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Business Models in a Regulated Commodity Sector: A Structural Analysis of Cocoa Agribusiness in Ghana

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Abstract

Purpose. *This study applies a Business Model Identity (BMI) framework to examine value creation in Ghana's state-regulated cocoa sector. BMI is conceptualized through three core dimensions – primary value-creation logic, strategic asset configuration and structural composition – within an institutional context that defines permissible activities, relationships and value-capture mechanisms.*

Methodology. *A sequential mixed-methods design combined a multistage survey of 330 cocoa-farming households, documentary analysis of statutory and corporate records, and financial-ratio profiling of post-farmgate actors. The analysis identified business-model archetypes, compared asset configurations, and systematically mapped relationships within the regulated value chain.*

Findings. *Four structurally distinct BMIs were identified: the Bean Input Producer (BIP), Statutory Composite Cocoa Agribusiness (SCCA), Composite Agricultural Commodities Distributor (CACD), and Chocolate Manufacturer (CM). The BIP is characterized by biological production and tangible operating assets; the SCCA combines regulatory, licensing, trading, and financial functions supported largely by intangible and contractual assets; the CACD integrates commodity distribution with supplementary financial activities; and the CM is defined by capital-intensive processing and fixed operating assets. Interaction mapping reveals a regulated BIP-CACD-CM sequence coordinated by the SCCA, with no direct producer-processor relationship. The findings indicate that capabilities and value-creation opportunities are conditioned by the alignment of value logics, asset structures, and institutionally prescribed relationships.*

Originality/value. *The study provides an initial empirical operationalization of BMI as a diagnostic framework for distinguishing business models that may share sectoral or archetypal labels but differ in their underlying structural architectures. Its transferability to other regulated commodity systems requires empirical testing.*

Keywords Business Model Identity, regulated commodity chains, Ghana cocoa sector, institutional embeddedness, asset configuration, value chain governance

JEL codes Q13, L51, L5

INTRODUCTION

Cocoa is Ghana's flagship export crop and a major source of foreign exchange, rural employment and livelihoods (Boansi et al., 2024; Kolavalli & Vigneri, 2017). More broadly, agrifood value chains play a central role in driving value addition, technology transfer, investment and employment across low- and middle-income countries (Barrett et al., 2022). Despite its importance, Ghana's cocoa sector faces persistent challenges, including low productivity, climate vulnerability, price volatility and unequal value distribution, reflecting deeper organizational and institutional structures that shape how value is created and captured (Teye et al., 2025).

The effectiveness of policy and technical interventions therefore depends on their alignment with the sector's underlying structure, including its rules, roles, and relationships (Kissi & Herzig, 2024). Research shows that performance, employment and growth are influenced by interactions across upstream and downstream segments of the agrifood system (Pauw et al., 2023), while value-chain governance shapes the distribution of transactions, coordination mechanisms and economic rents (Steinbach & Zurita, 2024). Understanding cocoa sector performance thus requires analysis of the underlying architecture of value creation and appropriation rather than observable outcomes alone.

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Business model theory provides a useful analytical lens. Business models explain how organizations convert resources into value through interconnected elements such as the value proposition, activity system, and revenue model (Teece, 2010; Chesbrough & Rosenbloom, 2002; Zott et al., 2024). They link technologies and resources to value capture and competitive positioning, while business model innovation is associated with organizational renewal and performance improvement (Chesbrough & Rosenbloom, 2002; Foss & Saebi, 2015, 2017). However, business model research remains relatively underdeveloped in regulated agribusiness sectors (Barth et al., 2017). In Ghana's cocoa sector, governance arrangements and financialization influence opportunities for upgrading and rent capture, highlighting the need for frameworks that examine underlying business model architectures rather than simple actor classifications (van Huellen & Abubakar, 2021).

To address this gap, we adopt Business Model Identity (BMI), herein defined as the relatively enduring, distinctive, and coherent configuration of a business model's primary value-creation logic, strategic asset configuration, and structural composition. Building on Wirtz's (2020) view of value-creation logic as the core of the business model, BMI draws on literature linking resources and activity configurations to value creation, capture and competitive positioning (Teece, 2010; Chesbrough & Rosenbloom, 2002; Foss & Saebi, 2017; Zott et al., 2024). This perspective is particularly relevant to Ghana's cocoa sector, where regulation shapes permissible activities, market relationships and value distribution (van Huellen & Abubakar, 2021).

