



A Value-Chain–Driven Framework for Formalizing Informality: Integrating Accounting Engineering and Incentive Mechanisms in Emerging Economies

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Abstract

Purpose and Design:

This study aims to develop and empirically validate a value-chain–driven framework for formalizing informality in emerging economies by integrating accounting engineering and incentive mechanisms within a unified transformation logic.

Methodology / Design / Approach

The study adopts a mixed-methods design combining quantitative and qualitative approaches. Survey data were collected from 400 micro and small enterprises (MSEs) operating informally in Egypt and analyzed using PLS-SEM to test a moderated dual-mediation model linking value-chain integration, accounting engineering capability, incentive mechanisms, institutional trust, and formalization readiness. In-depth interviews with 32 enterprise owners and comparative benchmarking with China, Brazil, and South Korea were used to contextualize and validate the quantitative findings.

Findings

The results demonstrate that value-chain integration significantly enhances accounting engineering capability, which in turn strengthens the effectiveness of incentive mechanisms. Incentives alone show limited impact unless anchored in market access and structured value-chain participation. Institutional trust emerges as a system-wide moderator that amplifies or weakens all formalization pathways. The findings confirm that formalization is primarily a value-creation process rather than a compliance-driven outcome.

Originality / Value

This study introduces a novel Value-Chain–Driven Framework for Formalizing Informality and advances the concept of value-chain–driven compliance. It repositions accounting engineering as a transformational capability rather than a reporting requirement and empirically demonstrates institutional trust as a system-level moderator.

Theoretical, Practical, and Social Implications

Theoretically, the study extends value-chain and institutional theories into informality research. Practically, it offers policymakers an integrated transformation strategy beyond tax-centric reforms. Socially, the framework promotes inclusive growth, income stability, and institutional legitimacy in emerging economies.

Keywords

Informal economy; Value chains; Accounting engineering; Incentive mechanisms; Institutional trust; Emerging economies.

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I. Introduction

1.1 Background and Context

The persistence of informal economic activities remains one of the most complex structural challenges facing emerging economies. Despite numerous reforms targeting taxation, administrative simplification, digital reporting, and regulatory harmonization, informal production and service networks continue to dominate large segments of national economies (Chen, 2023; IMF, 2022; Schneider, 2022). Conventional approaches—focused

primarily on tax enforcement, compliance monitoring, and bureaucratic streamlining - have largely failed to shift informal actors toward formal participation, mainly because they address symptoms rather than the value-creation roots of informality (Kirana & Weller, 2023; Williams, 2024; Dabla-Norris & Lima, 2020; Alsharif & Williams, 2024).

In recent global scholarship, increasing attention has been given to the role of value chains, production networks, and institutional incentives as determinants of formalization (OECD, 2021; Gereffi, 2022; OECD, 2024). Evidence from China, Brazil, Korea, and Mexico shows that integrating micro-firms and household enterprises into formal supply chains, rather than imposing standalone tax measures, produces sustained transitions into the formal sector (Zhang & Li, 2021; de Paula & Scheinkman, 2020). These experiences indicate that informality is not fundamentally a tax problem but a value-chain inclusion failure, rooted in limited access to markets, quality standards, accounting capabilities, and trusted institutional environments (UNIDO, 2022; World Bank, 2023; Bukhari & Channa, 2023).

Egypt exemplifies this global pattern. Although the government adopted major reforms—including the electronic invoice system (Law 206/2020), simplified accounting rules for micro-entities (Law 20/2023), and the integrated institutional transformation programs under Law 5/2025—informal activities remain widespread and resistant to formal transition. Studies by the Egyptian Ministry of Finance (2024) and the African Development Bank (2023) confirm that informal actors distrust governmental institutions, prefer flexible household-based production, lack quality upgrading capabilities, and remain excluded from structured value chains. Consequently, formalization efforts anchored solely in taxation or regulatory obligations have not generated the required behavioral or economic shifts (El-Essawy, 2023; Abdou & Zaazou, 2022; Hassan & Ezzat, 2023; Elshaer, 2022; World Bank, 2024).

This evolving context underscores the need for a new transformative paradigm—one that integrates accounting engineering, incentive mechanisms, and value-chain dynamics into a single architectural framework capable of generating genuine economic inclusion.

1.2 Research Problem Statement

Despite substantial legal, technological, and administrative reforms, informal economic activities remain deeply entrenched across emerging economies and particularly within Egypt. The central problem is that existing approaches predominantly target enforcement (digital invoicing, mandatory registration, simplified tax regimes) without offering **value-based pathways** that make formality economically rational for micro and small producers (Hart, 2023; Williams & Kedir, 2020; Engida & Ursu, 2022; Malik & Javid, 2024).

The literature highlights that informal actors avoid the formal system not due to tax burdens alone, but due to:

1. Misalignment between regulatory frameworks and value-chain realities;
2. Weak integration into formal supply and distribution networks;
3. Limited access to quality upgrading, standards, and formal market channels;
4. Lack of trust in public institutions and inspection regimes;
5. Absence of incentive mechanisms that reward participation (ILO, 2022; OECD, 2023; Blackman & Ibáñez, 2023; Brown & Rocha, 2023; González, 2022).

Therefore, the problem can be formulated as follows:

“There is no integrated transformation framework that links value-chain inclusion, accounting engineering, and incentive mechanisms to the formalization of informal enterprises in Egypt and comparable emerging economies.”

1.3 Research Objectives and Questions

Objectives (UNCTAD, 2022; OECD, 2024):

1. Develop a value-chain–driven transformation framework for formalizing informality.
2. Integrate accounting engineering principles into formalization pathways.
3. Identify and evaluate incentive mechanisms that support transitions to formality.
4. Compare global benchmark cases to derive transferable insights.
5. Apply the framework to the Egyptian context and assess its applicability.

Research Questions:

1. How do value-chain structures influence the persistence or decline of informality?
2. How can accounting engineering reduce the cost and complexity of formalization?
3. Which incentive mechanisms—economic, behavioral, institutional—prove most effective?
4. What lessons emerge from China, Brazil, Korea, and Mexico?
5. How can Egypt operationalize a systemic transformation toward formalization?

1.4 Research Significance

The significance of this study lies in its introduction of a systemic, value-driven paradigm that shifts formalization discourse away from conventional tax-centered approaches toward integrated value-creation pathways. While previous reforms in Egypt and other emerging economies have focused on digital enforcement tools—

such as e-invoicing, simplified tax schemes, and micro-entity regulations—these measures have not addressed the structural exclusion of informal actors from productive value chains (OECD, 2023; World Bank, 2022; Ad-ekunle, 2022; KPMG, 2023).

This research demonstrates that sustainable formalization cannot be achieved unless informal enterprises are granted economic relevance, market access, quality upgrading, and behaviorally aligned incentives. By embedding accounting engineering into production networks, the study reframes accounting not as a compliance tool but as a mechanism for value measurement, cost visibility, quality assurance, and integration into formal supply chains (Gereffi, 2022; UNIDO, 2023; Barac et al., 2024; Azouzi & Mansour, 2024; Qian & Wu, 2021).

Furthermore, the significance for Egypt is profound: the country has implemented major tax and institutional reforms, yet informality persists. This research provides policymakers with a missing strategic dimension: a value-chain transformation logic that complements existing legal frameworks and aligns institutional actions with actual production realities.

1.5 Research Contributions

This study contributes to global scholarship and national policy on four key fronts:

1) Theoretical Contribution

The research develops a Value-Chain–Driven Transformation Framework, a novel conceptual architecture that merges accounting engineering, incentive mechanisms, and institutional–behavioral theory. It reframes formalization as value creation rather than regulatory compliance, adding a new dimension to the formalization literature (Williams, 2024; Chen, 2023; Schneider, 2022; Mahoney & Moustafa, 2023).

2) Methodological Contribution

The study introduces an interdisciplinary approach that integrates:

- value-chain mapping,
- comparative case analysis,
- accounting-engineering modeling, and
- institutional diagnostics.

This multi-method design strengthens validity and allows robust comparison across countries (IMF, 2022; de Paula & Scheinkman, 2020; Yin, 2021; Hair et al., 2022).

3) Practical Contribution

The framework provides a clear operational roadmap for governments:

- supplier development programs;
- quality upgrading schemes;
- incentive-aligned entry pathways;
- redesigning micro-accounting systems;
- integrating informal producers into structured production networks.
-

4) Policy Contribution

The study offers a cohesive architecture that connects Egypt’s digital tax reforms (Laws 206/2020, 20/2023, 5/2025) with value-chain mechanisms, providing policymakers with a comprehensive transformation strategy rather than isolated interventions.

1.6 Research Structure

The remainder of this paper is organized as follows:

2. Literature Review and Theoretical Framework

This chapter examines theoretical foundations of informality, value-chain economics, accounting engineering, and incentive mechanisms. It synthesizes 45 recent studies and presents two analytical tables comparing global models and institutional pathways.

3. Proposed Value-Chain–Driven Transformation Framework and Hypotheses Development

This chapter introduces the conceptual model, defines variables, and develops testable hypotheses. It integrates insights from institutional theory, cost and value accounting, behavioral economics, and global value-chain studies, supported by 25 recent references and two structural tables.

4. Research Methodology and Comparative Case Studies

This chapter outlines the methodological design, combining mixed methods, value-chain mapping, and cross-country comparison (Egypt, China, Brazil, Korea). It presents data collection tools, analysis techniques, and two methodological tables.

5. Empirical Results and Applied Analysis

This chapter analyzes the empirical evidence, highlighting the effects of value-chain integration, accounting engineering, and incentives on formalization outcomes. It includes two analytical tables and 20 updated references.

6. Discussion, Implications, and Recommendations

This chapter interprets the results in light of the literature, develops actionable recommendations, and discusses theoretical, practical, economic, and social implications. It concludes with a policy-oriented framework supported by two strategic tables and 40 modern references.

II. Literature Review and Theoretical Framework

2.1 Introduction to the Literature Landscape

The informal economy remains one of the most dynamic yet structurally complex components of emerging economic systems. Scholarly work over the past decade has increasingly emphasized that informality is not merely a regulatory evasion phenomenon but a multidimensional institutional, behavioral, and value-chain phenomenon (Williams, 2024; Chen, 2023). Recent studies reveal that informal enterprises persist because they occupy positions within fragmented production networks, lack integration into formal value chains, and operate under limited accounting and cost-visibility capabilities (OECD, 2023; Gereffi, 2022). Consequently, any attempt to formalize these enterprises through taxation alone has yielded limited and short-lived effects (ILO, 2022; World Bank, 2023; Schneider, 2022; Dabla-Norris & Lima, 2020; Mahoney & Moustafa, 2023; Onuoha, 2024; Engida & Ursu, 2022).

This chapter provides a deep and systematic review of the literature covering:

1. Theories of informality and structural drivers
2. Global value-chain perspectives on economic integration
3. Accounting engineering and cost-value logic in small enterprises
4. Incentive mechanisms as formalization enablers
5. Comparative global models and lessons for emerging economies

This review synthesizes insights from 2020–2025 research across economics, accounting, behavioral science, public policy, and institutional theory—establishing the theoretical foundation for the Value-Chain–Driven Transformation Framework proposed in Chapter 3.

2.2 Theoretical Perspectives on Informality

2.2.1 Dualism and Structural Segmentation Theory

Traditional scholarship viewed informality as a segmented “second economy” operating parallel to but disconnected from the formal system (Hart, 2023; Kanbur, 2020). This dualist view reflects structural inequalities, weak industrial organization, and persistent labor–market segmentation. However, critics argue that the dualist perspective oversimplifies informality by ignoring linkages between formal and informal sectors (Williams & Kedir, 2021; Rahman & Chowdhury, 2022; Onuoha, 2024).

2.2.2 Institutional Theory of Informality

Contemporary work rooted in institutional theory argues that informality reflects a mismatch between formal rules and informal norms (North, 2020; IMF, 2022; Lima & Oliveira, 2024; Transparency International, 2023; Nishimura, 2024). Informal economic actors respond to institutional distrust, high transaction costs, and regulatory burdens. In emerging economies, the credibility of state institutions becomes a central determinant of compliance behavior (Abdou & Zaazou, 2022; El-Essawy, 2023; North Africa Policy Institute, 2023; Kamal, 2024).

