

SUPPLIER UPGRADING IN SUPPORTING INDUSTRIES UNDER GLOBAL SUPPLY CHAIN RESTRUCTURING: THE ROLE OF SUBNATIONAL INSTITUTIONAL QUALITY, FDI LINKAGES AND FIRM ABSORPTIVE CAPACITY – EVIDENCE FROM VIETNAM

Nguyen Huu Duc¹, Pham Minh Tien^{2*}, Tran Ky Viet³

¹*Dong Nai Economic and Industrial Zones Authority (DEIZA), Vietnam*

²*Ho Chi Minh City University of Industry and Trade (HUIT), Vietnam*

³*University of Finance and Marketing (UFM), Vietnam*

*Email: tienpm@huit.edu.vn

Received: 2 March 2026; Revised: 28 April 2026; Accepted: 16 May 2026

ABSTRACT

This research is to examine supplier upgrading in supporting industries under global supply chain restructuring, focusing on the interaction between subnational institutional quality, FDI linkages, and firm absorptive capacity. Moving beyond approaches that treat these factors independently, the study conceptualizes upgrading as a context-specific configuration shaped by their interdependent relationships. An exploratory qualitative design is adopted, combining document analysis and semi-structured interviews to identify underlying mechanisms. The findings show that institutional quality influences not only the business environment but also the embeddedness of FDI and the effectiveness of policy implementation. FDI linkages create access to knowledge and standards, but upgrading outcomes remain uneven and contingent on firms' absorptive capacity. Importantly, absorptive capacity is partially conditioned by institutional support and policy usability. The study identifies a triple interaction mechanism in which institutions shape linkage quality, linkages generate learning opportunities, and absorptive capacity determines knowledge conversion into upgrading. By integrating institutional and capability-based perspectives at the subnational level, the study provides a contextualized explanation for heterogeneous upgrading trajectories in emerging economies.

Keywords: FDI linkages, absorptive capacity, supporting industries.

1. INTRODUCTION

The development of supporting industries has become a strategic priority in the context of global value chain (GVC) restructuring, particularly in the post-COVID-19 period when risks associated with supply chain dependency have intensified [1], [2]. Supporting industries not only provide intermediate inputs but also constitute a critical foundation for technological upgrading and deeper integration into GVCs [3], [4].

The literature identifies three key determinants of upgrading: institutional quality, FDI linkages, and absorptive capacity [5]-[11]. However, these factors are often examined in isolation, with limited integrated perspectives, particularly at the subnational level [12]-[14].

In Vietnam, supporting industries have been recognized as a foundation for enhancing production autonomy [15]-[17]. Nevertheless, domestic firms remain largely concentrated in

low-value segments [18], [19]. The case of Dong Nai illustrates these structural constraints: supporting industries account for approximately VND 360 trillion, representing 21.82% of industrial output and 47.8% of exports, with 997 firms, of which 71.5% are FDI enterprises. The sectoral composition is dominated by labor-intensive industries such as textiles and garments (35.9%) and footwear (21.9%), while higher value-added sectors such as mechanical engineering (19.3%) and electronics (17.1%) remain relatively underdeveloped [20], [21].

This structure indicates a strong dependence on FDI and labor-intensive industries, suggesting that participation in GVCs does not necessarily lead to upgrading. It also highlights a research gap concerning the interaction mechanisms among institutional quality, FDI linkages, and firm-level capabilities.

Research gaps and contributions

This study addresses three main gaps:

- (i) The absence of an integrated analytical framework linking institutional quality, FDI linkages, and absorptive capacity;
- (ii) The limited availability of empirical evidence at the subnational level;
- (iii) The lack of adequate explanations for persistent structural constraints.

Accordingly, the study contributes by developing an integrated analytical framework, providing subnational empirical evidence from the case of Dong Nai, and clarifying uneven upgrading trajectories among firms.

Research questions

RQ1: How does local institutional quality influence supplier upgrading?

RQ2: How do FDI linkages affect upgrading outcomes?

RQ3: What role does absorptive capacity play in this process?

RQ4: How do these factors interact in subnational contexts such as Dong Nai?

2. LITERATURE REVIEW

This literature review establishes the analytical foundation for examining supplier upgrading in supporting industries by synthesizing three key strands of research: institutional quality, FDI linkages, and absorptive capacity. While prior studies have identified these determinants, they are predominantly treated as separate explanatory factors, with limited attention to their interaction, particularly in subnational contexts. In response, the following section develops a conceptual framework that integrates these dimensions into a coherent model, specifying their interrelationships and clarifying the mechanisms through which they jointly shape upgrading trajectories.

2.1. Supporting industries and upgrading in global value chains

In the context of global value chain (GVC) restructuring, supporting industries increasingly play a foundational role in enhancing the position of domestic firms. According to GVC logic, value added is unevenly distributed and concentrated in high-technology segments, while assembly and processing activities generate relatively low value [3], [13], [14]. Therefore, the position of supporting industry firms directly reflects their level of integration and competitiveness. Following COVID-19, trends toward supply chain diversification and strengthening domestic capabilities have further underscored this role [1], [2], [4].

However, participation in GVCs does not necessarily lead to upgrading. The literature identifies three main types of upgrading: process, product, and functional [13], [14], [22]. Nevertheless, many firms in developing economies remain “locked” in low-value segments

due to technological and organizational constraints [4], [13], [14]. This suggests that upgrading does not occur automatically but depends on the ability to transform market linkages into internal capabilities [3].

From a mechanistic perspective, institutional quality constitutes the first foundational factor. Institutions reduce transaction costs, enhance transparency, and stabilize the business environment [5], [23]. In GVC contexts, this is particularly important as firms must comply with high standards and maintain long-term contractual relationships. At the same time, institutions play a coordinating role in aligning policies and connecting actors within the industrial ecosystem. As emphasized by Rodrik [6], policy effectiveness depends on the state's capacity for coordination and learning. Strong institutions facilitate technology diffusion, whereas weak institutions increase fragmentation and compliance costs [12], [24].

Second, FDI linkages serve as a key channel for generating spillovers. Empirical studies show that backward linkages enable domestic firms to access advanced technologies, standards, and managerial practices [7], [8], [25]. However, these effects are not automatic and depend on industry structure and technological gaps [26]. In many cases, FDI operates as an “enclave,” limiting linkages with domestic firms [4].

Third, absorptive capacity determines the extent to which firms can transform external opportunities into internal capabilities. Cohen and Levinthal [9]–[11] define this as the ability to recognize, assimilate, and exploit knowledge, while Zahra and George [27], [28] extend it into a dynamic capability process. In GVC contexts, absorptive capacity enables firms to better leverage spillovers from FDI and the institutional environment to achieve upgrading [29], [30]. Conversely, in its absence, market linkages are unlikely to translate into substantive improvements [25].

Although these three factors—institutional quality, FDI linkages, and absorptive capacity—are well established, most studies examine them in isolation, limiting understanding of their interaction mechanisms, particularly at the subnational level [6], [13], [14], [24]. In the Vietnamese context, despite the prioritization of supporting industries in industrial policy, domestic firms remain concentrated in low-value segments and face persistent upgrading challenges [15]–[18], [31].