Accordingly, this study seeks to map the Business Model Identities operating within Ghana's regulated cocoa sector. Specifically, it aims to: (1) identify and characterise distinct BMIs using a structured typology; (2) differentiate these identities through quantitative analysis of asset structures; and (3) map their vertical and horizontal interactions to reveal the sector's architecture. In doing so, the study responds to calls for system-level analyses of agrifood transformation (Barrett et al., 2022; Pauw et al., 2023) and offers a diagnostic framework to support innovation, policy design and sustainable development in regulated commodity systems.

THEORETICAL AND CONCEPTUAL FRAMEWORK

This section develops the theoretical foundations of the Business Model Identity (BMI) lens and outlines its analytical application to regulated commodity systems.

Defining business model identity

Business Model Identity (BMI) requires conceptual grounding to distinguish it from organizational identity while clarifying its role within business model scholarship. In the classical organizational identity literature, identity addresses the question "Who are we as an organization?" and refers to the collective self-understandings and distinctive attributes that organizational members believe characterize their organization (Albert & Whetten, 1985). Organizational identity therefore concerns social meanings, shared interpretations, and perceptions of the organization.

In contrast, BMI concerns the identity of the business model rather than the organization itself. It refers to the relatively enduring, distinctive, and coherent configuration of primary value-creation logic, strategic asset configuration, and structural composition through which an enterprise creates, coordinates, and captures value within an institutional context. BMI therefore captures the structural character of the business model and the mechanisms through which economic activity is organized. Organizations with different cultures, ownership structures, or organizational identities may consequently exhibit the same BMI, while organizations with similar organizational identities may operate fundamentally different business model architectures.

This conceptualization is consistent with business model research that views the business model as an integrated architecture of value creation rather than a collection of discrete components. Teece (2010) conceptualizes the business model as the architecture through which firms create, deliver, and capture value, while Amit and Zott (2010) describe it as a system of interdependent activities whose content, structure, and governance jointly determine value creation. Similarly, Richardson (2008) and Bocken et al. (2014) emphasize the importance of coherence among value propositions, activity systems and value-capture mechanisms. Although business models evolve, their core logic often remains recognizable over time, allowing certain structural characteristics to persist despite adaptation and innovation (Demil & Lecocq, 2010). This suggests that business models possess an identifiable and relatively stable architecture that can be analyzed independently of organizational self-perceptions.

The use of the term *identity* is therefore deliberate. Identity conveys the notions of centrality, distinctiveness, coherence and continuity (Albert & Whetten, 1985; Whetten, 2006), all of which are relevant to understanding business model architecture. Centrality refers to the dominant value-creation logic that defines the model's economic role. Distinctiveness reflects the unique combination of strategic assets and structural arrangements that differentiate one model from another. Coherence captures

the alignment among value-creation activities, asset configurations and governance structures, while continuity reflects the persistence of these relationships despite incremental adaptation. In regulated commodity sectors, where organizations operate within established institutional frameworks, these characteristics provide a useful basis for understanding why certain business models emerge, persist and evolve.

The term *identity* is preferred to related concepts such as business model type, archetype or configuration. While these concepts primarily classify or describe observable arrangements of business model elements, BMI seeks to identify the underlying structural architecture that makes a business model recognizable and enduring despite changes in particular activities, assets or relationships. BMI therefore extends beyond classification by linking value-creation logic, strategic asset configuration, structural composition and institutional embeddedness into a single analytical construct. As such, it provides a diagnostic lens for examining how different business model architectures shape behavior, innovation potential and value capture within regulated commodity systems.

Theoretical foundations and operational dimensions of the BMI framework

The BMI framework rests on three complementary theoretical pillars, operationalized through three interrelated dimensions. The first pillar is archetypal value-creation logic, based on Malone et al.'s (2005) typology of Creator, Distributor, Landlord and Broker business models, which isolates the fundamental economic role through which a firm participates in value creation and exchange. Its transferability enables comparison between heterogeneous actors independent of sector-specific labels, making it valuable for analyzing complex agrifood chains. The second pillar is the configurational perspective, emphasizing alignment among the value proposition, activity system, and value capture mechanism (Amit & Zott, 2010; Bocken et al., 2014; Richardson, 2008). Rather than viewing business models as discrete components, this approach interprets them as integrated architectures where strength depends on coherence among internal elements; misalignment often explains underperformance or limited adaptability. The third pillar is institutional embeddedness, a critical but often underdeveloped dimension in business model research. In highly regulated commodity sectors, formal institutions define permissible activities, oversee pricing and quality, allocate rights, and structure market access (Kolavalli & Vigneri, 2017). As Barrett et al. (2022) observe, agrifood systems are shaped as much by governance structures and coordination mechanisms as by market incentives.