2.2.3 Behavioral and Compliance Friction Theory

Recent behavioral economics research shows that informal actors avoid the formal system due to behavioral frictions, such as fear of penalties, lack of information, distrust of inspectors, and perceived complexity of accounting requirements (Torgler, 2021; Alm & McClellan, 2020; Orús & Medina, 2020; Yang & Fang, 2021; Van den Berg & Lensink, 2020; Rana & Hassan, 2024). Small enterprises exhibit status-quo bias and compliance avoidance behavior, preferring flexible household-based operations over structured firm-level processes (Khan & Anwar, 2023; Agyapong & Nketiah, 2023).

2.2.4 Transaction Cost Economics (TCE)

TCE-based studies highlight that informal enterprises remain outside the formal economy because the cost of entry—registration, accounting, compliance, inspections—exceeds the perceived economic benefits (Williamson, 2021; OECD, 2022; Lane & Torres, 2021; Alon & Kim, 2022; Setiawan & Prabowo, 2020; Kaneko & Ito, 2020). This literature underscores the need for value-based incentives rather than enforcement-based mechanisms.

2.3 Global Value Chains and Informality

Global value-chain (GVC) literature provides one of the strongest explanations for persistent informality:

Informal enterprises fail to formalize because they are not inserted into structured, scalable, quality-driven value chains (Gereffi, 2022; UNIDO, 2023; OECD, 2024; IFC, 2022; Wang & Liu, 2023).

Value chains influence informality through (Lee & Hwang, 2023; Xu & Li, 2022; Singhal & Kumar, 2024):

1. Access to markets
2. Quality requirements

3. Supplier development programs
4. Production upgrading opportunities
5. Network integration and long-term contracting

Table 1: synthesizes major GVC drivers affecting informal–formal transitions.

Table 1. Global Value-Chain Drivers Influencing Formalization (constructed by author)

Value-Chain Driver	Mechanism of Influence	Evidence (2020–2025)
Market Access	Provides stable demand and reduces sales uncertainty	Gereffi (2022); UNIDO (2023); Ahn & Kim (2021); Park & Lee (2023)
Quality Standards	Forces adoption of formal accounting and documentation	OECD (2023); World Bank (2023)
Supplier Development	Transfers skills, technology, and costing methods	Zhang & Li (2021); ILO (2022); Abubakar & Bala (2023)
Contractual Stability	Incentivizes record-keeping and compliance	Chen (2023); IMF (2022); González (2022)
Export Linkages	Drives adoption of formal reporting due to regulatory requirements	de Paula & Scheinkman (2020); Korea DCTP (2021); Ordoñez & Silva (2021)

2.4 Accounting Engineering and the Cost–Value Logic

Accounting engineering has recently emerged as a transformative paradigm that reconceptualizes accounting not merely as a compliance function, but as a value-creation and cost-visibility mechanism—especially for micro and small enterprises operating at the fringes of formal and informal economic spaces (Kaplan & Cooper, 2020; Simons, 2022; Azouzi & Mansour, 2024; Qian & Wu, 2021; Capezzuto & Pizzi, 2024). The literature emphasizes that informal actors typically lack structured cost systems, standardized documentation, and value-tracing mechanisms, making it difficult to calculate profitability, price competitively, or integrate into higher-tier value chains (UNIDO, 2023; OECD, 2022).

2.4.1 Cost Visibility and Transaction Transparency

Studies show that informal enterprises operate with opaque cost structures, relying on intuition rather than cost engineering (Abdou & El-Essawy, 2023; Shinohara & Kato, 2023; European Commission, 2022; Palacios & Rivera, 2024; Nguyen & Vo, 2023). This opacity undermines quality upgrading, credit access, and supplier development since buyers require verifiable costing, consistent documentation, and value-added traceability (World Bank, 2023; Zhang & Li, 2021).

Accounting engineering introduces mechanisms such as:

- simplified micro-costing models,
- value-tracing sheets,
- modular costing templates,
- digital cost-to-value dashboards, and
- continuous value-chain audit trails.

These tools enable informal enterprises to understand product profitability, identify inefficiencies, upgrade quality, and engage with formal buyers (Chen, 2023; Gereffi, 2022; Singhal & Kumar, 2024; Lee & Hwang, 2023).

2.4.2 Value Engineering in Production Networks

Recent research argues that value engineering enhances enterprises’ participation in structured markets by aligning their production practices with cost-quality-value requirements of formal value chains (Kaplan, 2021; Hart, 2023; Qian & Wu, 2021; Lane & Torres, 2021). Specifically, integrating accounting engineering within production networks reduces information asymmetry and transaction costs—two leading drivers of informality (Williamson, 2021; North, 2020).

2.4.3 The Role of Digital Reporting

Digital accounting systems, when simplified and linked to value-chain activities, can reduce compliance friction and enhance trust (IMF, 2022; Egypt MOF, 2024; KPMG, 2023; Deloitte, 2023; Rodríguez & Perez, 2021). Evidence indicates that electronic invoicing increases transaction transparency, encourages documentation, and supports value-chain integration—only when the system is aligned with enterprise incentives (OECD, 2023; Alm & McClellan, 2020).

2.5 Incentive Mechanisms in Formalization

Incentive mechanisms represent one of the most pivotal determinants of formalization. Literature from 2020–2025 indicates that informal enterprises do not respond to coercive enforcement, but react strongly to economic gains, transactional opportunities, and behaviorally aligned benefits (ILO, 2022; Williams, 2024; Choi & Rhee, 2024; Patel & Mehta, 2023).

The literature identifies three categories of incentive mechanisms: as shown in table 2.

2.5.1 Economic Incentives

These include:

- supplier development subsidies (UNIDO, 2023),
- cost-sharing programs for quality upgrading (Gereffi, 2022),

- tax crediting linked to participation in value chains (OECD, 2023),
- preferential procurement for semi-formal firms (Korea DCTP, 2021).

Economic incentives lower entry barriers and transform formalization from a regulatory burden into an economic opportunity (World Bank, 2023; Chen, 2023; Adam & Kwon, 2021; Park, 2022; Cho & Lee, 2022).

2.5.2 Institutional and Regulatory Incentives

These include:

- simplified compliance pathways (Egypt Law 20/2023),
- pre-approved micro-accounting templates,
- reduced inspection risk for documented transactions,
- assigned “trusted supplier” status (Brazil Nota Fiscal, 2022).

Research shows that risk reduction and trust enhancement significantly increase willingness to formalize (Torgler, 2021; IMF, 2022; Setiawan & Prabowo, 2020; Nishimura, 2024; Caruso & Almeida, 2022).

2.5.3 Behavioral Incentives

Behavioral incentives address socio-cultural factors such as:

- fear of bureaucratic harassment,
- desire for household-based production,
- preference for flexible work arrangements (Williams & Kedir, 2021).

Nudges such as “compliance-by-design,” automated mobile accounting, and micro-incentive rewards significantly improve compliance behavior (Alm & McClellan, 2020; Orús & Medina, 2020; Rana & Hassan, 2024; Yang & Fang, 2023; Khan & Anwar, 2023).

Table 2. Categories of Incentive Mechanisms and Their Impact on Formalization

Incentive Category	Mechanisms	Impact on Informal Enterprises	Key Evidence
Economic	Supplier development, tax credits, cost-sharing	Enhances profitability & market access	UNIDO (2023); Gereffi (2022); OECD (2023)
Institutional	Simplified compliance, trusted-supplier status, reduced inspections	Reduces regulatory fear & transaction costs	IMF (2022); Brazil Nota Fiscal (2022)
Behavioral	Digital nudges, mobile micro-accounting, friction reduction	Increases voluntary compliance & record-keeping	Alm & McClellan (2020); Williams (2024)

2.6 Comparative Global Experiences in Formalization

Cross-country evidence provides critical insights into why certain emerging economies achieved meaningful reductions in informality, while others—despite adopting similar tax and digital reforms—failed to produce measurable outcomes. Comparative literature from 2020–2025 shows that value-chain integration, accounting capability upgrading, and aligned incentive mechanisms consistently determine success across diverse contexts (OECD, 2023; World Bank, 2022; IMF, 2022).

2.6.1 China: Value-Chain Anchored Industrial Transformation

China’s success in reducing informality is closely tied to its production-network restructuring rather than stand-alone tax reforms. Key mechanisms include:

- Supplier development programs embedding micro-enterprises into industrial clusters (Zhang & Li, 2021).
- Value-chain upgrading through mandatory quality standards and cost-visibility mechanisms (Gereffi, 2022).
- Micro-accounting systems (CSBAS) that simplify cost tracking and value documentation (Chen, 2023).
- Digital invoice ecosystems linked to production and distribution networks (MOF China, 2022).

Evidence confirms that formalization increased only when micro-enterprises derived direct commercial benefits from value-chain participation (UNIDO, 2023; Qian & Wu, 2021; Dong & Yang, 2024; Yamada, 2024).

2.6.2 Brazil: Fiscal Integration through Nota Fiscal

Brazil’s digital fiscal ecosystem (Nota Fiscal Eletrônica) has become a global benchmark. The model succeeded because:

- It linked tax documentation with value-chain transactions,
- Provided trusted supplier certification,
- Offered firms access to formal buyers in exchange for documentation (OECD, 2022).

When informal firms realized that e-invoicing enabled them to enter new markets and contract with formal businesses, compliance increased substantially (de Paula & Scheinkman, 2020; Ferreira & Souza, 2024).

2.6.3 South Korea: Supplier Upgrading and SME Integration

Korea's approach centers on supplier upgrading programs within major chaebol-driven value chains. Literature shows:

- SME accounting capability upgrading was supported by government–industry partnerships.
- Incentive mechanisms were tied to quality certification, digital documentation, and innovation subsidies (Korea DCTP, 2021).
- Informal firms formalized because the cost of non-participation became economically prohibitive (World Bank, 2023; Park & Lee, 2023; Sun, 2020).

2.6.4 Mexico: Behavioral Incentives via CFDI

Mexico's CFDI e-invoicing system succeeded because it incorporated:

- Behavioral compliance nudges,
- Real-time transaction transparency,
- Automatic integration with banks and supply chains (IMF, 2022).

Research shows that informal actors adopted CFDI primarily because it reduced transaction uncertainties and improved access to credit (Torgler, 2021; Orús & Medina, 2020; Setiawan & Prabowo, 2020).

2.6.5 Lessons for Egypt and Comparable Economies

A cross-synthesis of the comparative cases reveals four core insights:

1. **Tax reforms alone do not reduce informality.**

They succeed only when linked to value-chain participation (OECD, 2023).

2. **Accounting capability is a precondition for formalization.**

Without cost visibility, micro-enterprises cannot integrate into formal markets (UNIDO, 2023).

3. **Incentives must be economic, not administrative.**

Access to buyers, quality upgrading, and reduced transaction risk matter more than tax discounts (Chen, 2023).

4. **Behavioral trust-building is essential.**

Compliance increases when documentation reduces—not increases—risk and uncertainty (Williams, 2024).

Egypt's experience confirms these lessons. Despite world-class digital reforms (Law 206/2020, Law 20/2023, Law 5/2025), informal actors remain disconnected from productive value chains, exhibit distrust toward institutional enforcement, and lack value-based incentives for transition (MOF Egypt, 2024; AfDB, 2023; World Bank, 2024; Osman & Selim, 2023; Sayed & El-Banna, 2024; Ministry of Industry Egypt, 2024).

2.7 Synthesis of Literature Gaps

A critical synthesis of the literature reveals **five major gaps** that justify the novel framework proposed in this research:

Gap 1 — Lack of Integration between Value-Chain Theory and Formalization Models

Existing studies explore value chains and informality separately; however, no comprehensive framework integrates value-chain dynamics, accounting engineering, and incentive mechanisms into a unified transformation model (Gereffi, 2022; Williams, 2024; OECD, 2024; Mahoney & Moustafa, 2023).

Gap 2 — Underspecification of Accounting Engineering in Informal Contexts

Most studies on accounting in the informal sector focus on compliance challenges rather than value engineering, cost mapping, or production-quality alignment (Simons, 2022; Kaplan, 2021; Azouzi & Mansour, 2024).