In sum, supporting industries constitute a necessary but insufficient condition; upgrading trajectories depend on the interaction among institutions, FDI linkages, and absorptive capacity. This highlights the need for an integrated analytical framework at the subnational level to better explain upgrading mechanisms in the context of Vietnam.

2.2. Toward an Integrated Analytical Framework: Interaction Effects

Building on the synthesis of theoretical and empirical literature, this study develops an analytical framework to guide the collection and analysis of qualitative data, including secondary document analysis and in-depth interviews with firms and relevant stakeholders. The framework is employed as an analytical lens to examine how institutional factors, FDI linkages, and absorptive capacity interact and shape the upgrading processes of supporting industry firms in the context of global value chain restructuring (Figure 1).

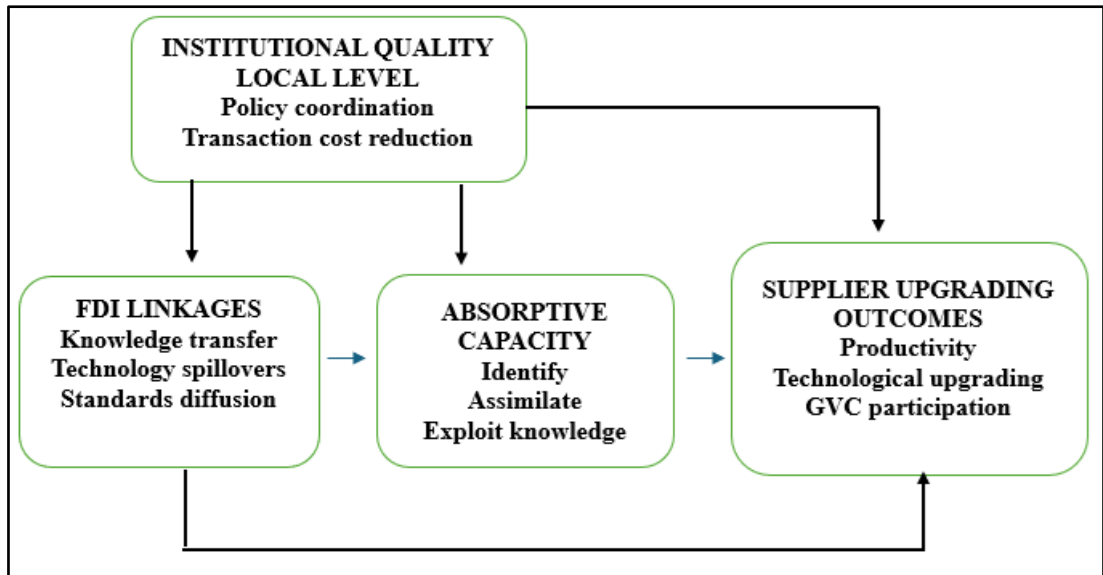


Figure 1. Integrated Conceptual Framework of Supplier Upgrading.

Source: Authors' compilation

First, local institutional quality is treated as the foundational context that shapes the operating environment and the conditions faced by firms. Previous studies suggest that effective institutions can reduce transaction costs, improve policy coordination, and enhance governance quality [6], [12]. In this study, the institutional dimension is used to explore how firms and policymakers perceive the role of the local environment in attracting FDI, facilitating access to resources, and supporting learning processes. At the same time, document analysis and interview data allow for the identification of variations across localities in policy implementation and firm support mechanisms [5].

Second, FDI linkages are conceptualized as a potential channel for the transmission of knowledge, technology, and production standards [7], [8], [32]. Rather than assuming that spillover effects occur automatically, this study focuses on examining how domestic firms actually engage in linkages with foreign-invested enterprises, the extent of their access to knowledge, and the barriers encountered in the learning process. Interview data play a key role in clarifying whether spillovers occur directly or through intermediary mechanisms, as well as how requirements and standards imposed by FDI firms influence the upgrading behavior of domestic suppliers.

Third, absorptive capacity is employed as a central concept to explain differences in firms' ability to leverage external resources [9]–[11], [27], [28]. Through qualitative analysis, the study investigates how firms identify, assimilate, and exploit knowledge from external sources, particularly through FDI linkages. It also examines the role of internal factors—such as human capital, accumulated experience, and organizational capabilities—in transforming knowledge into concrete upgrading outcomes.

Overall, this analytical framework is not intended to test hypotheses in a quantitative sense but is used to guide the exploration of causal relationships and underlying mechanisms among the key factors. Specifically, the study seeks to clarify:

- (i) How institutional quality shapes the opportunities and constraints faced by firms;
- (ii) How FDI linkages generate or limit knowledge flows;
- (iii) How firms' absorptive capacity determines whether these external resources are transformed into upgrading outcomes. This approach enables the study to capture the

complexity and context-dependence of upgrading processes, particularly in developing economies such as Vietnam, where subnational variation plays a critical role.

3. METHODOLOGY

The study adopts an exploratory qualitative design, combining document analysis and semi-structured interviews to examine the mechanisms of firm upgrading in supporting industries within the context of global supply chain restructuring. Data are analyzed using thematic analysis and theory-informed coding, with triangulation employed to enhance reliability. This approach enables the integration of institutional context, FDI linkages, and firm-level capabilities. The table below summarizes the alignment between research components, methods, data sources, and analytical objectives (Table 1).

Table 1. Research Methodology Design and Alignment

RESEARCH COMPONENT	METHOD	DATA SOURCE	ANALYTICAL FOCUS	PURPOSE	OUTPUT
Institutional context	Document analysis	Policy documents (Government of Vietnam, MOIT, local plans)	Institutional quality, policy design	Identify institutional setting	Institutional mapping
GVC & FDI linkages	Document analysis	Reports (World Bank, UNIDO, OECD)	GVC integration, spillovers	Clarify FDI role	Linkage patterns
Firm upgrading	Interviews	Supplier & FDI firms	Participation, upgrading	Understand firm behavior	Firm insights
Absorptive capacity	Interviews	Firms, experts	Learning, technology adoption	Assess capability	Capability insights
Institutional interaction	Interviews	Authorities, experts	Governance, policy execution	Evaluate local institutions	Governance insights
Variation	Sampling (purposive)	Firms (sector, size)	Heterogeneity	Capture differences	Comparative patterns
Analysis	Thematic analysis	All data	Theme development	Structure findings	Themes
Mechanisms	Theory-informed coding	Integrated data	Institutional–FDI–capacity links	Explain causality	Conceptual model
Validation	Triangulation	Multi-source data	Consistency check	Increase reliability	Robust findings
Ethics	Protocol	Participants	Consent, anonymity	Ensure compliance	Ethical compliance

Source: Author's compilation

3.1. Research design and approach

The study adopts an exploratory qualitative design to explain upgrading mechanisms in supporting industries within GVC restructuring, rather than measuring effects [33]. A context-

based case study focuses on the subnational level, where institutions, FDI, and industrial structure directly shape upgrading outcomes [12]-[14], [34].

The analytical framework centers on institutions–FDI–absorptive capacity, reflecting three core but often separately examined determinants [5]-[9], [27], [28], [10], [11].