These three perspectives are operationalized through three interrelated dimensions. Value-creation logic identifies the primary economic role of the model. In Ghana's cocoa sector, few actors fit neatly into a single archetype; Licensed Buying Companies, for example, function primarily as Distributors but often incorporate financial activities associated with hedging or liquidity management (Staritz et al., 2023; Kolavalli et al., 2012). Strategic asset configuration, building on the resource-based view (Barney & Clark, 2007), emphasizes how physical, intangible, financial, and human assets shape the feasible activity system (Barrett et al., 2022). In Ghana's cocoa chain, firms display highly asymmetrical asset bases: farmers are constrained by limited fixed capital and liquidity (Boansi et al., 2024; Abdulai et al., 2018), LBCs rely on warehouses, haulage assets, procurement financing and licensing agreements (Ansah et al., 2018), while processors depend on heavy fixed capital investments and strict quality certification (Naydenov et al., 2022; Codjoe et al., 2025). Temporal-structural embeddedness captures both stability and evolution of business models (Sosna et al., 2010), with adaptability conditioned by institutional frameworks and regulatory routines, pricing mechanisms, and quality standards (Teye et al., 2025). Together, these perspectives justify BMI as a structural identity embedded in economic logic, resource configuration and institutional constraints, moving analysis beyond classification to diagnostic insight.

Conceptual framework: Diagnosing identity within a regulated system

The BMI lens offers a three-stage diagnostic framework for regulated commodity sectors (Figure1). Stage one maps business model identities across the chain in Ghana's cocoa sector against the three BMI dimensions, providing a structured view of identity diversity. Stage two, which involves structural profiling, deepens this mapping through analysis of asset structures, financing arrangements and institutional dependencies, recognizing that actors face distinct financial constraints, regulatory obligations and capital requirements (Kolavalli et al., 2012), with institutional pressures shaping opportunity recognition and strategic choices (Teye et al., 2025). Stage three, interaction mapping, examines how identities relate through vertical coordination and horizontal dynamics, revealing the sector's operative architecture and mechanisms through which constraints propagate (van Paassen et al., 2022). This integrated approach yields a system map of business model identities and interdependencies, enabling identification of leverage points for innovation and policy intervention, aligning with insights on value chain governance, price setting and financialization that shape distributional outcomes (Staritz et al., 2023; Baines, 2017).

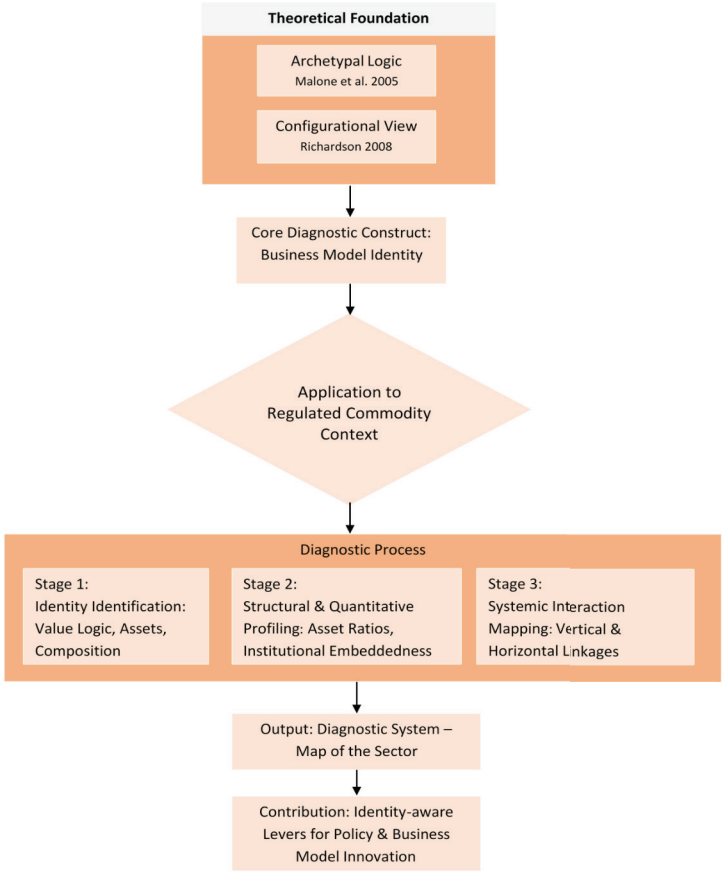


Figure 1. Conceptual framework for diagnosing business model identities in a regulated commodity sector

METHODOLOGY

This section details the methodological approach designed to operationalize the BMI framework. A sequential, mixed-methods design was employed, structured in three phases corresponding to the conceptual framework for diagnosing the architecture of Ghana's regulated cocoa sector.