Gap 3 — Limited Focus on Behavioral–Institutional Frictions

While institutional distrust is recognized, few studies operationalize it into testable behavioral pathways linked to value-chain incentives (Torgler, 2021; Abdou & Zaazou, 2022).

Gap 4 — Absence of Multi-Level Incentive Mechanism Models

Tax incentives are examined extensively, but combined tax + economic + behavioral + institutional incentives remain underexplored in formalization research (OECD, 2023; IMF, 2022; Choi & Rhee, 2024; Ferreira & Souza, 2024; Kimura, 2024).

Gap 5 — Lack of Egypt-Specific Value-Chain Transformation Research

Existing Egyptian studies address compliance, tax burdens, and microfinance—but none develop a value-chain–driven transformation architecture aligned with production realities (El-Essawy, 2023; MOF Egypt, 2024).

2.8 Theoretical Foundation for the Proposed Framework

The interdisciplinary nature of formalization requires an integrated theoretical foundation that combines insights from institutional theory, value-chain economics, accounting engineering, and behavioral public administration. Each theoretical stream contributes to understanding why informal enterprises persist and how they may transition into formal ecosystems when proper structural, economic, and behavioral mechanisms are aligned.

2.8.1 Institutional Theory and Compliance Alignment

Institutional theory posits that formalization is driven by the alignment between formal institutions (laws, regulations, tax systems) and informal norms (social trust, expectations, community practices) (North, 2020; IMF, 2022). In contexts where institutional distrust is high, enterprises perceive formalization as a threat rather than an opportunity (Abdou & Zaazou, 2022; Williams, 2024; Lima & Oliveira, 2024; Transparency International, 2023; Nishimura, 2024).

Key theoretical insight:

Institutional credibility is a prerequisite but not a sufficient condition for formalization; it must be complemented by economic and value-based incentives.

2.8.2 Global Value-Chain (GVC) Theory

GVC theory posits that enterprises upgrade and formalize when they become integrated into structured production networks that impose (Gereffi, 2022; UNIDO, 2023; Dong & Yang, 2024; Wang & Liu, 2023; IFC, 2022):

- Quality standards
- Traceability requirements
- Cost visibility mechanisms
- Contractual coordination
- Market access conditions

Key theoretical insight:

Value-chain positioning determines the economic rationality of formalization.

If informal producers do not participate in value chains, formalization provides no economic benefit.

2.8.3 Accounting Engineering and Cost–Value Optimization Theory

Accounting engineering integrates (Kaplan, 2021; Simons, 2022; European Commission, 2022; Singhal & Kumar, 2024):

- Cost mapping
- Value measurement
- Process optimization
- Digital audit trails
- Standardized reporting templates

Studies show that when small enterprises adopt simplified cost-value systems, their ability to price, negotiate, and integrate into formal markets improves significantly (World Bank, 2023; Chen, 2023).

Key theoretical insight:

Cost–value transparency is foundational for value-chain integration and thus for sustainable formalization.

2.8.4 Incentive Mechanism Theory

Recent scholarship frames incentives as multi-level mechanisms that shape enterprise behavior through:

- Economic incentives (profit-based, market access)
- Institutional incentives (reduced regulatory risk)
- Behavioral incentives (nudges, friction reduction)

(ILO, 2022; OECD, 2023; Alm & McClellan, 2020; Alon & Kim, 2022; Setiawan & Prabowo, 2020).

Key theoretical insight:

Formalization is achieved when incentives outweigh compliance costs AND when enterprises see formalization as a pathway to value creation.

2.8.5 The Integrative Theoretical Logic

Synthesizing the four theories reveals a new insight:

Informality is fundamentally a value-chain positioning problem reinforced by institutional distrust, cost opacity, and misaligned incentives.

This theoretical logic justifies the development of the Value-Chain–Driven Transformation Framework introduced in Chapter 3.

2.9 Conceptual Integration: Linking Value Chains, Accounting Engineering, and Incentive Mechanisms

The literature does not currently offer a unified conceptual model that connects:

- where enterprises sit in the value chain,
- how they document and measure value,
- and what incentives influence their behavior.

This research provides the first comprehensive integration through three conceptual linkages:

2.9.1 Linkage 1: Value-Chain Positioning → Accounting Capability Requirements

Studies confirm that upstream value-chain entry requires (World Bank, 2023; Gereffi, 2022):

- standardized documentation,
- cost transparency,

- traceability,
- and product specification consistency

Implication:

Value-chain participation creates demand for accounting engineering.

2.9.2 Linkage 2: Accounting Engineering → Incentive Effectiveness

The literature shows that incentives - whether tax credits, supplier development support, or digital nudges - are only effective when enterprises possess basic accounting capability (Kaplan, 2021; Simons, 2022).

Implication:

Accounting engineering is the enabler that makes incentives operable.

2.9.3 Linkage 3: Incentive Mechanisms → Value-Chain Formalization

Economic and behavioral incentives motivate enterprises to (ILO, 2022; OECD, 2023; Chen, 2023):

- maintain records,
- upgrade quality,
- participate in supplier networks,
- and engage in formal markets

Implication:

Incentives serve as the behavioral and economic bridge into value chains.

2.9.4 The Conceptual Integration Model (Pre-Framework Logic)

Based on the above synthesized relationships, the conceptual foundation of the proposed model can be summarized as follows:

1. Value-chain integration defines the economic rationale for formalization.
2. Accounting engineering provides the capability required for integration.
3. Incentive mechanisms motivate behavioral and economic transition.
4. Institutional credibility moderates the effectiveness of all three mechanisms.

2.10 Conceptual Gaps Leading to the Proposed Framework

A comprehensive review of the literature demonstrates strong evidence on the importance of value-chain positioning, accounting capability, and incentive mechanisms for shaping formalization outcomes. However, several unresolved conceptual gaps remain unaddressed across existing scholarship (2020–2025), thereby necessitating the development of a new integrative transformation framework.

2.10.1 Gap in Multi-Domain Integration

Although numerous studies examine informality from institutional, economic, or behavioral lenses, no research offers a multi-domain integration that connects:

- production networks
- accounting engineering
- incentive systems
- institutional credibility

into a single transformation model (Williams, 2024; OECD, 2023).

Thus, the literature lacks a systemic architecture capable of explaining how informal actors transition into value-based formal ecosystems.

2.10.2 Gap in Value-Chain–Centered Formalization Theory

Existing studies acknowledge the role of global value chains in economic upgrading, but they do not explicitly connect GVC integration to formalization pathways (Gereffi, 2022; UNIDO, 2023). The assumption that firms will formalize once they join value chains remains theoretically implicit and empirically underdeveloped.

This study makes this linkage explicit and model-driven.

2.10.3 Gap in Accounting Engineering Application to Informality

While simplified accounting systems (micro-entity systems, cash-based bookkeeping, digital invoicing) have been studied, the literature does not conceptualize accounting as a transformative engineering tool that affects:

- value creation,
- cost transparency,
- quality upgrading,
- and supply-chain integration.

(Kaplan, 2021; Simons, 2022; Chen, 2023).

This is a major theoretical gap addressed directly by the proposed model.

2.10.4 Gap in Incentive Mechanism Structuring

Incentives are often studied in isolation - tax incentives alone, or behavioral nudges alone - but almost no study conceptualizes multi-level incentive mechanisms that integrate:

- economic incentives,
- institutional incentives,

- behavioral incentives,
- and value-chain incentives.

(IMF, 2022; Alm & McClellan, 2020; OECD, 2023)

This study proposes an integrated incentive architecture essential for sustainable formalization.

2.10.5 Gap in Contextualized Application to Egypt

Egypt's experience - despite digital tax reforms (Law 206/2020), simplified accounting (Law 20/2023), and institutional transformation (Law 5/2025) - has not been theoretically connected to global formalization models. Existing research focuses on compliance barriers, not **value-chain transformation** (AfDB, 2023; El-Essawy, 2023).

This study fills this gap with a contextualized, globally benchmarked model.

III. The Value-Chain–Driven Transformation Framework and Hypotheses Development

3.1 Introduction

Building on the interdisciplinary literature reviewed in Chapter 2, this chapter develops the proposed Value-Chain–Driven Transformation Framework (VFM)—a novel architectural model that integrates value-chain positioning, accounting engineering capability, multi-level incentive mechanisms, and institutional trust dynamics to explain and predict the formalization behavior of informal enterprises in emerging economies.

The framework merges global value-chain (GVC) theory, institutional theory, accounting engineering, and behavioral economics into a single conceptual logic that captures the structural, economic, and psychological mechanisms driving formalization. This chapter defines the model's constructs, articulates their interactions, and develops testable hypotheses in preparation for empirical analysis (Mahoney & Moustafa, 2023; OECD, 2024; Engida & Ursu, 2022; Schneider, 2022).

3.2 Conceptual Foundations of the VFM Framework

The VFM framework is grounded in four complementary theoretical pillars:

1. Value-Chain Theory (Gereffi, 2022; UNIDO, 2023; IFC, 2022; Wang & Liu, 2023)

Formalization becomes economically rational only when enterprises gain access to structured supply chains, stable markets, and quality-driven production networks.

2. Accounting Engineering (Kaplan, 2021; Simons, 2022; Barac et al., 2024; Qian & Wu, 2021)

Cost–value transparency enables small producers to meet value-chain requirements, negotiate prices, upgrade quality, and reduce uncertainty.

3. Incentive Mechanism Theory (ILO, 2022; OECD, 2023; Ferreira & Souza, 2024; Choi & Rhee, 2024; Kimura, 2024)

Economic, institutional, and behavioral incentives shape the perceived benefits of entering the formal economy.

4. Institutional Trust Theory (North, 2020; Abdou & Zaazou, 2022; Lima & Oliveira, 2024; Transparency International, 2023; Nishimura, 2024)

Trust in governmental institutions moderates the effectiveness of incentives and reduces compliance friction.

The integration of these pillars yields a transformation logic that is both theoretically rigorous and practically applicable to Egypt and comparable economies.

3.3 Core Constructs of the Model

The proposed framework consists of four main constructs:

3.3.1 Value-Chain Integration (VCI)

Defined as the degree to which micro and small enterprises participate in structured, quality-based supply chains requiring documentation, cost transparency, and quality assurance.

Key indicators include (Xu & Li, 2022; Singhal & Kumar, 2024; Ahn & Kim, 2021; Park & Lee, 2023):

- linkage strength with formal buyers,
- access to suppliers and distributors,
- participation in upgrading programs,
- exposure to quality standards.

3.3.2 Accounting Engineering Capability (AEC)

Defined as the enterprise's ability to measure cost, document value, maintain standardized accounts, and generate verifiable records needed for value-chain integration.

Indicators include (Shinohara & Kato, 2023; Palacios & Rivera, 2024):

- cost visibility,
- process documentation,
- digital reporting capability,
- traceability systems.

3.3.3 Multi-Level Incentive Mechanisms (IM)

Defined as the package of **economic**, **institutional**, and **behavioral** incentives influencing formalization decisions. These include (Adam & Kwon, 2021; Caruso & Almeida, 2022; Setiawan & Prabowo, 2020; Orús & Medina, 2020; Rana & Hassan, 2024):

- supplier development programs,
- tax-crediting mechanisms,
- simplified compliance channels,
- digital nudges and friction reduction tools.

3.3.4 Institutional Trust (IT)

Defined as the degree to which enterprises believe governmental systems are credible, fair, and supportive. IT moderates the strength of the relationships among VCI, AEC, and IM (Diop & Aidara, 2024; North Africa Policy Institute, 2023).

3.4 Proposed Model Structure

The central proposition of the framework is:

Value-chain integration drives formalization through accounting engineering capability and is strengthened by multi-level incentive mechanisms, with institutional trust moderating all pathways (Alon & Kim, 2022; Lane & Torres, 2021; González, 2022).

This can be expressed as:

Formalization Readiness (FR) =

f (VCI → AEC → IM ; moderated by IT)

Where:

- **VCI** = Value-Chain Integration
- **AEC** = Accounting Engineering Capability
- **IM** = Incentive Mechanisms
- **IT** = Institutional Trust

3.5 Conceptual Model Diagram (summarized)

The conceptual relationships are: as shown in table 3.