Data are analyzed using document analysis and thematic analysis, with themes emerging inductively before being mapped onto the theoretical framework [35], [36]. The design supports theory-building by clarifying interaction mechanisms and uneven upgrading trajectories [12]-[14].

3.1.1. Document analysis

Document analysis is used as a primary data source to reconstruct the institutional context and industrial structure of supporting industries in Vietnam, consistent with exploratory qualitative research [35].

Sources follow a multi-source strategy^{4.2}

- (i) Domestic policy documents [15]-[17], [20], [21], [37], [38];
- (ii) International reports on GVCs and supply chain restructuring [2], [4], [12];
- (iii) And academic literature on institutions, FDI, and absorptive capacity.

The analysis aims to:

- (i) Identify the institutional context;
- (ii) Examine supporting industry and FDI policies;
- (iii) And clarify value chain structure and firm positioning
- (iv) This method provides macro-level context and supports triangulation with interview data, enhancing reliability and clarifying upgrading mechanisms.

3.1.2. Semi-structured interviews

Semi-structured interviews are used to collect primary data and examine firm-level upgrading mechanisms, balancing analytical guidance and flexibility [39] (see appendix 1).

Purposive sampling includes four groups: supporting industry firms, FDI/buyer firms, local authorities, and experts, capturing interactions among institutions, FDI, and firms [12], [13], [14].

The sample (15–25 participants) reaches saturation [33]. Each interview lasts 45–60 minutes, with consented recording and anonymized coding. Data are thematically analyzed and triangulated with documents to enhance reliability (see appendix 2).

3.2. Sampling strategy

Sampling aligns with the objective of analyzing upgrading mechanisms. Firms are selected based on FDI linkages and varying positions in value chains, enabling observation of diverse spillovers.

Participants are required to have at least two years of relevant experience to ensure practical knowledge of linkages, standards, and upgrading processes.

Maximum variation sampling captures diversity across (i) firm size, (ii) sectors (textiles, mechanical, electronics), and (iii) upgrading levels, supporting comparison and reducing bias [39].

The strategy aims to capture heterogeneity in upgrading and subnational differences in institutions and industrial structures.

The sample is not statistically representative but prioritizes depth and diversity for mechanism-based, theory-building analysis in Vietnam.

3.3. Data analysis

The study applies thematic analysis combined with theory-informed coding to interpret qualitative data systematically [36], following three steps.

First, open coding identifies themes inductively without imposing theory, ensuring exploratory rigor [35].

Second, axial coding links themes to the three core dimensions—institutions, FDI, and absorptive capacity—to clarify relationships.

Third, selective coding develops causal mechanisms, including direct, mediating, and interaction effects.

Themes are derived from data before being mapped to theory, supporting reliability and theory-building.

3.4. Triangulation and validity

Triangulation is applied at multiple levels. Data triangulation compares documents and interviews, while source triangulation spans firms, authorities, and experts to reduce bias and capture multiple perspectives. Internal validity is ensured through cross-checking across sources and actors. Reliability is strengthened by a transparent and replicable coding process [36].

4. FINDINGS AND DISCUSSION

The findings present empirical patterns emerging from the interaction between institutional conditions, FDI linkages, and firm-level absorptive capacity, highlighting how these factors jointly shape heterogeneous upgrading trajectories among supporting industry firms. Rather than isolated effects, the results reveal context-dependent mechanisms, including enabling, constraining, and selective pathways of upgrading. Building on these findings, the discussion interprets the identified mechanisms in relation to existing literature, clarifies the role of subnational institutional variation, and explains why participation in GVCs does not uniformly translate into upgrading outcomes

4.1. Triangulation of data sources and methods

The triangulation process provides a systematic basis for filtering and selecting themes for subsequent analysis. By comparing three data sources—policy documents, academic literature, and interviews—the study distinguishes analytically relevant themes from purely descriptive ones (Table 2).

The results indicate that only a limited set of themes shows strong convergence across sources and direct relevance to the research questions. In particular, local institutional quality, FDI linkages, and firms' absorptive capacity emerge as the three core dimensions, consistently identified and capable of explaining supplier upgrading mechanisms. Importantly, the interaction among these factors constitutes the central finding, moving beyond the fragmented approaches in prior studies [12]–[14].

In contrast, themes such as general industry descriptions, macro-level cooperation, or descriptive policy listings are excluded or downgraded, as they do not directly explain firm- or subnational-level upgrading mechanisms. This selective approach reduces descriptive bias and strengthens analytical rigor.

Based on the triangulated themes, Section 4.2 develops a descriptive–explanatory analysis linking empirical findings to relevant theoretical frameworks. This section forms the core of the study, where upgrading mechanisms are systematically articulated.

Table 2. Triangulation-based selection of themes

THEME GROUP	SUBTHEMES	STATUS	RELATED RQS	RATIONALE
Institutional quality	Policy usability; coordination; infrastructure; data transparency	RETAIN (core)	RQ1, RQ4	Strong triangulation across all sources; directly explains enabling/constraining mechanisms
	Policy implementation gap	RETAIN	RQ1	Captures “policy vs practice”; adds analytical novelty
	Industrial land & support system	RETAIN	RQ1, RQ4	Highly relevant to subnational context (Dong Nai)
FDI linkages	Backward linkages; supplier integration	RETAIN (core)	RQ2, RQ4	Directly addresses RQ2; well-supported across sources
	Embeddedness; selective spillovers	RETAIN	RQ2, RQ4	Shifts focus from FDI presence to FDI quality (analytical value)
	Localization requirements	RETAIN	RQ2	Reflects real upgrading mechanisms
	FDI presence (scale, quantity)	NOT RETAINED (core)	–	Descriptive only; does not explain upgrading outcomes
Absorptive capacity	Process & quality capability; certification	RETAIN (conditional)	RQ3, RQ4	Supported by triangulation but requires strong firm-level evidence
	Learning capability; engineering interpretation	RETAIN	RQ3	Core mechanism for knowledge internalization
	Innovation / human capital (broad)	REDUCE / MERGE	RQ3	Too broad; risk of conceptual overlap
	Policy support for capability	NOT RETAINED as key finding	–	Policy support ≠ actual absorptive capacity
Interaction mechanisms	Institution × FDI	RETAIN (core)	RQ4	Critical intermediate mechanism
	FDI × absorptive capacity	RETAIN (core)	RQ3, RQ4	Explains uneven spillover effects
	Institution × absorptive capacity	RETAIN	RQ4	Underexplored linkage in prior literature
	Triple interaction	RETAIN (ESSENTIAL)	RQ4	Core contribution; moves beyond fragmented literature

Source: Authors’ compilation

4.2. Thematic analysis and key findings

This section presents the main themes identified through triangulation, focusing on factors explaining supplier upgrading mechanisms. The analysis is organized by themes aligned with the research questions and linked to relevant theoretical frameworks.

4.2.1. Local institutional quality as enabling and constraining mechanisms

4.2.1.1. Policy usability and institutional coordination capacity

Triangulation indicates that local institutional quality lies not only in policy design but in policy usability in practice. Policy documents and academic studies emphasize inter-agency coordination and transparency in enabling firms to access resources and participate in supply chains [4], [12]. However, interview data reveal a gap between policy existence and accessibility:

“Policies exist, but firms do not know where to start, or must go through multiple intermediaries, making access difficult.” (interviewee 3 - P3)

This suggests that local institutions act as intermediating mechanisms shaping firms' access to FDI networks, consistent with institutional theory highlighting coordination in reducing transaction costs and uncertainty [6].

