietnam Ministry of Industry and Trade, *Vietnam logistics report 2025* (Hanoi: Industry and Trade Publishing House, 2025) (in Vietnamese