Phase 1: Identity identification – data collection and analytical grid

The objective was to map key sector actors against the three BMI dimensions: Primary Value Creation Logic, Strategic Asset Configuration, and Structural Composition.

Sampling framework

On-Farm Actors (Producer Households)

A multi-stage sampling procedure was used to collect data on cocoa-farming households. Selection of the sample size was done at the following stages:

Stage I: Purposive selection of the Eastern Region in Ghana (See Appendix A1 for the justification for the selection of the region).

Stage II: Purposive selection of three districts in the Eastern Region from clusters of districts in the region. The selected districts included the West Akim, Upper West Akim, and the Asene Manso-Akroso districts.

Stage III: Random selection of farming communities in the districts.

Stage IV: Random sampling of respondent cocoa agribusiness units (producer households) in the farming communities.

Each selected community in the study area (Figure 2) was zoned, and cocoa agribusiness units were selected from each zone based on who was available in a particular zone at the time the researcher and/or his agents got to the zone in the community, at times when operators were expected to be at home.

Post-Farmgate Actors

A purposive sampling strategy was used to select the entities that define the core regulated value chain architecture:

a. Ghana Cocoa Board (COCOBOD): The statutory regulator and market coordinator.
b. PBC Ltd: A Licensed Buying Company (LBC), and the only one purposively sampled for this category.
c. Cocoa Processing Company (CPC) Ltd: A downstream processor.

See Appendix A2 for the justification for post-farmgate actor selection for the study.

The business model typology grid

Actor characteristics were analyzed using the foundational archetypal grid by Malone et al. (2005), which classifies businesses by their primary value creation logic and the type of asset involved. The adapted grid used for this study is presented below:

Table 1. Business model typology grid

Basic Business Model Archetype	Type of Asset/Value Involved			
	Financial	**Physical**	**Intangible**	**Human**
Creator	Entrepreneur	Manufacturer	Inventor	Human Creator
Distributor	Financial Trader	Wholesaler/Retailer	Intellectual Property Trader	Human Distributor
Landlord	Financial Landlord	Physical Landlord	Intellectual Property Landlord	Contractor
Broker	Financial Broker	Physical Broker	Intellectual Property Broker	Human Resource Broker