4.2.1.2. Policy implementation gap

A key theme is the gap between policy design and implementation. While policy documents outline clear directions for supporting industries and FDI linkages, interviews and academic sources indicate fragmented and inconsistent execution. This results in *“policy on paper but not in practice,”* (P2) weakening support for upgrading.

This gap reduces policy effectiveness and affects firms' investment and expansion decisions, limiting deeper GVC participation. It reinforces the view that institutional quality should be assessed through implementation capacity, not only formal frameworks.

4.2.1.3. Industrial infrastructure, land access, and support systems

Industrial infrastructure and land access emerge as core elements of local institutional quality. Policy documents show strong development of industrial zones in Dong Nai to attract FDI and support domestic firms. However, interviews highlight constraints in accessing suitable production space:

“Firms want to expand to take larger orders but struggle to find affordable land in industrial zones.” (P6)

This indicates that institutions operate not only through regulations but also through resource allocation, directly affecting upgrading capacity. Industrial development studies similarly emphasize infrastructure and support ecosystems as critical for linking domestic firms to GVCs [4], [40].

4.2.2. FDI linkages as conditional upgrading channels

Triangulation across academic, policy, and interview data shows that FDI linkages do not generate automatic spillovers but operate as conditional upgrading channels. Their effects depend on linkage structure, embeddedness, and firms' absorptive capacity, rather than mere FDI presence [7], [8], [32].

4.2.2.1. Backward linkages and supplier integration

Backward linkages are the primary channel for transferring standards, processes, and production knowledge from FDI to domestic firms [7], [25], [32]. However, evidence indicates strong selectivity:

“Only a few firms meet the standards to become first- or second-tier suppliers; the rest find it very difficult to enter.” (P4)

This suggests that FDI linkages function as a capability screening mechanism, where only firms meeting thresholds in quality, processes, and management can participate.

4.2.2.2. Embeddedness and selective spillovers

Spillovers depend on the degree of FDI embeddedness in the local ecosystem. Lead firms often maintain tight supply chain control and limit knowledge transfer [8], [13], [14], resulting in selective spillovers.

Interview data confirm this:

“Many FDI firms already have suppliers from their global networks, so opportunities for domestic firms are limited.” (P2)

This indicates that FDI presence does not guarantee local linkages; closed supply chains constrain spillovers. The finding shifts focus from FDI presence to embeddedness, explaining heterogeneous upgrading outcomes within the same locality [13], [14].

4.2.2.3. Buyer pressure and upgrading requirements

Upgrading is driven less by passive learning than by buyer-imposed requirements. Standards, certifications, delivery time, and compliance pressures compel domestic firms to upgrade to maintain contracts, consistent with GVC governance logic [13], [14].

This mechanism indicates externally induced upgrading: firms upgrade not primarily through voluntary learning but through adaptation to survive in value chains. Combined with absorptive capacity, only firms capable of learning can convert such pressure into substantive upgrading [7], [9], [32].

4.2.3. Absorptive capacity

Absorptive capacity is identified as a firm-level condition determining whether FDI linkages translate into substantive upgrading outcomes. Rather than operating independently, it functions as a conversion mechanism through which firms internalize and transform external knowledge into production and technological capabilities, consistent with the recognition–assimilation–application framework [9], [27], [28].

4.2.3.1. Learning capability and technical interpretation (core mechanism)

Findings show that learning capability—particularly the ability to interpret technical requirements, interact with clients’ R&D units, and adjust production processes—is central.

“...to meet the strict standards of multinational partners... firms must work directly with the client’s R&D department.” (P7)

This reflects interactive learning, where firms co-develop solutions rather than passively receive knowledge, consistent with GVC upgrading literature [8], [22].

4.2.3.2. Process, quality, and certification capabilities (conditional mechanism)

Process control, quality management, and international certifications are necessary for GVC participation [4], [40], but evidence indicates they function mainly as entry conditions rather than drivers of upgrading.

“Increasing technological content is the key determinant of product and firm competitiveness.” (P9)

This highlights a gap: firms may comply with standards yet fail to upgrade without learning capability. Compliance does not equal upgrading, reinforcing absorptive capacity as a dynamic capability rather than a static attribute.

4.2.3.3. Conceptual boundary: absorptive capacity vs. policy support

A key finding is the need to distinguish absorptive capacity from related concepts such as innovation, human capital, or policy support. Although frequently cited [29]-[31], [41], these do not consistently appear as firm-level mechanisms in interview data.

Policy interventions—training, technology support, digitalization—should be treated as institutional inputs rather than components of absorptive capacity. Conflating these levels risks overstating policy effects and blurring the distinction between capacity and context.

Accordingly, absorptive capacity is maintained as a firm-level construct focused on learning and knowledge transformation, while external support is situated within the institutional framework.

4.2.4. Interaction mechanisms

The findings indicate that supplier upgrading emerges from multi-dimensional interactions among institutional quality, FDI linkages, and absorptive capacity, rather than from isolated factors. This aligns with GVC literature emphasizing conditional and interdependent relationships in upgrading processes [12]-[14].

4.2.4.1. Institutions × FDI: shaping linkage quality

Local institutional quality determines both the extent and quality of FDI linkages, influencing how domestic firms are integrated into supply chains [5], [29], [30].

“Local authorities remain relatively passive in implementing industrial development policies...” (P2)

This indicates that weak institutions do not prevent FDI inflows but constrain spillovers, consistent with the role of institutions in coordination and transaction cost reduction [6].

4.2.4.2. FDI × absorptive capacity: uneven spillovers

FDI linkages create opportunities, but upgrading depends on firms' absorptive capacity. Spillovers are selective rather than automatic [8], [40].

“The shortest path for Vietnamese firms to enter global supply chains is to link with multinational companies.” (P4)

While valid in terms of access, evidence shows that participation does not ensure upgrading, as outcomes depend on firms' ability to recognize, assimilate, and apply knowledge [9] [10], [11].

4.2.4.3. Institutions × absorptive capacity: conditioning learning

Absorptive capacity is partly shaped by the institutional environment. Policy support—training, technology transfer, and firm assistance—facilitates learning [15]-[17], [31], [38].

“Procedures to access support are too complex...” (P5)

This indicates that policy usability conditions whether institutional inputs translate into firm capabilities.

4.2.4.4. Triple interaction: upgrading configuration

The core mechanism lies in the interaction among institutions, FDI, and absorptive capacity as a conditional configuration.

“...there should be requirements for FDI firms to increase localization rates.” (P2)

This reflects the need to align institutional coordination, FDI linkages, and firm capabilities. Consistent with GVC literature [3], [14], upgrading depends on this configuration, while misalignment leads to persistence in low-value segments.

4.3. An integrated framework for supplier upgrading in Dong Nai

Figure 2 presents an integrated conceptual framework explaining supplier upgrading in supporting industries at the subnational level. A key feature is the distinction between two types of relationships: solid lines indicate direct effects, while dashed lines represent interaction and conditional relationships among components.