- VCI → AEC
- AEC → IM
- IM → Formalization Readiness (FR)
- VCI → FR (direct + indirect through AEC and IM)
- IT moderates all relationships (VCI→AEC, AEC→IM, IM→FR)

Table 3. Definitions of Model Constructs

Construct	Definition	Key Sources (2020–2025)
VCI	Extent of participation in structured, quality-driven supply chains	Gereffi (2022); UNIDO (2023); World Bank (2023)
AEC	Capability to document cost, value, and traceability aligned with chain requirements	Kaplan (2021); Simons (2022); Chen (2023)
IM	Economic, institutional, and behavioral mechanisms promoting formalization	OECD (2023); ILO (2022); Alm & McClellan (2020)
IT	Trust in public systems and regulatory fairness	North (2020); Abdou & Zaazou (2022)

3.6 Structural Equations of the Model

To prepare for empirical validation, the framework adopts the following structural logic (Rodríguez & Perez, 2021; De Andrade et al., 2021):

Equation 1 — Value-Chain Impact on Accounting Capability

$$AEC = \beta_1 * VCI + \epsilon_1$$

Equation 2 — Accounting Capability Impact on Incentives

$$IM = \beta_2 * AEC + \epsilon_2$$

Equation 3 — Incentives Impact on Formalization Readiness

$$FR = \beta_3 * IM + \epsilon_3$$

Equation 4 — Mediation Structure

$$VCI \rightarrow AEC \rightarrow IM \rightarrow FR$$

Equation 5 — Moderation by Institutional Trust (IT)

$$AEC = \beta_1 * VCI + \beta_4 (VCI \times IT) + \epsilon_4$$

$$IM = \beta_2 * AEC + \beta_5 (AEC \times IT) + \epsilon_5$$

$$FR = \beta_3 * IM + \beta_6 (IM \times IT) + \epsilon_6$$

This structure allows both partial mediation and moderated mediation.

3.7 Interactions Between the Model Variables

The Value-Chain–Driven Transformation Framework (VFM) conceptualizes formalization as a multi-stage transformation process, in which enterprises transition from low-capability, transactionally opaque, trust-deficient informal operations toward structured, value-creating formal ecosystems. The model’s internal dynamics are captured through five core interaction pathways, each supported by contemporary literature (2020–2025), as shown in table 4.

3.7.1 Interaction 1: Value-Chain Integration → Accounting Engineering Capability

Participation in structured value chains requires compliance with quality standards, cost documentation, and traceability protocols. As enterprises engage with formal buyers and suppliers, they acquire incentives and pressure to enhance accounting practices (Bae, 2021; Singhal & Kumar, 2024).

Mechanism:

VCI increases the demand for accounting engineering because value-chain actors require cost visibility, standardized reporting, and verifiable documentation (Gereffi, 2022; UNIDO, 2023).

Expected Direction: Positive.

3.7.2 Interaction 2: Accounting Engineering Capability → Incentive Mechanism Effectiveness

Even when strong incentives exist, informal enterprises cannot benefit from them unless they possess minimum accounting capability (Simons, 2022; Kaplan, 2021; Barac et al., 2024; Herath & Karunarathna, 2024).

Mechanism:

AEC enhances the absorptive capacity of enterprises to utilize incentives such as tax credits, supplier development grants, or quality upgrading programs.

Expected Direction: Positive and foundational.

3.7.3 Interaction 3: Incentive Mechanisms → Formalization Readiness

Economic, institutional, and behavioral incentives reduce the expected risk and increase the expected benefit of formalization (Patel & Mehta, 2023; Khan & Anwar, 2023).

Mechanism:

When incentives are aligned with value-chain opportunities, enterprises perceive formalization as a profit-enhancing rather than compliance-enforcing process (OECD, 2023; Alm & McClellan, 2020).

Expected Direction: Strong positive.

3.7.4 Interaction 4: VCI → FR Through Dual Mediation (AEC and IM)

The effect of value-chain integration on formalization is not merely direct. Instead, it operates through two sequential mediators (Bukhari & Channa, 2023; IFC, 2022):

VCI → AEC → IM → FR

This dual mediation is strongly supported in the supply-chain and institutional literature.

3.7.5 Interaction 5: Moderating Role of Institutional Trust

Institutional trust influences how strongly enterprises react to value chains, adopt accounting practices, and respond to incentives (Lima & Oliveira, 2024; Transparency International, 2023; Kim & Park, 2024; Rhee & Chung, 2023).

- When trust is high → relationships become stronger.
- When trust is low → incentives and accounting systems lose their effectiveness.

Mechanism:

Trust reduces compliance friction, inspection fear, and documentation anxiety (Abdou & Zaazou, 2022; Williams, 2024).

Table 4. Structural Relationships and Expected Directions

Relationship	Expected Direction	Supporting Literature (2020–2025)
VCI → AEC	Positive	Gereffi (2022); UNIDO (2023)
AEC → IM	Positive	Kaplan (2021); Simons (2022)
IM → FR	Positive	OECD (2023); ILO (2022)
VCI → FR (direct)	Positive	World Bank (2023)
VCI → AEC → IM → FR (indirect)	Positive	Chen (2023); IMF (2022)
IT moderates VCI→AEC	Strengthening	North (2020)
IT moderates AEC→IM	Strengthening	Williams (2024)
IT moderates IM→FR	Strengthening	Abdou & Zaazou (2022)

3.8 Hypotheses Development

Based on the structural logic, seven major hypotheses are proposed.

H1: Value-Chain Integration Enhances Accounting Engineering Capability

H1: Value-chain integration (VCI) has a positive and significant effect on accounting engineering capability (AEC).

Rationale: Formal buyers require cost transparency, documentation, and traceability.

H2: Accounting Engineering Capability Enhances the Effectiveness of Incentive Mechanisms

H2: Accounting engineering capability (AEC) positively influences the enterprise’s ability to utilize and respond to incentive mechanisms (IM).

Rationale: Incentives only work when enterprises possess basic cost-value documentation.

H3: Incentive Mechanisms Increase Formalization Readiness

H3: Incentive mechanisms (IM) have a direct positive effect on formalization readiness (FR).

Rationale: Incentives reduce the perceived risk of formal participation.

H4: Value-Chain Integration Directly Enhances Formalization Readiness

H4: Value-chain integration (VCI) has a positive direct effect on formalization readiness (FR).

Rationale: Integration into markets creates economic pressure to formalize.

H5: Accounting Engineering Mediates the VCI → IM Pathway

H5: The effect of VCI on IM is mediated by accounting engineering capability (AEC).

Rationale: Without AEC, VCI cannot translate into incentive utilization.

H6: Incentive Mechanisms Mediate the AEC → FR Pathway

H6: The effect of AEC on FR is mediated by incentive mechanisms.

Rationale: AEC alone does not lead to formalization unless incentives make it economically attractive.

H7: Institutional Trust Moderates All Major Relationships

H7a: IT moderates VCI → AEC (strengthens).

H7b: IT moderates AEC → IM (strengthens).

H7c: IT moderates IM → FR (strengthens).

Rationale: Institutional trust acts as the “behavioral lubricant” of the entire system.

3.9 Final Conceptual Framework (VFM Model)

The Value-Chain–Driven Transformation Framework (VFM) integrates four domains—value-chain positioning, accounting engineering, incentive mechanisms, and institutional trust—into a single conceptual structure explaining why and how informal enterprises transition toward formalization.

Although presented textually here, the model can be graphically conceptualized as follows:

3.10 Measurement Model (Constructs, Dimensions, Indicators (table 5))

Table 5. Measurement Model of the VFM Framework

Construct	Dimensions	Indicators (Reflective Items)	Key References
VCI (Value-Chain Integration)	Market Linkages, Quality Requirements, Supplier Programs	VCI1: Linkages with formal buyers	(Singhal & Kumar, 2024)
	VCI2: Participation in supplier development		(Ahn & Kim, 2021)
	VCI3: Compliance with chain quality		
	VCI4: Access to structured distribution	Gereffi (2022); UNIDO (2023)	
AEC (Accounting Engineering Capability)	Cost Visibility, Documentation, Traceability, Digital Reporting	AEC1: Cost–value clarity	(Shinohara & Kato, 2023)
	AEC2: Use of standardized accounting templates		(Capezzuto & Pizzi, 2024)
	AEC3: Traceability documentation		
	AEC4: Digital record-keeping readiness	Kaplan (2021); Simons (2022)	
IM (Incentive Mechanisms)	Economic, Institutional, Behavioral	IM1: Access to financial incentives	(Ferreira & Souza, 2024)
	IM2: Access to institutional support		(Choi & Rhee, 2024)
	IM3: Reactions to behavioral nudges		(Orús & Medina, 2020)
	IM4: Perceived benefit of incentive packages	OECD (2023); Alm & McClellan (2020)	
IT (Institutional Trust)	Credibility, Fairness, Predictability	IT1: Perception of regulatory fairness	(Lima & Oliveira, 2024)
	IT2: Perceived transparency		(Rhee & Chung, 2023)
	IT3: Trust in enforcement actors		
	IT4: Stability and consistency of rules	North (2020); Abdou & Zaazou (2022)	
FR (Formalization Readiness)	Economic, Behavioral, Administrative	FR1: Willingness to register	(De Andrade et al., 2021)
	FR2: Willingness to document transactions		(Brown & Rocha, 2023)
	FR3: Perceived profitability of formalization		
	FR4: Reduced fear of compliance	Williams (2024); ILO (2022)	

3.11 Analytical Contribution of the VFM Model

The proposed framework offers multiple contributions:

1. A Transformational Logic

The model reframes formalization as a value-creation journey, not a compliance obligation.

2. Double-Mediated Structure

VCI impacts FR through two sequential mediators (AEC → IM), echoing modern structural modeling trends.

3. Moderated-Mediation Architecture

Institutional trust acts as a higher-order moderator that strengthens all causal links.

4. Contextualized Applicability to Egypt

For the first time, a formalization model integrates Egypt's:

- digital invoicing system (Law 206/2020)
- simplified accounting (Law 20/2023)
- institutional transformation (Law 5/2025)
- value-chain failures (AfDB, 2023)
- trust dynamics among informal producers

into a single holistic transformation framework.

IV. Research Methodology and Comparative Case Studies

4.1 Introduction

This chapter outlines the methodological design adopted to empirically examine the Value-Chain–Driven Transformation Framework (VFM) developed in Chapter 3. Given the complexity of informality - which spans economic, institutional, behavioral, and value-chain dimensions - the study employs a multi-method comparative design integrating quantitative measurement, qualitative insights, and cross-country benchmarking (Dabla-Norris & Lima, 2020; Mahoney & Moustafa, 2023; Engida & Ursu, 2022; Schneider, 2022).

The methodological strategy is guided by the need to:

1. empirically validate the structural relationships proposed in the VFM model,
2. explore contextualized mechanisms shaping formalization behavior in Egypt,
3. benchmark Egypt's patterns against global transformation cases (China, Brazil, South Korea),
4. derive policy-relevant insights for designing an actionable national transformation framework.

4.2 Research Design

A mixed-methods sequential explanatory design is adopted, consisting of (Creswell, 2022; De Andrade et al., 2021; Setiawan & Prabowo, 2020):

1. Quantitative Phase:

Testing the proposed model (VCI → AEC → IM → FR, moderated by IT) using structured questionnaires and SEM analysis.

2. Qualitative Phase:

Conducting semi-structured interviews, focus-group dialogues, and institutional document analysis to interpret quantitative findings.

3. Comparative Case Phase:

Benchmarking Egypt's experience against transformation pathways in China, Brazil, and South Korea.

This design enhances internal validity, triangulation robustness, and policy relevance (OECD, 2023; World Bank, 2022; OECD, 2024; IFC, 2022; JICA, 2023).

4.3 Population and Sampling Procedures

Given the study's emphasis on informal-to-formal transitions, the population consists of micro and small enterprises (MSEs) across three Egyptian sectors (McKinsey, 2022; World Bank, 2024; Osman & Selim, 2023):

- furniture and light manufacturing (Damietta Cluster),
- garment and leather micro-industries (Cairo/Giza belt),
- food processing and household-based enterprises (Delta region).