Source: Adapted from Malone et al., 2005

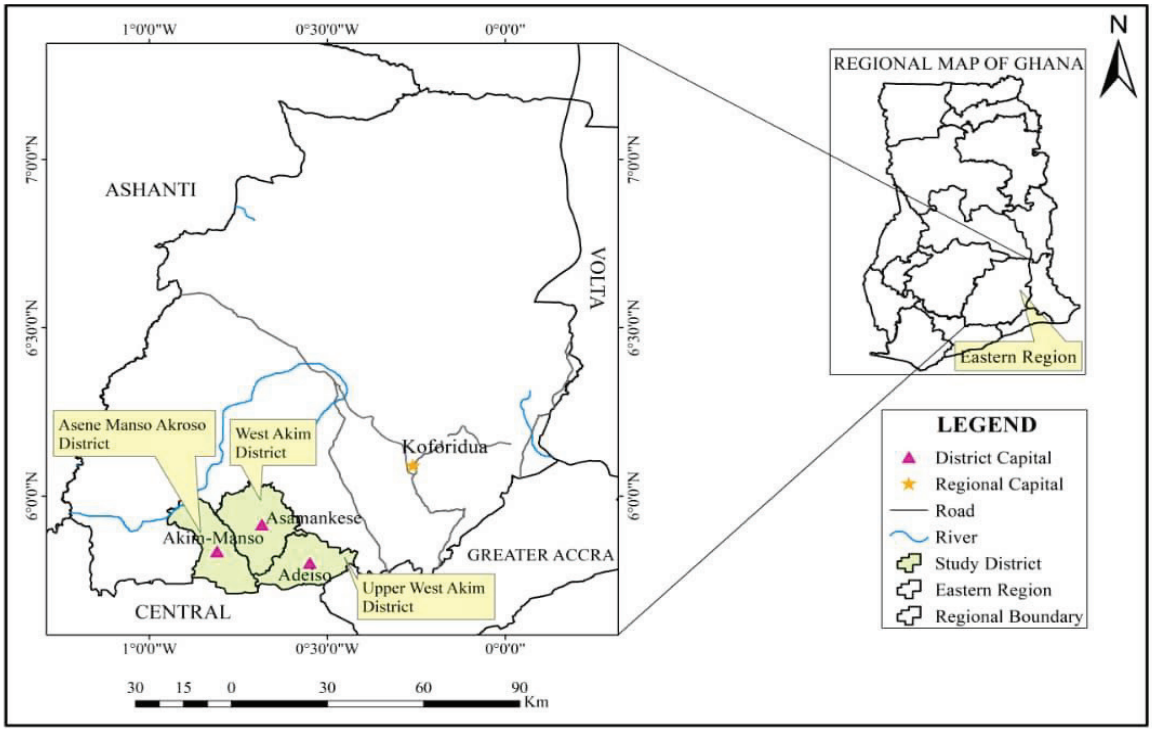


Figure 2. Map of the on-farm study area

Data collection and document analysis

Data were triangulated from multiple sources to construct robust BMI profiles.

- Structured Questionnaires: Administered to the 330 on-farm households to collect systematic data on operations, asset inventories, production activities, and market interactions. Data collection was undertaken by trained enumerators using structured questionnaires administered in Twi and English.
- Systematic Document Analysis**:** A detailed review of primary documents provided the data for profiling post-farmgate actors. Table 2 specifies the key data extracted from each source.

Phase 2: Structural profiling – quantitative asset analysis

This phase aimed to quantify the Strategic Asset Configuration dimension of each BMI, providing a material fingerprint.

Financial ratio analysis

Three tailored ratios were calculated to profile asset structure, moving beyond standard liquidity or profitability metrics to focus on architectural configuration (Carreras-Simó & Coenders, 2021).

a. Tangible to Intangible Asset Ratio (TIAR): Measures the fundamental reliance on physical versus non-physical strategic assets.

$$\mathrm{TIAR}=\frac{\sum \pi_{t...}}{\sum \pi_{i...}} \quad (1)$$

Where $\sum \pi_{t...}$ and $\sum \pi_{i...}$ represent the sum of the values of individual tangible assets and intangible assets, respectively.

b. Fixed to Current Asset Ratio (FCAR): Indicates capital intensity, illiquidity risk, and the model's orientation towards long-term investment versus short-term turnover.

$$\mathrm{FCAR}=\frac{\sum Z_{f...}}{\sum Z_{c...}} \quad (2)$$

Where $\sum Z_{f...}$ and $\sum Z_{c...}$ represent the sum of the values of individual fixed assets and current assets, respectively.

c. Operating to Non-Operating Asset Ratio (ONAR): Reflects strategic focus on core operational activities versus peripheral or financial investments.

$$\mathrm{ONAR}=\frac{\sum \lambda_{o...}}{\sum \lambda_{n...}} \quad (3)$$

Where $\sum \lambda_{o...}$ and $\sum \lambda_{n...}$ represent the sum of the values of individual operating assets and non-operating assets respectively.

For on-farm actors, asset values were aggregated from survey data. For post-farmgate actors, figures were extracted from annual report balance sheets (2015-2020), and mean ratios were calculated across the period to smooth annual variations. Appendix B shows the protocol used for the classification of the assets.

Table 2. Document analysis data extraction framework

Actor	Documents Analysed	Key Data Extracted for BMI Profiling
COCOBOD	PNDC Law 81 (Statute); Annual Reports (2015-2020); Policy Directives; Licensing Templates.	Statutory mandates and objectives; revenue mechanisms (levies, fees); asset composition (physical, intangible, financial); licensed activities; vertical coordination rules; investment portfolio in subsidiaries.
PBC Ltd	Annual Reports (2015-2020); Operational Reports.	Authorized business activities; asset structure (property, plant, equipment, inventory, receivables); revenue streams from cocoa and non-cocoa activities; ownership structure and investments; evidence of contractual relationships with COCOBOD and farmers.
Cocoa Processing Company (CPC) Ltd	Annual Reports (2015-2020); Product Listings; Corporate Website.	Core business activity description; breakdown of property, plant & equipment vs. inventory; product portfolio (semi-finished vs. finished); sales and revenue data; ownership links to COCOBOD.

Source: Author 2025

Phase 3: Interaction mapping – integrative systemic analysis
The objective was to map the vertical and horizontal interactions between the profiled BMIs. Data from Phases 1 and 2 were synthesized. Using flow diagrams derived from documentary rules (e.g., the COCOBOD-PBC Ltd agreement) and survey data on market outlets, the formal vertical interactions and horizontal power relationships were charted to produce a diagnostic system map of the sector's architecture.

RESULTS

Our findings, structured according to the three-phase analytical process, formalize and interpret the distinct architectural identities of key actors and their material foundations. It also captures the resulting systemic structure that defines the sector's opportunities and constraints.