Notably, the dashed structure encompassing the entire model highlights that the framework is not a linear causal system but a context-specific configuration, reflecting subnational dynamics in a transition economy [12], [24].

At the direct level, three groups of factors—local institutional quality, FDI linkages, and absorptive capacity—affect upgrading outcomes through solid lines. First, institutional quality directly shapes the operating environment and policy coordination, reducing transaction costs and uncertainty [5], [6], [23]. Second, FDI linkages act as channels for transmitting knowledge, standards, and managerial practices through backward supply-chain relationships [7], [8], [25]. Third, absorptive capacity determines firms’ ability to recognize, assimilate, and exploit external knowledge, thereby converting opportunities into upgrading outcomes [10], [11], [27], [42]. These direct relationships align with existing theories on institutions, spillovers, and learning in GVCs [14], [43].

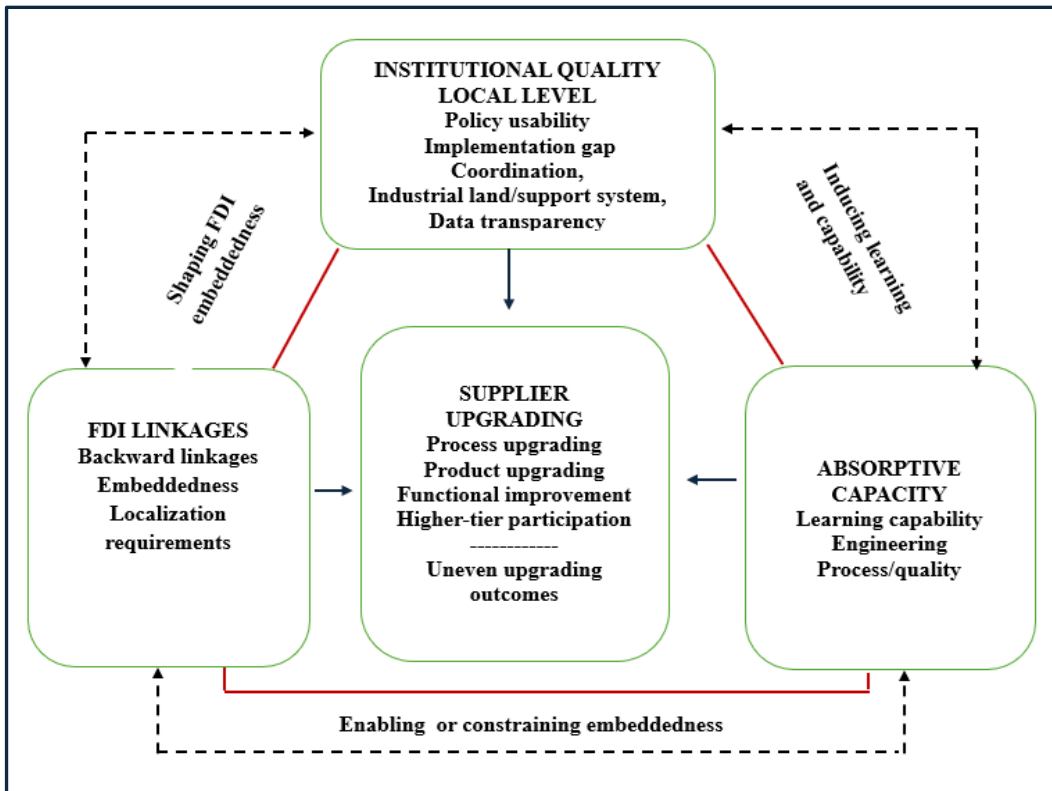


Figure 2. Integrated Conceptual Framework of Supplier Upgrading at the Subnational Level, the case of Dong Nai Province, Vietnam

Source: Author’s compilation

However, the framework emphasizes that these factors do not operate independently but interact in conditional ways. Dashed lines capture three key interaction mechanisms. First, institutions $\times$ FDI: institutional quality shapes the embeddedness of FDI in the local economy, influencing the formation and quality of supplier linkages [5], [12], [29], [30]. Second, FDI $\times$ absorptive capacity: knowledge spillovers do not automatically lead to upgrading but depend on firms' learning capacity [8], [25], consistent with the role of absorptive capacity in mediating spillover effects (Cohen & Levinthal, 1990). Third, institutions $\times$ absorptive capacity: policy environments and support systems can enable or constrain capability formation, thereby conditioning learning processes [6], [15]–[17], [31], [38].

Importantly, dashed lines represent conditional mechanisms rather than simple indirect effects, where the impact of one factor depends on the state of others. The dashed structure encompassing the model highlights that upgrading results from a triple interaction among institutions, FDI, and firm capabilities—a dynamic configuration explaining uneven outcomes [12], [14].

The framework contributes to the literature in three ways. First, it shifts the focus from FDI presence to the quality and embeddedness of FDI, clarifying the conditions under which spillovers occur. Second, it distinguishes institutional context from firm capability, avoiding conceptual overlap [29], [30]. Third, it proposes an integrated subnational approach addressing fragmentation across institutions, FDI, and absorptive capacity [1], [6], [14].

Accordingly, supplier upgrading is not a linear outcome but a context-specific configuration: institutions shape linkages, linkages generate pressures and learning opportunities, and absorptive capacity determines their transformation, explaining heterogeneous upgrading trajectories in contexts such as Dong Nai.

5. CONCLUSION

This study seeks to clarify the mechanisms of upgrading supporting industrial suppliers in the context of global supply chain restructuring, through a local case study. The results show that upgrading is not an automatic consequence of participating in the value chain, but depends on the interaction between institutional quality, FDI linkages, and the absorptive capacity of enterprises.

Instead of operating independently, these factors combine in different ways to create uneven upgrading trajectories. Institutions shape the conditions and linkage structures, FDI creates learning opportunities and pressures, and absorptive capacity determines the ability to transform these opportunities into substantive improvements.

Despite its limitations, the study initially suggests that understanding upgrading as a conditional and context-dependent process may better explain the observed differences at the local level. This also highlights the need for further integrated and comparative research to clarify these mechanisms in different contexts.

5.1. Theoretical contributions

This study contributes in three main ways.

First, it proposes an integrated analytical framework linking local institutional quality, FDI linkages, and absorptive capacity—factors often examined separately. The framework suggests that upgrading should be understood as a configuration of interacting conditions rather than a linear process.

Second, it clarifies the role of FDI by emphasizing embeddedness rather than mere presence, showing that upgrading effects depend on the structure and depth of linkages with domestic firms.

Third, it provides a subnational perspective, demonstrating how variations in institutional conditions and linkages lead to uneven upgrading trajectories. Identifying interactions among institutions, FDI, and absorptive capacity offers a context-sensitive explanation.

5.2. Policy implications

The findings suggest that institutional improvement should focus not only on policy design but also on implementation and accessibility. Policies may need to shift from attracting FDI to enhancing linkages between FDI and domestic firms.

Support for firm learning capabilities is necessary, but its effectiveness depends on implementation. Isolated policies are unlikely to generate impact without coordination across institutions, FDI, and capability development.

5.3. Practical implications for firms

For firms, upgrading depends not only on participation in existing value chains but also on actively expanding opportunities. Moving beyond familiar networks can create learning conditions.