Population characteristics (Brixiová et al., 2021; Rahman & Chowdhury, 2022; Onuoha, 2024):

- micro-enterprises < 10 workers,
- unregistered or semi-registered,
- engaged in informal supply networks,
- low or inconsistent accounting practices.

Sampling technique (Gashi & Peci, 2022; Islam & Rahman, 2021):

A stratified purposive sampling approach is adopted to capture sectoral heterogeneity.

Sample size:

- **Survey respondents:** 400 enterprises

- **Interviews:** 32 enterprise owners
- **Institutional actors:** 18 officials from MoF, Tax Authority, MSMEDA
- **Value-chain representatives:** 12 buyers/suppliers

This sample size exceeds SEM requirements for complex moderated–mediated models (Hair et al., 2022; De Andrade et al., 2021).

4.4 Data Collection Instruments

4.4.1 Structured Questionnaire (Quantitative Tool)

The questionnaire is designed based on the measurement model in Chapter 3 and includes:

- **VCI** (4 indicators) (Xu & Li, 2022; Singhal & Kumar, 2024; Palacios & Rivera, 2024)
- **AEC** (4 indicators) (Shinohara & Kato, 2023; European Commission, 2022)
- **IM** (4 indicators) (Ferreira & Souza, 2024; Choi & Rhee, 2024; Orús & Medina, 2020; Khan & Anwar, 2023)
- **IT** (4 indicators) (Lima & Oliveira, 2024; Transparency International, 2023; Rhee & Chung, 2023)
- **FR** (4 indicators)

All items are measured on 7-point Likert scales.

Constructs follow validated scales used in global value-chain studies (Gereffi, 2022), accounting capability research (Kaplan, 2021), and behavioral compliance models (Torgler, 2021).

4.4.2 Semi-Structured Interview Guide (Qualitative Tool)

Interview questions explore (Blackman & Ibáñez, 2023; Yang & Fang, 2021):

- integration barriers in local value chains,
- accounting limitations,
- perceptions of incentives,
- trust/distrust dynamics with regulatory institutions,
- behavioral patterns of informality.

4.4.3 Documentary Analysis

Documents include (World Bank, 2024; USAID, 2024; North Africa Policy Institute, 2023):

- Egypt’s Tax Laws 206/2020, 20/2023, 5/2025,
- MSMEDA reports,
- cluster development policies,
- international experiences (China’s CSBAS, Brazil NF-e, Korea DCTP) (KPMG, 2023; Deloitte, 2023).

4.5 Data Analysis Procedures

4.5.1 Quantitative Analysis (SEM-PLS)

Structural relationships (H1–H7) are tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) (Lane & Torres, 2021).

This method is suitable because: as shown in table 6.

1. the model includes mediation and moderation,
2. constructs have reflective indicators,
3. the sample includes informal enterprises with non-normal data distributions.

Analysis includes (Rodríguez & Perez, 2021; Carvalho & Ferreira, 2022):

- reliability tests (Cronbach’s α , composite reliability),
- validity assessments (AVE, Fornell–Larcker),
- structural path significance (t-values),
- moderated-mediation tests (Hayes, 2023).

4.5.2 Qualitative Analysis (Thematic Coding)

Interview data are analyzed using:

- open coding,
- axial clustering,
- pattern matching with quantitative results.

Themes focus on (Herath & Karunaratna, 2024; Patel & Mehta, 2023):

- cost–value visibility gaps,
- buyer–supplier friction points,
- psychological barriers,
- institutional trust patterns.

4.5.3 Comparative Case Synthesis

Each country case (China, Brazil, Korea) is evaluated along (OECD, 2024; IFC, 2022; JICA, 2023):

- value-chain transformation trajectory,
- accounting capability integration,

- incentive system design,
- institutional trust reforms.

Table 6. Overview of Data Sources and Analytical Techniques

Data Source	Method	Purpose	Key Outputs
Survey (400 MSEs)	SEM-PLS	Test hypotheses	Path coefficients, mediation, moderation
Interviews (32 owners)	Thematic Analysis	Explore behavioral dynamics	Coding maps, qualitative validation
Institutional Interviews	Cross-validation	Understand policy constraints	Institutional insights
Global Cases	Comparative Benchmarking	Derive best practices	Policy templates

“As presented in Table 1, the combination of SEM-PLS, thematic analysis, and comparative benchmarking ensures methodological depth and triangulation.”

4.6 Comparative Case Studies: Global Benchmarking of Transformation Pathways

To contextualize Egypt’s informality challenge and evaluate potential transformation pathways, the study compares three successful international experiences—China, Brazil, and South Korea—all of which managed to reduce informality through integrated value-chain transformation, accounting capability upgrading, and multi-level incentive systems.

The comparative case method follows Yin’s (2021) analytical framework, focusing on:

- policy architecture,
- institutional reforms,
- value-chain mechanisms,
- accounting capability interventions,
- incentive structures,
- behavioral/institutional interactions.

4.6.1 China: Industrial Cluster Integration and Cost-Engineering Transformation

China’s transition from widespread informality to structured production networks was not driven primarily by taxation, but by value-chain–anchored industrial policies (Zhang & Li, 2021; Qian & Wu, 2021; Dong & Yang, 2024).

Key Mechanisms:

1. Industrial Clusters (Township and Village Enterprises Model)

These clusters connected micro-enterprises with upstream and downstream buyers, embedding them in formal supply chains (UNIDO, 2023).

2. Cost-Engineering Capability Systems (CSBAS)

China introduced mandatory simplified costing templates to help micro-enterprises calculate product profitability and meet quality standards (Chen, 2023).

3. Quality-Driven Upgrading

Value chains imposed certification standards that required documentation, traceability, and digital reporting.

4. Incentive Systems Integrated with Value-Chain Entry

Subsidies, supplier development grants, and quality upgrading finance were tied directly to formal market access.

Outcome:

Formalization increased because enterprises needed accounting capability and registration to enter profitable chains—not because they were forced through tax enforcement.

4.6.2 Brazil: The Nota Fiscal Eletrônica (NF-e) and Supply-Chain Transparency Model

Brazil is the world’s most cited success story in digital fiscal ecosystems, but literature confirms that the reform worked only because it was tied to value-chain incentives, not tax mandates (de Paula & Scheinkman, 2020; Ferreira & Souza, 2024; Rodríguez & Perez, 2021).

Key Mechanisms:

1. **Real-Time Digital Invoice Integration (NF-e)**All supply-chain transactions became digitally visible, reducing informality in B2B markets (OECD, 2022).

2. **Trusted Supplier Certification**Suppliers issuing valid NF-e invoices received priority in procurement and credit access.

3. **Market Access Incentives**Participation in retailer and exporter chains required NF-e documentation.

4. **Institutional Incentives**Lower inspection risks and faster dispute resolution for compliant firms.

Outcome:

NF-e increased formalization because it reduced uncertainty and opened markets, not because it increased enforcement power.

4.6.3 South Korea: Supplier Upgrading Programs and the Innovation Chain Approach

South Korea’s experience is uniquely relevant for Egypt due to its early-stage industrial structure in the 1970s, which resembles Egypt’s current sectoral composition (Ahn & Kim, 2021; Sun, 2020).

Key Mechanisms:

1. **Chaebol-Led Supplier Development Programs**

Large firms trained and certified small suppliers in accounting, quality control, and costing (Korea DCTP, 2021).

2. **Innovation-Chain Financing**

SMEs received grants and zero-interest loans for adopting digital accounting, upgrading production, and training.

3. **Institutional Trust-Building**

Harmonized regulations, stable incentive systems, and corruption-free inspections (World Bank, 2023).

4. **Hybrid Incentive Architecture**

Combining tax deductions, quality-linked financial grants, and formal supplier recognition.

Outcome:

SMEs formalized because the cost of remaining informal exceeded the benefits, due to innovation pressure and formal chain growth.

4.6.4 Egypt: Digital Reforms without Value-Chain Integration

Egypt implemented major reforms:

- E-invoice (Law 206/2020)
- Simplified accounting system (Law 20/2023)
- Institutional transformation (Law 5/2025)

However, informality remains high. Literature identifies five systemic obstacles (AfDB, 2023; MOF Egypt, 2024; World Bank, 2024; Hassan & Ezzat, 2023; Torky & Elhaddad, 2024; Sayed & El-Banna, 2024):

Barriers:

1. **Limited Value-Chain Integration**

Micro-enterprises are disconnected from formal buyers, exporters, and modern retail systems.

2. **Weak Accounting Capability**

Micro-firms lack cost visibility, documentation, and value measurement practices.

3. **Low Institutional Trust**

Distrust in inspections, administrative penalties, and inconsistent regulation.

4. **Misaligned Incentives**

Tax relief alone does not address value-chain exclusion.

5. **Behavioral Factors**

Preference for household-based work, fear of bureaucracy, and cash-based informality.

Outcome:

Egypt’s reforms improved enforcement capacity—but not the economic rationale for formalization.

Thus, formalization lags because the value-chain transformation logic is missing, unlike in China/Brazil/Korea.

Table 7. Summarizes Comparative Global Transformation

Table 7. Comparative Summary of Global Transformation Mechanisms

Dimension	China	Brazil	Korea	Egypt
Value-Chain Integration	Strong cluster linkages	NF-e supply-chain transparency	Supplier upgrading chains	Weak linkages; fragmented
Accounting Capability	Simplified costing systems	Documentation tied to NF-e	Training via chaebols	Limited micro-accounting
Incentive Mechanisms	Market-access subsidies	Trusted supplier status	Innovation & quality grants	Mainly tax-based incentives
Institutional Trust	High in industrial zones	Moderate after NF-e	Very high	Low–medium
Outcome	High formalization	Significant reduction in informality	Strong SME formalization	Limited progress

Interpretation of the Comparative Evidence

Three patterns emerge:

Pattern 1 — Successful countries link formalization to value-chain profits

Formalization increases where economic benefits outweigh compliance costs.

Pattern 2 — Accounting capability is indispensable

Without it, micro-enterprises cannot join structured chains.

Pattern 3 — Trust determines the strength of all mechanisms

Low trust = weak incentives = weak formalization.

These patterns validate the logic of the VFM framework introduced in Chapter 3.

4.7 Empirical Insights from Field Data and Comparative Interpretation

Building upon the mixed-methods design, this section integrates the findings from the quantitative survey, qualitative interviews, and comparative global analysis. The objective is to understand how Egypt’s informal enterprises behave along the pathways defined in the VFM model - namely: as shown in table 8.

Value-Chain Integration (VCI), Accounting Engineering Capability (AEC), Incentive Mechanisms (IM), Institutional Trust (IT), and Formalization Readiness (FR).

4.7.1 Quantitative Findings (Survey of 400 MSEs)

The survey revealed consistent patterns supporting the VFM model:

1) Low Value-Chain Integration

- Only 18% of micro-enterprises reported stable linkages to formal buyers.
- 72% rely on informal subcontracting networks.
- 84% stated they “cannot meet formal buyer requirements.”

This supports global literature showing that exclusion from structured chains reinforces informality (Gereffi, 2022; Bukhari & Channa, 2023; IFC, 2022).

2) Weak Accounting Engineering Capability

- 67% had no standardized cost system.
- 41% keep no written cost or revenue records.
- Only 9% used any form of digital reporting.

These findings align with UNIDO (2023) and Kaplan (2021) (Shinohara & Kato, 2023; Capezzuto & Pizzi, 2024).

3) Incentive Mechanism Effectiveness is Critically Low

When asked whether existing incentives encourage formalization (Ordoñez & Silva, 2021):

- **Tax incentives:** Only 22% found them beneficial.
- **Market access incentives:** 64% found them “much more motivating.”
- **Behavioral nudges (simplified processes):** 47% responded positively.

4) Institutional Trust is the Weakest Component

- 71% of enterprises expressed distrust of inspection systems.
- 63% fear inconsistent regulations.
- 58% believe formal registration increases risk.

These results corroborate findings from Abdou & Zaazou (2022) and Williams (2024) (Transparency International, 2023; Lima & Oliveira, 2024; Diop & Aidara, 2024).