Identification and characterization of business model identities
Applying the BMI construct reveals four core identities, each representing a stable configuration of value creation logic, strategic assets, and structural form. Their characterization provides a diagnostic map of the sector's foundational elements.

Bean input producer (BIP) model: The singular creator
The cocoa-farming household was classified as a Creator of Physical Assets under the Malone et al. (2005) typology. The term Bean Input Producer (BIP) Model was adopted in place of Manufacturer because its primary output results from biological production rather than industrial transformation. Table 3 shows that all valued BIP assets were tangible and operating. Cocoa beans accounted for 89.60% of total valued assets, followed by land at 7.65% and equipment at 2.75%. Cocoa trees were classified as tangible, fixed, and operating assets but were not assigned a monetary value. The BIP therefore exhibited a singular production logic supported predominantly by tangible current assets.

Statutory composite cocoa agribusiness (SCCA) model: The architect-player
COCOBOD's activities extended across several business-model archetypes, including Intellectual Property Landlord, Inventor, Wholesaler/Retailer and Financial Trader. The designation Statutory Composite Cocoa Agribusiness (SCCA) Model reflects its statutory basis, combination of value-creation logics and sectoral focus. Figure 3 records between 48 and 55 marketing licenses issued annually during 2016/2017–2019/2020, while the number of active Licensed Buying Companies declined from 44 to 38. Licensing therefore constituted a central component of the SCCA's operating configuration.
The SCCA displayed a mixed tangible and intangible asset structure. Trade and other receivables constituted the largest share of total assets at 35.81%, followed by property, plant and equipment at 26.49%, contract assets at 12.81%, cash and cash equivalents at 8.09%, and inventories at 7.49%. The remaining assets comprised intangible assets, financial investments, investment properties, and rights-of-use assets. Overall, intangible and contractual claims exceeded tangible holdings, distinguishing the SCCA from the other models.

Composite agricultural commodities distributor (CACD) model: The obligatory intermediary
PBC Ltd was classified primarily as a Distributor of Physical Assets, reflecting its aggregation, storage, and movement of agricultural commodities. Its supplementary investment and financial activities supported its classification as a composite

Table 3. Nature of assets held by the Bean Input Producer (BIP) model

Business assets	Physical Existence	Convertibility	Usage	Share(%) of total assets (GHS 5.6 million)
Land	tangible	fixed	operating	7.65
Equipment	tangible	fixed	operating	2.75
Cocoa beans	tangible	current	operating	89.60
Cocoa trees	tangible	fixed	operating	n/a
Total				**100.00**

Source: Author 2025

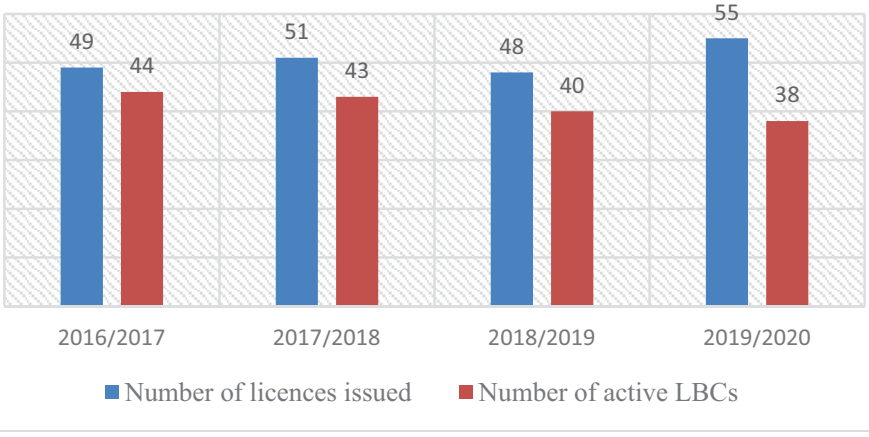


Figure 3. Issuance of cocoa marketing licenses by the SCCA model operator

Table 4. Nature of assets held by the Statutory Composite Cocoa Agribusiness (SCCA) model

Recurrent assets	Physical Existence	Convertibility	Usage	Share(%) of total assets (GHS 13679.2million)
Intangible assets	intangible	fixed	non-operating	4.96
Contract assets	intangible	fixed	operating	12.81
Property, plant & equipment	tangible	fixed	operating	26.49
Investment properties	tangible	fixed	non-operating	0.14
Right of use assets	intangible	fixed	operating	0.28
Trade & other receivables	intangible	fixed	operating	35.81
Investment in subsidiaries	intangible	fixed	non-operating	<0.01
Investment in associate	intangible	fixed	non-operating	0.03
Other investments	Intangible	fixed	non-operating	0.06
Inventories	tangible	current	operating	7.49
Other financial assets	intangible	current	non-operating	3.84
Cash and cash equivalents	intangible	current	operating	8.09
Total				**100.00**

Source: Authors' elaboration from COCOBOD annual reports (2015-2020)

model. The designation Composite Agricultural Commodities Distributor (CACD) Model therefore captures both its dominant distribution logic and its additional business activities.