Upgrading involves interactive learning rather than compliance alone, where engagement with R&D and technical partners is critical. Standards should be treated as a starting point for continuous improvement.

5.4. Limitations

The study is subject to limitations associated with an exploratory qualitative design. While diverse, the sample does not fully cover all stakeholder groups.

The focus on mechanism identification also limits systematic comparison across cases and does not extend to cross-country analysis.

5.5. Future research

Future studies may extend in three directions: (i) comparative analysis across regions or countries to test the framework; (ii) quantitative approaches to examine interaction effects; and (iii) deeper analysis of firm-level learning processes, including sectoral differences and emerging trends such as digital transformation./.

REFERENCES

- [1] R. Baldwin, R. Freeman, and A. Theodorakopoulos, “Hidden exposure: Measuring US supply chain reliance,” *Brook. Pap. Econ. Act.*, vol. 2023, no. 2, pp. 79–134, 2023. Doi: <https://doi.org/10.1353/eca.2023.a935416>
- [2] C. Schwellnus, A. Haramboure, and L. Samek, “Policies to strengthen the resilience of global value chains: Empirical evidence from the COVID-19 shock,” *OECD Science, Technology and Industry Policy Papers*, no. 141, Feb. 2023. Doi: <https://doi.org/10.1787/fd82abd4-en>
- [3] D. Taglioni and D. Winkler, *Making global value chains work for development*. World Bank Publications, 2016. Available: <https://documents1.worldbank.org/curated/en/450521467989506537/pdf/106305-PUB-ADD-ISBN-DOI-AUTHORS-SERIES-ABSTRACT-OUO-9.pdf>
- [4] UNIDO, *Industrial development report 2020: Industrializing in the digital age*. UN, 2019. Available: <https://www.unido.org/sites/default/files/unido-publications/2023-03/UNIDO-IDR2020-main-report-en.pdf>

- [5] J. Jung, "Institutional quality, FDI, and productivity: A theoretical analysis," *Sustainability*, vol. 12, no. 17, p. 7057, 2020. Doi: <https://doi.org/10.3390/su12177057>
- [6] D. Rodrik, "An industrial policy for good jobs," *Hamilt. Proj. Propos. Wash. DC Brook. Inst.*, 2022.
- [7] B. S. Javorcik, "Can survey evidence shed light on spillovers from foreign direct investment?," *World Bank Res. Obs.*, vol. 23, no. 2, pp. 139–159, 2008. Doi: <https://doi.org/10.1093/wbro/lkn006>
- [8] B. A. Demena and P. A. van Bergeijk, "A meta-analysis of FDI and productivity spillovers in developing countries," *J. Econ. Surv.*, vol. 31, no. 2, pp. 546–571, 2017. Doi: <https://doi.org/10.1111/joes.12146>
- [9] W. M. Cohen and D. A. Levinthal, "Absorptive Capacity: A New Perspective on Learning and Innovation," in *Strategic Learning in a Knowledge Economy*, 1st ed., R. Cross and S. Israelit, Eds. London, U.K.: Routledge, 2000.
- [10] T. Dzhengiz and E. Niesten, "Competences for Environmental Sustainability: A Systematic Review on the Impact of Absorptive Capacity and Capabilities" *J. Bus. Ethics*, vol. 162, no. 4, pp. 881–906, 2020. Doi: <https://doi.org/10.1007/s10551-019-04360-z>
- [11] I. Kastelli, P. Dimas, D. Stamopoulos, and A. Tsakanikas, "Linking digital capacity to innovation performance: The mediating role of absorptive capacity," *J. Knowl. Econ.*, vol. 15, no. 1, pp. 238–272, 2024. Doi: <https://doi.org/10.1007/s13132-022-01092-w>
- [12] World Bank (*World Development Report 2020: Trading for Development in the Age of Global Value Chains*. Washington, DC, USA: World Bank, 2020. Available: <https://www.worldbank.org/en/publication/wdr2020>
- [13] G. Gereffi, J. Humphrey, R. Kaplinsky, and T. J. Sturgeon, "Introduction: Globalisation, value chains and development," 2001. Doi: <https://doi.org/10.1111/j.1759-5436.2001.mp32003001.x>
- [14] G. Gereffi, *Global Value Chains and Development: Redefining the Contours of 21st Century Capitalism*. Cambridge, U.K.: Cambridge University Press, 2018.
- [15] Government of Vietnam, *Decree No. 111/2015/ND-CP on the Development of Supporting Industries*, No. 111/2015/ND-CP, Nov. 3, 2015.
- [16] Government of Vietnam, *Resolution No. 138/NQ-CP Promulgating the Government's Action Plan to Implement Resolution No. 68-NQ/TW*, No. 138/NQ-CP, May 16, 2025.
- [17] Government of Vietnam, *Decree No. 205/2025/ND-CP Amending and Supplementing a Number of Articles of Decree No. 111/2015/ND-CP on the Development of Supporting Industries*, No. 205/2025/ND-CP, Jul. 9, 2025.
- [18] N. D. T. Nguyễn and Y. N. Nguyễn, "Development of supporting industries towards production and export autonomy in Ho Chi Minh City," *VNUHCM J. Econ.-Law Manag.*, vol. 6, no. 3, pp. 3386–3395, 2022. Doi: <https://doi.org/10.32508/stdjelm.v6i3.1031>
- [19] N. B. Minh, "Financial Policy on Promotion of Supporting Industries for Vietnam: Reality and Recommendation," *Arch. Bus. Res.*, vol. 10, no. 8, 2022. Doi: <https://doi.org/10.14738/abr.108.12693>
- [20] Dong Nai Provincial People's Committee, *Decision No. 1329/QĐ-UBND Approving the Supporting Industry Development Program of Dong Nai Province for the Period 2026–2030, with Orientation to 2035*, No. 1329/QĐ-UBND, Apr. 2, 2026.