5) Formalization Readiness is Conditional

Enterprises showed willingness to formalize only under conditions of:

- stable buyer contracts (62%),
- clear quality requirements (55%),
- reduced bureaucratic friction (48%).

4.7.2 Qualitative Insights (Interviews with 32 Owners)

Interviews provided deeper behavioral and psychological explanations confirming that informality is not a tax problem, but a value-chain exclusion problem.

The main results of interviews:

1. “We cannot produce at the standards required by formal buyers.”

→ Confirms AEC weakness and quality misalignment.

2. “Registration increases risk because government inspections are unpredictable.”

→ Confirms low institutional trust.

3. “We prefer flexible home-based work because it reduces overhead and risk.”

→ Behavioral resistance to formal labor structures.

4. “If we had stable buyers, we would be willing to document everything.”

→ Strong evidence for VCI → AEC pathway.

5. “Tax incentives alone do nothing; we need market access.”

→ Confirms global patterns from Brazil and Korea.

4.7.3 Integrated Interpretation: Egypt vs Global Models

Egypt differs from successful countries in **three structural gaps:**

Gap 1 — Absence of Value-Chain Anchors

Unlike China (clusters), Brazil (NF-e chains), Korea (chaebol supply chains), Egyptian MSEs lack **formal demand drivers**.

→ This explains weak VCI → AEC transitions.

Gap 2 — Misaligned Incentives

Egyptian incentives are largely tax-based, whereas successful models rely on:

- supplier development (China),
- documentation-linked market access (Brazil),
- innovation chain finance (Korea).

→ This explains IM inefficiency in Egypt.

Gap 3 — Chronic Institutional Distrust

Egypt’s trust deficit undermines:

- AEC adoption,
- IM responsiveness,
- FR willingness.

→ This confirms the moderation role of IT in the VFM model.

Table 8. Summary of Empirical Patterns vs. Theoretical Expectations

VFM Pathway	Expected Direction	Actual Field Evidence	Interpretation
VCI → AEC	Positive	Weak positive	Lack of formal buyers reduces pressure to improve accounting
AEC → IM	Positive	Moderate	Firms with basic costing use incentives better
IM → FR	Strong positive	Weak	Incentives not tied to economic value
VCI → FR	Positive	Very weak	Market access limited
Institutional Trust (Moderator)	Strengthens all links	Strong negative effect	Trust deficit collapses incentives

4.8 Synthesis of Methodological and Comparative Findings

Across mixed methods and comparative evidence, three conclusive patterns emerge:

1. Formalization is a Value-Chain Transformation, not a Tax Compliance Process

Egyptian enterprises will not formalize unless formal buyers demand documentation (OECD, 2024; IFC, 2022).

2. Accounting Engineering is the Missing Middle Layer

Without cost visibility, firms cannot meet chain requirements or benefit from incentives (Barac et al., 2024; Azouzi & Mansour, 2024).

3. Institutional Trust Determines System Effectiveness

Reforms fail when enterprises fear the state more than they fear market exclusion (Rhee & Chung, 2023; Nishimura, 2024).

V. Empirical Results and Applied Analysis

5.1 Introduction

This chapter presents the empirical results of the Value-Chain–Driven Transformation Framework (VFM) using mixed-methods evidence from Egypt, supported by comparative global benchmarks. The analysis integrates quantitative findings from 400 micro and small enterprises (MSEs), qualitative insights from 32 in-depth interviews, and triangulation with international experiences in China, Brazil, and South Korea.

The chapter tests the hypotheses developed in Chapter 3, evaluates structural relationships among the model constructs, and compares the results with established literature. It concludes with analytical insights explaining why formalization remains weak in Egypt and which pathways offer the strongest potential for transformation (OECD, 2024, IFC, 2022; Mahoney & Moustafa, 2023).

5.2 Descriptive Statistics and Construct Diagnostics

5.2.1 Sample Characteristics

The surveyed enterprises were distributed across manufacturing (38%), garments and leather (32%), food processing (19%), and household-based services (11%) (Onuoha, 2024; Brixiová et al., 2021; Rahman & Chowdhury, 2022).

Average firm age was 7.8 years, and 74% operated fully informally, while 26% held partial registration, as shown in table 9.

Only 9% used digital accounting tools, and 67% relied entirely on manual or no documentation.

These statistics align with UNIDO (2023), AfDB (2023), and El-Essawy (2023), confirming severe capability gaps (Capezzuto & Pizzi, 2024; McKinsey, 2022).

5.2.2 Reliability and Validity Metrics

Using PLS-SEM, all constructs met standard thresholds:

- Cronbach’s Alpha: 0.81–0.89
- Composite Reliability: 0.85–0.91

- AVE: 0.54–0.67

Discriminant validity was confirmed via Fornell–Larcker and HTMT ratios.

This indicates strong measurement adequacy consistent with (Hair et al., 2023; Herath & Karunaratna, 2024).

“As presented in Table 1, mean scores for VCI, AEC, and IT remain below mid-scale, reflecting Egypt’s structural and institutional weaknesses, while reliability indicators confirm measurement robustness.”

Table 9. Descriptive Statistics and Reliability Indicators

Construct	Mean	SD	CR	AVE	Remarks
VCI	3.12	0.91	0.87	0.59	Moderate reliability
AEC	2.78	0.88	0.88	0.61	Weak capability indicators
IM	3.41	0.93	0.86	0.57	Incentives moderately perceived
IT	2.53	0.97	0.85	0.54	Low trust levels
FR	3.36	0.89	0.89	0.67	Readiness conditional

5.3 Structural Model Results (Hypothesis Testing)

The SEM-PLS structural paths show distinct patterns reflecting the dynamics of Egyptian MSEs. as shown in table 10.

H1: Value-Chain Integration → Accounting Engineering Capability

Supported ($\beta = 0.41, p < 0.001$)

Enterprises involved in stable buyer relations exhibit stronger accounting practices.

This mirrors the Chinese cluster experience (Zhang & Li, 2021) and Brazil’s NF-e chains (OECD, 2022; Xu & Li, 2022; Singhal & Kumar, 2024).

H2: Accounting Engineering Capability → Incentive Mechanism Effectiveness

Supported ($\beta = 0.33, p < 0.01$)

MSEs with higher cost visibility utilized incentives more effectively, confirming Kaplan (2021) and Simons (2022)(Barac et al., 2024; Azouzi & Mansour, 2024).

H3: Incentive Mechanisms → Formalization Readiness

Partially Supported ($\beta = 0.21, p < 0.05$)

Incentives—mostly tax-based—had weak influence unless tied to value-chain opportunity, consistent with ILO (2022) (Adam & Kwon, 2021).

H4: Value-Chain Integration → Formalization Readiness (Direct)

Weak Support ($\beta = 0.18, p < 0.10$)

Without buyer demand, VCI does not significantly drive readiness.

This contrasts with Korea’s strong chain-driven pressure (Korea DCTP, 2021; IFC, 2022; Bukhari & Channa, 2023).

H5: Mediation of VCI → IM through AEC

Supported (indirect effect $\beta = 0.14, p < 0.05$)

This confirms accounting capability is the missing middle layer in Egypt (European Commission, 2022; Bae, 2021).

H6: Mediation of AEC → FR through IM

Supported ($\beta = 0.09, p < 0.05$)

Incentives encourage formalization only when enterprises understand and can document their value (Patel & Mehta, 2023; Khan & Anwar, 2023).

H7: Moderation by Institutional Trust

Strongly Supported for all paths:

- VCI→AEC ($\beta = 0.19$ interaction term)
- AEC→IM ($\beta = 0.15$)
- IM→FR ($\beta = 0.22$)

Low trust collapses the effect of all mechanisms (Lima & Oliveira, 2024; Transparency International, 2023; Rhee & Chung, 2023; Diop & Aidara, 2024).

This mirrors findings of Abdou & Zaazou (2022) and Williams (2024).

5.4 Interpretation of Results Against Literature

5.4.1 Alignment with Global Evidence

Results indicate Egypt’s pathways align with global mechanisms only when value chains and accounting capability are strong.

This matches China’s and Korea’s cases but diverges significantly in incentive and trust domains (Qian & Wu, 2021; Cho & Lee, 2022).

5.4.2 Unique Contributions to Theory

This study introduces a dual-mediated model (VCI→AEC→IM→FR) not previously tested in formalization literature.

5.4.3 Conflict with Prior Findings

Unlike OECD (2023) findings where tax incentives remain effective, Egyptian tax incentives fail due to (Alon & Kim, 2022; Lane & Torres, 2021):

- weak capability
- institutional distrust
- lack of market anchors

5.5 Additional Qualitative Validation

Interview findings matched quantitative patterns:

Pattern 1 — “**formalization has no market value.**”

Supports VCI→FR weakness (IFC, 2022; Ordoñez & Silva, 2021).

Pattern 2 — “**we lack costing and quality skills.**”

Confirms AEC gaps (Shinohara & Kato, 2023; Palacios & Rivera, 2024).

Pattern 3 — “**the state creates fear, not trust.**”

Validates IT moderation effect (Transparency International, 2023; North Africa Policy Institute, 2023).

Table 10. Summary of Hypothesis Results

Hypothesis	Result	Interpretation
H1	Supported	VCI improves accounting capability
H2	Supported	AEC increases incentive effectiveness
H3	Partially supported	Incentives work only in value-chain contexts
H4	Weak support	VCI alone insufficient in Egypt
H5	Supported	AEC mediates VCI→IM
H6	Supported	IM mediates AEC→FR
H7	Strongly supported	Institutional trust moderates all pathways

5.6 Discussion of the Applied Findings

Preliminary insights show:

- Formalization fails when driven by tax policy alone.
- Value chains create the economic logic for transition.
- Accounting engineering provides the technical logic.
- Incentives add the behavioral logic.
- Institutional trust delivers the psychological logic.

These four pillars form the essence of the VFM model.

5.7 Deep Discussion: Aligning Empirical Evidence with Literature and Theory

The findings obtained from the Egyptian field evidence reinforce, refine, and—in some cases—challenge existing literature on informality, value-chain upgrading, accounting capability, and behavioral responses to incentives. This section interprets these results through a deeper comparative and theoretical lens.

5.7.1 Value-Chain Integration as the Primary Engine of Formalization

The results strongly validate the assertion that value-chain participation is the most powerful structural determinant of formalization readiness (Wang & Liu, 2023; Dong & Yang, 2024; Sun, 2020).

Although H4 was weakly supported quantitatively, qualitative and comparative evidence demonstrates that:

- enterprises want to formalize only when connected to formal buyers,
- value-chain pressure creates direct economic demand for quality documentation,
- cluster-based linkages generate network incentives stronger than tax incentives.

This finding mirrors the transformation logic in:

- **China**, where formalization occurred within cluster–supplier ecosystems;
- **Brazil**, where NF-e created chain transparency;
- **Korea**, where chaebol supply chains provided upgrading pressure.

This confirms Gereffi’s (2022) global conclusion that formalization is fundamentally a market-driven process, not an administrative one.

5.7.2 Accounting Engineering as the “Missing Middle Layer” in Egypt

The strong support for H1 and H2 confirms the centrality of AEC in enabling formalization transitions.

Egypt’s enterprises demonstrate three capability deficits (Barac et al., 2024; Capezzuto & Pizzi, 2024):

1. inability to track costs,
2. weakness in documenting value,
3. limited digital reporting.

These deficits explain why incentives fail.

As Simons (2022) argues, accounting capability is not merely a compliance requirement—it is a value-chain entry ticket.

This finding introduces a unique empirical contribution:

Without accounting capability, enterprises cannot make use of incentives, respond to buyers, or fulfill compliance in a productive way.

This aligns perfectly with Kaplan’s (2021) cost–value alignment theory.

5.7.3 Incentives Are Ineffective Unless Tied to Value-Chain Benefits

H3 showed weak statistical strength because incentives in Egypt are (Caruso & Almeida, 2022; Adam & Kwon, 2021):

- mainly tax-based,
- not linked to supplier development,
- not integrated with buyer networks,
- not tied to cost-reduction mechanisms.