Property, plant and equipment accounted for 53.50% of the CACD's total assets (Table 5), making tangible fixed assets the principal component of its asset base. Trade and other receivables represented 22.73%, inventories 8.34%, cash and cash equivalents 6.65%, and investments in subsidiaries 6.51%. The remaining assets consisted of financial investments, leasehold prepayments, tax credits, and other intangible items. The CACD was therefore characterized by a tangible, fixed-asset base combined with substantial current financial claims.

Chocolate manufacturer (CM) model: The capital-intensive processor

Cocoa Processing Company Ltd was classified as a Creator of Physical Assets because it transforms cocoa beans into semi-finished and finished products. The designation Chocolate Manufacturer (CM) Model specifies its principal value-creation activity and output. Property, plant and equipment constituted 85.96% of the CM's total assets (Table 6), while inventories accounted for a further 7.35%. Trade and other receivables represented 3.66%, prepayments 1.64%, fixed-deposit investments 0.83%, and cash and cash equivalents 0.55%. Tangible assets therefore comprised more than 93% of the asset base, with fixed operating assets dominating the model's structural configuration.

Table 5. Nature of assets held by the Composite Agricultural Commodities Distributor (CACD) model

Recurrent assets	Physical Existence	Convertibility	Usage	Share(%) of total assets (GHS 643.4 million)
Property, plant and equipment	tangible	fixed	operating	53.50
Intangible assets	intangible	fixed	operating	0.02
Investment in subsidiaries	intangible	fixed	non-operating	6.51
Available for sale financial assets	intangible	fixed	non-operating	0.59
Leasehold prepayment	intangible	fixed	operating	0.17
Medium-term investments	intangible	fixed	non-operating	0.07
Inventories	tangible	current	operating	8.34
Trade and other receivables	intangible	current	operating	22.73
Short-term investments	intangible	current	non-operating	1.41
Current tax credit	intangible	current	operating	0.02
Cash and cash equivalents	intangible	current	operating	6.65
Total				**100.00**

Source: Authors' elaboration from PBC Ltd annual reports (2015-2020)

Table 6. Nature of assets held by the Chocolate Manufacturer (CM) model

Recurrent assets	Physical Existence	Convertibility	Usage	Share(%) of total assets (USD 136.5 million)
Property, plant and equipment	tangible	fixed	operating	85.96
Inventories	tangible	current	operating	7.35
Current tax assets	intangible	current	operating	<0.01
Trade and other receivables	intangible	current	operating	3.66
Prepayments	intangible	current	operating	1.64
Fixed deposit investments	intangible	current	non-operating	0.83
Cash and cash equivalents	intangible	current	operating	0.55
Total				100.00

Source: Authors' elaboration from CPC Ltd annual reports (2015-2020).

Comparative structural profiling

Table 7 compares the tangible-to-intangible, fixed-to-current, and operating-to-non-operating asset ratios of the four models. The BIP contained no valued intangible or non-operating assets, producing infinite tangible-to-intangible and operating-to-non-operating ratios. Its fixed-to-current ratio of 0.12 was the lowest among the models, reflecting the dominance of cocoa beans within its valued asset base. The SCCA recorded the lowest tangible-to-intangible ratio, at 0.52, and a fixed-to-current ratio of 0.93. It was therefore the only model in which intangible and contractual assets exceeded tangible assets and fixed and current holdings were approximately balanced. The CACD ratios of 1.62 and 1.55 indicated greater reliance on tangible and fixed assets, respectively. The CM recorded the highest tangible-to-intangible ratio of 13.96, fixed-to-current ratio of 6.13, and operating-to-non-operating ratio of 118.79.

The profiles consequently differentiated the models according to their material foundations. Current tangible production assets dominated the BIP; intangible and contractual claims were most prominent in the SCCA; tangible fixed distribution assets characterized the CACD; and fixed operating assets overwhelmingly defined the CM.

Interaction mapping

Figure 4 presents the vertical and horizontal relationships among the four BMIs. The SCCA forms the regulatory envelope within which the other models operate. Its vertical relationships with the BIP, CACD, and CM involve the downward transmission of rules, licenses, and prices and the corresponding upward movement of cocoa beans and regulatory compliance.