- [21] Dong Nai Provincial People's Committee, *Plan No. 116/KH-UBND on the Implementation of Plan No. 23-KH/TU Regarding Resolution No. 68-NQ/TW on Private Sector Development in Dong Nai Province*, No. 116/KH-UBND, Oct. 1, 2025.
- [22] J. Humphrey and H. Schmitz, "How does insertion in global value chains affect upgrading in industrial clusters?," *Reg. Stud.*, vol. 36, no. 9, pp. 1017–1027, 2010. Doi: <https://doi.org/10.1080/0034340022000022198>
- [23] A. Lasagni, A. Nifo, and G. Vecchione, "Firm productivity and institutional quality: Evidence from Italian industry," *Journal of Regional Science*, vol. 55, no. 5, pp. 774–800, Nov. 2015. Doi: <https://doi.org/10.1111/jors.12203>
- [24] H. Gong, C. Binz, R. Hassink, and M. Tripl, *Emerging industries: institutions, legitimacy and system-level agency*, vol. 56, no. 4. Taylor & Francis, 2022, pp. 523–535. Doi: <https://doi.org/10.1080/00343404.2022.2033199>
- [25] C. Li and S. Tanna, "The impact of foreign direct investment on productivity: New evidence for developing countries," *Econ. Model.*, vol. 80, pp. 453–466, 2019. Doi: <https://doi.org/10.1016/j.econmod.2018.11.028>
- [26] T.-C. Wang, C.-N. Wang, and X. H. Nguyen, "Evaluating the influence of criteria to attract foreign direct investment (FDI) to develop supporting industries in Vietnam by utilizing fuzzy preference relations," *Sustainability*, vol. 8, no. 5, p. 447, 2016. Doi: <https://doi.org/10.3390/su8050447>
- [27] S. A. Zahra, B. Larraneta, and J. L. Galán, "Absorptive capacity and technological innovation," *Wiley Encycl. Manag.*, vol. 13, pp. 1–5, 2015. Doi: <https://doi.org/10.1002/9781118785317.weom130020>
- [28] S. A. Zahra and G. George, "Absorptive capacity: A review, reconceptualization, and extension," *Acad. Manage. Rev.*, vol. 27, no. 2, pp. 185–203, 2002. Doi: <https://doi.org/10.2307/4134351>
- [29] G. Ge, J. Xue, and Q. Zhang, "Industrial policy and governmental venture capital: Evidence from China," *J. Corp. Finance*, vol. 84, p. 102532, 2024. Doi: <https://doi.org/10.1016/j.jcorpfin.2023.102532>
- [30] Y. Ge, D. Dollar, and X. Yu, "Institutions and participation in global value chains: Evidence from belt and road initiative," *China Econ. Rev.*, vol. 61, p. 101447, 2020. Doi: <https://doi.org/10.1016/j.chieco.2020.101447>
- [31] Ministry of Industry and Trade of Vietnam, *Report on Industrial Production and Trade Performance in the First 11 Months of 2025*, 2025. [Online]. Available: <https://moit.gov.vn/thong-ke/bao-cau-tinh-hinh-san-xuat-cong-nghiep-va-hoat-dong-thuong-mai-11-thang-dau-nam-2025.html>
- [32] B. S. Javorcik, "Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages," *Am. Econ. Rev.*, vol. 94, no. 3, pp. 605–627, 2004. Doi: <https://doi.org/10.1257/0002828041464605>
- [33] J. W. Creswell and J. D. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications, 2017.
- [34] R. K. Yin, *Case study research and applications*, vol. 6. Sage Thousand Oaks, CA, 2018.
- [35] G. A. Bowen, "Document analysis as a qualitative research method," *Qual. Res. J.*, vol. 9, no. 2, pp. 27–40, 2009. Doi: <https://doi.org/10.3316/QRJ0902027>
- [36] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qual. Res. Psychol.*, vol. 3, no. 2, pp. 77–101, 2006. Doi: <https://doi.org/10.1191/1478088706qp063oa>

- [37] Communist Party of Vietnam, *Resolution No. 68-NQ/TW on the Development of the Private Economy*, No. 68-NQ/TW, May 4, 2025. [Online]. Available: <https://xaydungchinhsach.chinhphu.vn/toan-van-nghi-quyet-so-68-nq-tw-ve-phat-trien-kinh-te-tu-nhan-119250505101309949.htm>
- [38] Government of Vietnam, *Decree No. 20/2026/ND-CP Detailing and Guiding the Implementation of a Number of Articles of Resolution No. 198/2025/QH15 on Special Mechanisms and Policies for Private Sector Development*, No. 20/2026/ND-CP, Jan. 15, 2026.
- [39] M. Q. Patton, *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications, 2014.
- [40] A. Jaax, S. Miroudot, and E. van Lieshout, “Deglobalisation? The Reorganisation of Global Value Chains in a Changing World,” OECD Publishing, 272, 2023. Doi: <https://doi.org/10.1787/b15b74fe-en>
- [41] H. V. T. Thanh and T. T. Viet, “Nhân tố ảnh hưởng đến phát triển công nghiệp hỗ trợ ngành điện tử Việt Nam,” *Tạp chí Kinh tế và Phát triển*, vol. 295, pp. 40–50, 2022. [Online]. Available: <https://js.ktpt.edu.vn/index.php/jed/article/view/360>
- [42] Y. Zhou, “Human capital, institutional quality and industrial upgrading: global insights from industrial data,” *Econ. Change Restruct.*, vol. 51, no. 1, pp. 1–27, 2018. Doi: <https://doi.org/10.1007/s10644-016-9194-x>
- [43] H. Taguchi, *Domestic Value Creation in Global Value Chains in Asian Economies*. Munich Personal RePEc Archive (MPRA), MPRA Paper No. 89741, Oct. 2018. [Online]. Available: https://mpra.ub.uni-muenchen.de/89741/1/MPRA_paper_89741.pdf

APPENDICES

APPENDIX 1 INTERVIEW QUESTIONNAIRE / BẢNG CÂU HỎI PHỎNG VẤN

(For multiple stakeholder groups / Dùng cho nhiều nhóm đối tượng)

PART A. BACKGROUND INFORMATION / PHẦN A. THÔNG TIN NỀN

1. Organization type / Loại hình tổ chức:

- ☐ FDI firm / Doanh nghiệp FDI
- ☐ Domestic supporting industry firm / Doanh nghiệp CNHT nội địa
- ☐ Government / agency / association / Cơ quan quản lý / hiệp hội
- ☐ Other / Khác: ...

2. Industry/sector / Ngành/lĩnh vực hoạt động:

3. Years of operation/experience / Số năm hoạt động/kinh nghiệm:

4. Position of interviewee / Vị trí người trả lời:

5. Main activities in the supply chain/ecosystem / Vai trò chính trong chuỗi cung ứng/hệ sinh thái:

6. Geographic scope of operation / Phạm vi hoạt động:

- ☐ Local / Địa phương
- ☐ National / Quốc gia
- ☐ International / Quốc tế

PART B. INTERVIEW QUESTIONS / PHẦN B. CÂU HỎI PHỎNG VẤN

Section 1. Position in the Supply Chain / Vị trí trong chuỗi cung ứng

1. How would you describe your organization’s role within the supply chain or industrial ecosystem?

→ Anh/chị mô tả vai trò của tổ chức trong chuỗi cung ứng hoặc hệ sinh thái công nghiệp như thế nào?

2. Have there been changes in supply chain structures, sourcing, or coordination in recent years?

→ Trong những năm gần đây, có sự thay đổi nào về cấu trúc chuỗi cung ứng, tìm nguồn cung hoặc điều phối không?

3. What factors currently shape participation in supply chains at the local level?

→ Những yếu tố nào hiện đang ảnh hưởng đến việc tham gia chuỗi cung ứng ở cấp địa phương?

Section 2. Linkages and Interactions / Liên kết và tương tác

1. How are linkages between firms and other stakeholders (e.g., FDI firms, domestic suppliers, institutions) typically formed?

→ Các liên kết giữa doanh nghiệp và các chủ thể khác (FDI, doanh nghiệp nội địa, cơ quan) thường được hình thành như thế nào?

2. What types of requirements, expectations, or coordination mechanisms are commonly observed?

→ Những yêu cầu, kỳ vọng hoặc cơ chế phối hợp nào thường xuất hiện trong các liên kết này?