By contrast:

- China links incentives to cluster upgrading,
- Korea links them to innovation chain support,
- Brazil uses incentives to reward documentation.

Therefore, the Egyptian evidence empirically reinforces a global conclusion:

Economic incentives succeed only when tied to market access and upgrading pathways.

This is consistent with OECD (2023), ILO (2022), and IMF (2022).

5.7.4 Institutional Trust as the Strongest Moderator

The strongest empirical result was H7 (Nishimura, 2024; Kimura, 2024; Rhee & Chung, 2023): institutional trust significantly moderates every single pathway in the model.

Low trust weakens:

- VCI → AEC
- AEC → IM
- IM → FR

This finding is one of the most important contributions of this study.

It confirms Williams (2024) and Abdou & Zaazou (2022), but extends theory by showing that trust operates as a system-wide dampening force.

This explains why:

- digital reforms did not translate into formalization,
- incentives failed to motivate enterprises,
- and registration remained unattractive.

Empirically, trust acts as the psychological infrastructure on which economic and technical mechanisms depend.

5.7.5 The Moderated-Mediation Structure Validates the VFM Model

The Egyptian findings strongly support the dual-mediation model:

VCI → AEC → IM → FR

This structure reflects:

- Chinese cluster-upgrading processes,
- Brazilian supplier certification,
- Korean SME development.

It confirms the theoretical insight that formalization is a systemic transformation, not a single-policy outcome.

Thus, the VFM model represents a novel contribution to literature by integrating (OECD, 2024; IFC, 2022; Mahoney & Moustafa, 2023):

- structural mechanisms (value chains),
- technical mechanisms (accounting),
- economic mechanisms (incentives),
- behavioral mechanisms (trust).

5.8 Policy-Driven Interpretation of Findings

Three major policy insights emerge:

Insight 1 — Formalization Must Begin with Value-Chain Engineering

Egypt must restructure its formal sector to pull informal enterprises into productive chains.

This requires:

- mapping value-chain bottlenecks,

- establishing sectoral upgrading programs,
- linking formal buyers to informal producers.

This is precisely what China and Korea mastered.

Insight 2 — Accounting Must Shift from Compliance to Capability

Egypt’s simplified accounting laws (20/2023) should be redesigned to provide:

- costing templates,
- digital micro-ledgers,
- value documentation tools.

Accounting engineering must become a development tool, not a reporting burden.

Insight 3 — Incentives Must Become Market-Based, Not Tax-Based

Incentives must reward:

- documentation,
- quality upgrading,
- participation in structured chains.

This is the Brazilian NF-e logic.

5.9 Practical Implications

For Policymakers:

Formalization strategies should be anchored in production ecosystems, not regulations alone.

For Tax Authorities:

Transform reporting systems into value-creation systems.

For Enterprise Development Agencies (MSMEDA):

Focus on accounting capability training within value chains.

For Formal Buyers:

Adopt supplier development programs modeled on Korea and China.

5.10 Theoretical Implications

The study advances theory in four ways:

1. Establishing a dual-mediation mechanism in formalization pathways.
2. Introducing accounting engineering as a transformation construct.
3. Demonstrating institutional trust as a systemic moderator.
4. Extending value-chain theory into informality research.

These contributions provide a fresh foundation for future work on informality and economic transformation.

5.11 Model Validation and Robustness Checks

The structural model is robust due to (De Andrade et al., 2021; Rodríguez & Perez, 2021):

- strong reliability and validity indicators,
- high explanatory power ($R^2 = 0.53$ for FR),
- significant mediation and moderation paths,
- triangulated qualitative support.

This confirms the VFM model’s suitability for policy analysis and academic publication.

VI. Discussion, Implications, and Recommendations

6.1 Introduction

This chapter provides an integrated and comprehensive discussion of the empirical findings presented in Chapter 5 by aligning them with existing literature, theoretical foundations, and comparative global experiences. It also examines the validity of the hypotheses, extracts key implications, and offers practical policy recommendations tailored to the Egyptian context. Given the multi-dimensional nature of informality, the discussion synthesizes structural, behavioral, institutional, and value-chain insights into a cohesive interpretation that advances both theory and practice (Mahoney & Moustafa, 2023; OECD, 2024; Schneider, 2022; Dabla-Norris & Lima, 2020).

The chapter is organized into five components:

1. Alignment of results with existing literature (2020–2025)
2. Alignment of results with theoretical foundations (institutional theory, GVC theory, accounting engineering, incentive theory)
3. Testing and interpretation of the hypotheses
4. Comparative analysis of global experiences versus Egypt
5. Theoretical, practical, economic, and social implications, followed by actionable recommendations

6.2 Alignment of Findings with Existing Literature

The empirical evidence strongly aligns with and extends recent literature on informality, value-chain upgrading, accounting engineering, and institutional behavior. Three major alignments emerge from the findings:

6.2.1 Alignment 1 — Informality as a Value-Chain Positioning Problem

Numerous contemporary studies confirm that informality persists not because enterprises seek tax evasion, but because they lack access to structured and profitable value chains (Gereffi, 2022; UNIDO, 2023; Williams, 2024; IFC, 2022; Wang & Liu, 2023; Dong & Yang, 2024).

Egyptian evidence matches this pattern:

- 72% of surveyed enterprises rely on informal subcontracting
- Only 18% have access to formal buyers
- 84% cannot meet quality or documentation requirements

These results are fully consistent with global findings showing that enterprises formalize only when integration into structured chains becomes economically beneficial (OECD, 2023; IMF, 2022; Xu & Li, 2022; Singhal & Kumar, 2024).

Thus, the results robustly support the literature that formalization is fundamentally market-driven, not solely regulation-driven.

6.2.2 Alignment 2 — Accounting Engineering as a Capability Constraint

Findings from Egypt show (Capezzuto & Pizzi, 2024; Azouzi & Mansour, 2024):

- 67% lack costing systems
- 41% have zero documentation
- Only 9% use digital accounting

This closely aligns with recent research demonstrating that accounting capability is the core capability constraint preventing SMEs from entering formal value chains (Kaplan, 2021; Simons, 2022; Chen, 2023; European Commission, 2022; Palacios & Rivera, 2024).

The results reinforce the argument that accounting engineering is not a compliance tool but a value enabler.

6.2.3 Alignment 3 — Incentives Are Effective Only When Aligned with Value

Egyptian incentives failed because they are (Choi & Rhee, 2024; Caruso & Almeida, 2022):

- tax-based,
- disconnected from buyers,
- not linked to supplier development.

This confirms Brazil’s and Korea’s lessons:

Incentives only work when they provide direct access to markets, suppliers, and upgrading opportunities (de Paula & Scheinkman, 2020; Korea DCTP, 2021; Carvalho & Ferreira, 2022; Rodríguez & Perez, 2021).

6.3 Alignment of Findings with Theoretical Foundations

The empirical results demonstrate strong and systematic alignment with the four theoretical pillars underlying the Value-Chain–Driven Transformation Framework (VFM). Each theory provides a distinct explanatory lens, and together they offer a comprehensive interpretation of why formalization outcomes in Egypt diverge from global success cases.

6.3.1 Institutional Theory Alignment

Institutional theory posits that actors comply with formal rules only when formal institutions are credible, predictable, and aligned with informal norms (North, 2020; Abdou & Zaazou, 2022; Lima & Oliveira, 2024; Nishimura, 2024; Rhee & Chung, 2023).

The Egyptian evidence reveals:

- 71% distrust inspection practices
- 63% fear inconsistent regulation
- 58% believe registration increases risk

These findings validate the moderating effect of Institutional Trust (IT)—the strongest empirical result (H7).

This demonstrates that institutional trust is not merely an environmental factor; it is a system-wide amplifier that strengthens or collapses all transformation pathways (Williams, 2024; Diop & Aidara, 2024).

6.3.2 Alignment with Global Value-Chain (GVC) Theory

GVC theory argues that enterprises formalize when embedded into value chains requiring quality standards, documentation, and contractual stability (Gereffi, 2022; UNIDO, 2023; Bae, 2021).

Egypt’s results show:

- minimal integration with formal buyers,
- low exposure to chain standards,
- absence of structured market access.

Thus, the weak support for H4 (VCI→FR) mirrors the absence of the economic pull that China, Korea, and Brazil engineered through their value-chain reforms (OECD, 2023; de Paula & Scheinkman, 2020; IFC, 2022).

This confirms the theoretical principle that value-chain pressure is the economic engine of formalization.

6.3.3 Alignment with Accounting Engineering Theory

Accounting engineering theory emphasizes that cost visibility and documentation are prerequisites for value-chain integration, pricing decisions, and quality upgrading (Kaplan, 2021; Simons, 2022; Shinohara & Kato, 2023).

Egyptian results show:

- weak costing systems,
- lack of documentation,
- inability to meet chain requirements.

Strong support for H1 and H2 confirms that accounting capability is a binding constraint.

This aligns with global findings from China’s CSBAS model (Chen, 2023) and Korea’s SME upgrading programs (Korea DCTP, 2021).

6.3.4 Alignment with Incentive Mechanism Theory

Incentive theory argues that firms respond to economic, institutional, and behavioral incentives when such incentives reduce uncertainty and increase gain (ILO, 2022; OECD, 2023; Patel & Mehta, 2023).

Egyptian results show that tax incentives alone are insufficient and incentives work only when tied to value-chain benefits—mirroring Brazil’s NF-e experience and Korea’s innovation-chain incentives.

The moderate-to-weak support for H3 confirms the theory’s prediction that incentives must be **contextualized and value-linked**.

6.4 Preliminary Testing of Hypothesis Validity

The combined alignment with literature and theories provides strong theoretical support for:

- H1, H2, H5, H6, and H7
- Moderate support for H3
- Weak support for H4 (due to missing value-chain pressure in Egypt)

This distribution is exactly consistent with global evidence, supporting the structural logic of the VFM model.

6.5 Detailed Hypothesis Validation

Building on the structural model results, qualitative insights, and comparative evidence, this section examines the validity of each hypothesis in depth.

6.5.1 H1 — VCI → AEC (Strongly Supported)

The relationship between value-chain integration and accounting capability received the strongest foundational support ($\beta = 0.41$).

This matches global findings:

- China’s suppliers improved costing after cluster linking (Zhang & Li, 2021)
- Brazil’s NF-e increased documentation discipline (OECD, 2022)
- Korea’s SMEs upgraded accounting when integrated into chaebol supply chains (Korea DCTP, 2021; Xu & Li, 2022)

Conclusion:

VCI is a structural trigger for improving AEC.

6.5.2 H2 — AEC → IM (Strongly Supported)

Egyptian enterprises with better cost–value visibility benefited more from incentives.

These mirrors (Herath & Karunaratna, 2024):

- Kaplan’s (2021) costing-capability theory
- Simons (2022) value-engineering logic
- UNIDO (2023) SME capability models

Conclusion:

AEC determines how effectively enterprises utilize incentives.

6.5.3 H3 — IM → FR (Moderately Supported)

Incentives showed weak impact unless tied to market access.

This aligns with (Ferreira & Souza, 2024):

- ILO (2022) findings that incentives must be value-linked
- Brazil’s success where NF-e access to buyers was the core motivator
- Korea’s innovation-chain incentive system (World Bank, 2023)

Conclusion:

IM is insufficient alone — it requires anchoring within VCI.

6.5.4 H4 — VCI → FR (Weak Support)

Egypt’s weak value-chain structures reduce the power of VCI to drive formalization.

This diverges significantly from China/Korea, where chains were strong (IFC, 2022).

Conclusion:

VCI must be strengthened before it can influence FR directly.

6.5.5 H5 and H6 — Dual Mediation (Fully Supported)

The pathways (European Commission, 2022):

- VCI → AEC → IM
- AEC → IM → FR

were both statistically and qualitatively validated, confirming the layered transformation logic of the VFM model.

Conclusion:

Formalization requires sequential capability and incentive layers.

6.5.6 H7 — Institutional Trust Moderation (Strongest Support)

Institutional trust significantly influenced all model relationships.

Low trust weakened (Nishimura, 2024):

- buyer–supplier cooperation,
- accounting adoption,
- incentive responsiveness,
- and formalization readiness.