3. What factors facilitate or constrain stronger linkages?

→ Những yếu tố nào thúc đẩy hoặc cản trở việc hình thành liên kết chặt chẽ hơn?

Optional probes / Gợi mở thêm:

- Are there differences across firm types or sectors?

→ Có sự khác biệt giữa các loại hình doanh nghiệp/ngành không?

- How stable or long-term are these relationships?

→ Các mối quan hệ này có ổn định/lâu dài không?

Section 3. Institutional and Business Environment / Môi trường thể chế và kinh doanh

1. How would you assess the current institutional and business environment at the local level?

→ Anh/chị đánh giá môi trường thể chế và kinh doanh tại địa phương hiện nay như thế nào?

2. What types of policies, programs, or support mechanisms are relevant to supply chain development?

→ Những chính sách, chương trình hoặc cơ chế hỗ trợ nào có liên quan đến phát triển chuỗi cung ứng?

3. How accessible and effective are these mechanisms in practice?

→ Các cơ chế này có mức độ tiếp cận và hiệu quả như thế nào trong thực tế?

Optional probes / Gợi mở thêm:

- Have there been changes or improvements in recent years?

→ Có sự thay đổi/cải thiện trong những năm gần đây không?

- What gaps remain between policy design and implementation?

→ Có khoảng cách nào giữa thiết kế và triển khai chính sách không?

Section 4. Capabilities and Learning / Năng lực và học hỏi

1. What capabilities are important for firms to participate and upgrade within supply chains?

→ Những năng lực nào quan trọng để doanh nghiệp tham gia và nâng cấp trong chuỗi cung ứng?

2. How do firms acquire or develop these capabilities?

→ Doanh nghiệp thường phát triển các năng lực này bằng cách nào?

3. What challenges do firms face in learning, adapting, or meeting higher standards?

→ Doanh nghiệp gặp khó khăn gì trong quá trình học hỏi, thích ứng hoặc đáp ứng tiêu chuẩn cao hơn?

Optional probes / Gợi mở thêm:

- What role do external partners or institutions play?

→ Các đối tác hoặc thể chế bên ngoài đóng vai trò gì?

- Are there differences across firm size or experience?

→ Có sự khác biệt theo quy mô hoặc kinh nghiệm không?

Section 5. Supplier Upgrading / Nâng cấp nhà cung ứng

1. How would you describe “upgrading” in this context?
→ Anh/chị hiểu “nâng cấp” trong bối cảnh này như thế nào?
2. In practice, how does upgrading typically occur (e.g., process, product, functional)?
→ Trong thực tế, nâng cấp thường diễn ra như thế nào (quy trình, sản phẩm, chức năng)?
3. What factors are most important in enabling or limiting upgrading outcomes?
→ Những yếu tố nào quan trọng nhất trong việc thúc đẩy hoặc hạn chế kết quả nâng cấp?

Closing Questions / Câu hỏi kết thúc

1. What is the most critical issue affecting supply chain development at the local level?
→ Vấn đề quan trọng nhất ảnh hưởng đến phát triển chuỗi cung ứng ở cấp địa phương là gì?
2. What priorities would you suggest for improving linkages and upgrading outcomes?
→ Anh/chị đề xuất những ưu tiên nào để cải thiện liên kết và kết quả nâng cấp?

Note for Research Use / Ghi chú sử dụng nghiên cứu

- No confidential or commercially sensitive information is requested.
→ Không thu thập thông tin mật hoặc nhạy cảm.
- Responses will be anonymized and used for academic purposes only.
→ Dữ liệu được ẩn danh và chỉ dùng cho mục đích học thuật.

Appendix 2 CODED INTERVIEWEES

CODE	ORGANIZATION TYPE	INDUSTRY / SECTOR	DESCRIPTION
P1	Domestic firm	Cast iron manufacturing	A company specializing in cast iron production located in Ho Nai Industrial Park, Dong Nai Province
P2	Domestic firm	Aluminum casting	A firm engaged in aluminum casting in Ho Nai Industrial Zone, Dong Nai Province
P3	Domestic firm	Fasteners (screws and bolts)	A domestic enterprise producing screws and bolts in Bien Hoa City, Dong Nai Province
P4	Domestic firm	Industrial equipment fabrication and installation	A firm specializing in fabrication and installation of industrial equipment in Bien Hoa City
P5	Domestic firm	Precision mechanical processing	A company engaged in precision mechanical engineering and machining in Dong Nai Province
P6	Domestic firm	Industrial boiler and environmental systems	A firm providing industrial boiler solutions, dust treatment systems, and industrial ventilation equipment
P7	Domestic firm	Packaging materials and equipment	A manufacturer of strapping, pallet wrapping films, adhesive tapes, and packaging machinery
P8	Domestic firm	(No data provided in original list)	Domestic supporting industry firm (information not specified in source document)
P9	FDI firm	Household electrical appliances manufacturing	A foreign-invested enterprise producing household appliances such as electric pans, lunch boxes, and electric kettles
P10	FDI firm	Mechanical components manufacturing	A foreign-invested firm specializing in mechanical processing of diesel engine and oil press machine components

Appendix 3. AUTHOR CONTRIBUTIONS AND RESPONSIBILITY ALLOCATION

Task	Pham Minh Tien (HUIT)	Nguyen Huu Duc* (DEIZA)	Tran Ky Viet (UFM)
Overall role	Co-author	Lead researcher & Corresponding author	Co-author
Conceptualization & research design	Co-developed research ideas and questions	Led the research direction, conceptual framework, and overall analytical design	Co-developed theoretical framework, provided academic direction and critical conceptual input
Literature review & mapping	Conducted literature synthesis and mapping references	Led theoretical integration and identification of research gaps	Systematized literature, refined theoretical grounding and academic positioning
Methodology & interview protocol	Contributed to research design and question development	Led research design, tool development, and coordination of implementation	Advised and refined interview protocol, ensuring methodological rigor and validity
Data collection & processing	Supported document analysis and participated in interviews	Led fieldwork coordination and data collection process	Participated in interviews and supported data coding and processing
Analysis & findings development	Co-conducted thematic analysis and theme development	Led analytical framework, interaction mechanisms, and interpretation of findings	Co-analyzed data, provided critical review, and ensured theoretical–empirical consistency
Manuscript writing	Drafted literature review and methodology sections	Led writing of findings, discussion, and overall integration of the manuscript	Co-drafted the manuscript, particularly conceptual framework, analysis, and academic argumentation
Review & editing	Reviewed structure and content	Took primary responsibility for final content, accuracy, and responses to reviewers	Refined academic writing, coherence, and language standardization
Scientific responsibility	Responsible for individual contributions	Responsible for overall scientific integrity of the study	Responsible for individual contributions
Right to independent research development	Entitled to develop follow-up research based on individual contributions with proper citation	Entitled to extend the main research direction and framework	Entitled to develop related research streams (especially theoretical and methodological), ensuring academic integrity

Note:

Corresponding author: Pham Minh Tien (tienpm@huit.edu.vn)

All authors contributed to the major stages of the research and participated in the development of the study. The allocation of roles reflects functional responsibilities and coordination, with the lead researcher ensuring overall integration and quality. Each author retains the right to develop independent research outputs based on their contributions, subject to proper attribution and adherence to academic integrity standards.