This reflects:

- Williams (2024)
- Abdou & Zaazou (2022)
- OECD (2023)

Conclusion:

Trust acts as a systemic amplifier — when low, the entire system collapses.

6.6 Comparative Discussion: Global Models vs. Egyptian Reality

Egypt’s formalization problem can be understood only through a comparative lens.

Global success cases demonstrate a three-pillar transformation architecture:

1. China → Cluster-driven value-chain engineering
2. Brazil → Documentation-driven transparency & incentives
3. Korea → Capability-driven supplier upgrading

Egypt lacks all three pillars simultaneously (World Bank, 2024).

Table 11. Summarizes Imperative Comparative Interpretation of Findings Against Global Models

Table 11. Comparative Interpretation of Findings Against Global Models

Dimension	China	Brazil	Korea	Egypt (Findings)
Value-Chain Integration	Very strong	Moderate–High	Very strong	Weak
Accounting Capability	Structured costing templates	NF-e documentation	Innovation-driven costing	Very weak
Incentive Effectiveness	Upgrading subsidies	Trusted supplier benefits	Innovation-linked grants	Weak (tax-based only)
Institutional Trust	High in clusters	Moderate	High	Low
Model Alignment	Matches H1–H6	Matches H3	Matches H1–H2	Only partially aligned

6.7 Theoretical Implications

The results of this study provide several theoretical contributions that advance multiple research streams in accounting, informality, value-chain economics, and institutional behavior.

6.7.1 Contribution to Value-Chain Theory

The study demonstrates empirically that value-chain integration acts as a structural precondition for formalization (Wang & Liu, 2023).

This extends GVC theory (Gereffi, 2022) by showing that:

- VCI is not only a driver of productivity but also a driver of compliance behavior.
- Informal enterprises formalize when value chains reward documentation and penalize informality.

Thus, the study introduces “value-chain–driven compliance” as a new sub-construct in informality research.

6.7.2 Contribution to Accounting Engineering Theory

Findings confirm that accounting capability is a binding constraint in transforming informal enterprises.

The study advances Kaplan’s (2021) theory by demonstrating (Barac et al., 2024):

- AEC mediates between market pressure and incentive responsiveness.
- Documentation is not a compliance requirement but a strategic capability.

This positions “accounting engineering” as a central theoretical pillar in development economics and SME transformation.

6.7.3 Contribution to Institutional Theory

The strong moderating effect of trust expands institutional theory (North, 2020; Williams, 2024; Kimura, 2024):

- Trust acts as a system-level moderator, not a single-path moderator.
- Low trust neutralizes incentives, capabilities, and chain linkages simultaneously.

This marks a major theoretical advancement.

6.8 Practical Implications

6.8.1 Implications for Policymakers

- Formalization must be built from the value chain upward, not from tax policy downward.
- Industrial policies must integrate SME upgrading, documentation, and buyer–supplier coordination.

6.8.2 Implications for Tax Authorities

- Incentives must evolve from tax-centric to value-centric, linking benefits to documentation and chain participation.
- Reporting systems should shift to simplified, sector-ready costing templates.

6.8.3 Implications for Enterprise Development Agencies

- MSMEDA should adopt Chinese/Korean-style supplier development packages.
- Programs must integrate accounting capability building, not only financing.

6.8.4 Implications for Formal Buyers and Exporters

- Adoption of Korea-style supplier upgrading programs would integrate informal producers into formal supply chains.

6.9 Economic and Social Implications

The study identifies four systemic implications:

1. Economic Upgrading

Integrating informal producers into value chains will increase productivity, export capacity, and input quality.

2. Social Inclusion

Formalization anchored in market opportunity increases household income stability and reduces vulnerability.

3. Efficiency of Public Revenues

Documentation-based formalization lowers enforcement costs and enhances voluntary tax compliance.

4. Institutional Legitimacy

Improved trust in state institutions increases regulatory compliance and reduces economic conflict.

Table 12. Summarizes Theoretical, Practical, Economic, and Social Implications

Table 12. Summary of Theoretical, Practical, Economic, and Social Implications

Dimension	Key Implications	Evidence Basis	Global Parallels
Theoretical	VCI-driven compliance; accounting engineering mediation; trust moderation	H1–H7	China, Korea
Practical	Value-chain industrial policy; capability upgrading	Survey & interviews	Brazil, China
Economic	Productivity + export integration	AEC, VCI effects	Korea
Social	Inclusion + legitimacy	Trust dynamics	Global South cases

6.10 Strategic Recommendations for Egypt

Based on the empirical findings, global comparative evidence, and theoretical integration, this study proposes a National Value-Chain Transformation Strategy (NVCTS) to structurally reduce informality and embed micro and small enterprises (MSEs) into productive, high-value ecosystems.

The strategy is built on four transformational pillars.

6.10.1 Pillar 1 — Value-Chain Re-engineering (VCI)

Objective: Create structured economic demand for formalization.

Recommended Actions:

1. Mapping sectoral value chains (furniture, garments, food, home-based manufacturing).
2. Establishing cluster-based industrial ecosystems following the Chinese model.
3. Developing buyer–supplier platforms linking large firms with informal producers.
4. Mandating documentation requirements through buyer contracts, not tax authorities.

This aligns with global success models: China’s clusters, Korea’s supplier networks, and Brazil’s documentation-based chains.

6.10.2 Pillar 2 — Accounting Engineering & Capability Upgrading (AEC)

Objective: Transform accounting from compliance to capability.

Recommended Actions:

1. Issuing standardized costing templates per sector for micro enterprises.
2. Developing a national “Micro-Ledger App” integrated with e-invoice and e-receipt systems.
3. Providing government-funded accounting training within clusters.
4. Embedding documentation requirements in procurement and supply contracts.

This converts accounting into a value enabler, similar to China’s CSBAS and Korea’s SME upgrading systems.

6.10.3 Pillar 3 — Incentive Architecture Realignment (IM)

Objective: Make incentives market-based rather than tax-based.

Recommended Actions:

1. Link incentives to value-chain participation, not tax status (Brazil’s NF-e logic).
2. Award “Trusted Supplier Status” for documented enterprises.
3. Offer innovation and quality-upgrading grants tied to accounting capability.
4. Provide preferential access to finance for documented suppliers.

Incentives must reward economic value, not legal compliance alone.

6.10.4 Pillar 4 — Institutional Trust Reconstruction (IT)

Objective: Establish predictable, transparent, and credible government–SME relations.

Recommended Actions:

1. Reforming inspection procedures to ensure predictability and fairness.
2. Providing conflict-resolution units for SMEs (fast-track).
3. Guaranteeing protection from retroactive penalties for newly formalized firms.
4. Public communication campaigns to rebuild trust in regulatory institutions.

Trust is the psychological infrastructure of all transformation pathways.

6.11 Integrated Policy Framework

The proposed model synthesizes the four pillars into a unified transformation architecture:

VCI → AEC → IM → FR, moderated by IT

This framework is consistent with:

- China’s cluster-value logic
- Brazil’s documentation-incentive logic
- Korea’s innovation-chain logic

and directly addresses Egypt’s capability, trust, and value-chain deficits.

VII. General Conclusion

7.1 Introduction

This concluding chapter synthesizes the theoretical, empirical, and comparative insights presented across the study. It provides an integrated reflection on the central findings, highlights the contributions to literature and practice, and outlines future research directions. The study’s overarching message is clear: formalization is not a tax or regulatory process—it is a value-chain, capability, and trust transformation journey (Dabla-Norris & Lima, 2020; OECD, 2024). This chapter consolidates the implications of that insight.

7.2 Summary of the Research Problem

Egypt continues to experience persistent and pervasive informality despite extensive legislative, administrative, and digital reforms, including:

- Electronic invoice law 2020/206
- Simplified Accounting Law 2023/20
- Institutional Transformation Law 2025/5

However, empirical evidence confirmed that these reforms—while necessary—remain insufficient because they target formal requirements rather than the economic engines that motivate enterprises to formalize (Ordoñez & Silva, 2021; Alon & Kim, 2022).

The core research problem was thus framed:

Why does informality persist in Egypt despite comprehensive regulatory and digital reforms, and what structural mechanisms can drive sustainable formalization?

7.3 Synthesis of Key Findings

7.3.1 Value-Chain Integration as the Foundation

The study revealed that informal enterprises formalize only when formal buyers require documentation, costing, and quality control (Singhal & Kumar, 2024).

Without value-chain demand, formalization is economically irrational.

7.3.2 Accounting Engineering as a Binding Constraint

Accounting capability is the missing middle layer linking informal producers to structured chains.

Weak costing, documentation, and digital accounting significantly restrict (Capezzuto & Pizzi, 2024; Azouzi & Mansour, 2024):

- quality upgrading,
- integration into formal markets,
- benefit from incentives,
- readiness for formal registration.

7.3.3 Incentive Mechanisms Require Market Anchoring

Tax incentives alone showed weak influence (Caruso & Almeida, 2022; Choi & Rhee, 2024).

Enterprises respond more effectively to:

- supplier recognition,
- quality-based rewards,
- chain access,
- certification benefits.

7.3.4 Institutional Trust as the Systemic Moderator

Trust in inspection, regulation, and governance strongly influenced all pathways (Kimura, 2024; Diop & Aidara, 2024).

Low trust had a system-wide negative effect, collapsing:

- capability adoption,
- incentive responsiveness,
- chain cooperation,
- formalization willingness.

7.4 Contributions of the Study

7.4.1 Theoretical Contributions

1. Introducing Value-Chain–Driven Compliance Theory
2. Establishing Accounting Engineering as a transformation mechanism
3. Demonstrating trust as a systemic moderator, not a contextual variable
4. Proposing a dual-mediation model explaining informal-to-formal transitions

7.4.2 Empirical Contributions

The study provides rare, large-scale empirical evidence from Egyptian MSEs (400 survey responses + 32 interviews) aligned with global comparative cases (China, Brazil, Korea).

It validates a structural transition model:

VCI → AEC → IM → FR,

moderated by institutional trust.

7.4.3 Practical and Policy Contributions

The research proposes the National Value-Chain Transformation Strategy (NVCTS) with (World Bank, 2024; USAID, 2024):

1. Value-chain re-engineering
2. Accounting capability upgrading
3. Incentive architecture redesign
4. Institutional trust rebuilding

This strategy aligns with global best practices and addresses Egypt’s structural gaps.

7.5 Comparative Insights

Global experiences confirm that formalization succeeds when three engines operate simultaneously:

Country	Engine of Transformation	Relevance
China	Cluster-driven value chains	High
Brazil	Documentation-based incentives (NF-e)	High
Korea	Supplier upgrading & accounting capability	Very High

Egypt’s gap lies in lacking **all three engines at once**.

7.6 Policy-Level Implications

1. Formalization must start from value chains, not tax obligations.
2. Accounting must shift from compliance - development capability.
3. Incentives must become market-based.
4. Institutional trust must be rebuilt through predictable, transparent enforcement.
5. Digitalization succeeds only when embedded in economic incentives.

7.7 Limitations and Future Research

While the study provides strong empirical and theoretical foundations, potential limitations include:

- sectoral concentration in manufacturing-focused MSEs,
- cross-sectional data limitation for dynamic evolution,
- limited representation of rural informal clusters.

Future research directions:

- longitudinal tracking of value-chain interventions,
- behavioral experiments on trust reconstruction,
- sector-specific accounting engineering models,

- simulation-based policy modeling for incentive redesign.

7.8 Final Conclusion

The research concludes unequivocally that informality is neither a tax problem nor an administrative deficiency—it is a structural, economic, and behavioral phenomenon.

Formalization requires (OECD, 2024; IFC, 2022; Mahoney & Moustafa, 2023):

- economic pull from value chains,
- technical readiness through accounting capability,
- incentive alignment tied to real market opportunities,
- institutional trust that enables compliance rather than punishes it.

The proposed VFM model and the National Value-Chain Transformation Strategy offer a realistic, evidence-based, and globally aligned blueprint for Egypt to transition from fragmented informality to a productive, high-value, inclusive economy.

Conflict of Interest Statement

The author declares that there is no conflict of interest regarding the publication of this paper. The author has no financial, personal, or professional relationships that could have appeared to influence the work reported in this study.

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