Table 7. Asset structure ratios of cocoa agribusiness models

Agribusiness Model	Tangible/Intangible Ratio	Fixed/Current Ratio	Operating/Non-operating Ratio
BIP	∞ (All tangible)	0.12	∞ (All operating)
SCCA	0.52	0.93	9.70
CACD	1.62	1.55	10.67
CM	13.96	6.13	118.79

Source: Calculated from survey and annual report data (2015-2020 averages).

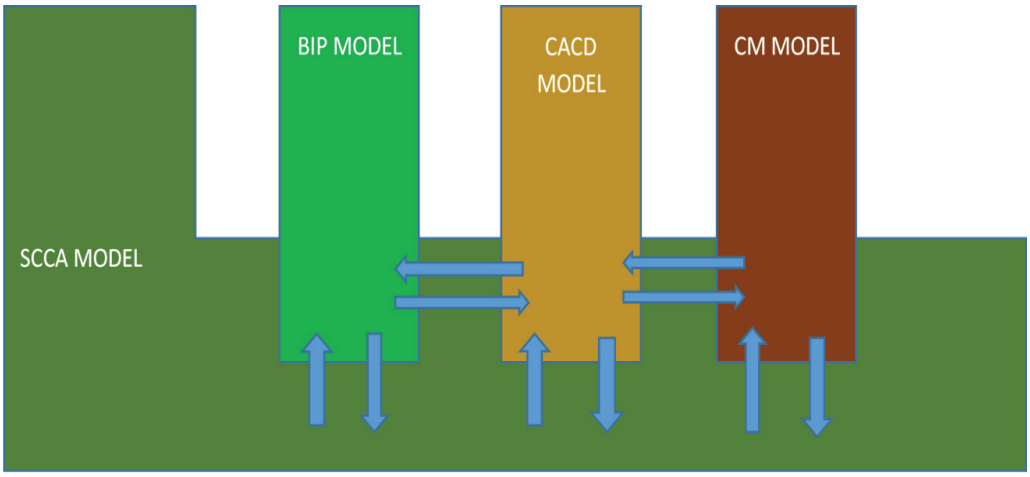


Figure 4. Interaction of agribusiness models in Ghana's cocoa sector

Horizontal market transactions follow the sequence BIP → CACD → CM. The BIP supplies cocoa beans to the CACD, which aggregates and transfers them through the regulated system to the CM for processing. No direct horizontal relationship was identified between the BIP and CM. The CACD therefore occupies the intermediary position between primary production and processing, while the SCCA coordinates the system through its regulatory and commercial relationships.

DISCUSSION AND THEORETICAL INTEGRATION

The findings provide initial empirical support for Business Model Identity (BMI) as a recognizable configuration of value-creation logic, strategic assets, structural composition and institutional position. This is consistent with business-model literature that conceptualizes the business model as a value-creation architecture (Teece, 2010), a system of interdependent activities (Zott & Amit, 2010), and a coherent configuration of mutually reinforcing elements (Richardson, 2008; Bocken et al., 2014).

Distinctive business model configurations

The BIP and CM models demonstrate that actors sharing the same archetype may possess different identities. Both are Creators of Physical Assets, but the BIP is organized around biological production and current operating assets, whereas the CM depends on industrial transformation and fixed processing assets. BMI therefore provides greater analytical precision than archetypal classification by identifying how a value-creation logic is enacted through a distinctive asset and activity configuration.

The SCCA and CACD illustrate composite identities. The SCCA combines Landlord, Distributor and Financial Trader logics under a statutory mandate, while the CACD integrates a dominant distribution logic with supplementary financial activities. These findings support Wirtz's (2020) view that value-creation logic forms the core of a business model, while showing that this core may combine several logics in regulated sectors.

Assets as the material expression of identity

The contrasting asset profiles provide observable evidence of the four BMIs. This supports the resource-based view that resource configurations shape feasible organizational activities and strategies (Barney & Clark, 2007), as well as configurational perspectives emphasizing alignment among assets, activities, and value-capture mechanisms (Amit & Zott, 2010; Richardson, 2008).

The BIP's dependence on tangible production assets is consistent with documented capital and liquidity constraints among Ghanaian cocoa farmers (Abdulai et al., 2018; Boansi et al., 2024). The CACD's fixed-asset structure corresponds with the storage, transport, and procurement infrastructure required by Licensed Buying Companies (Ansah et al., 2018), while the CM's concentration in processing assets reflects the capital intensity of cocoa manufacturing (Naydenov et al., 2022; Codjoe et al., 2025).

The SCCA extends conventional resource-based interpretations because much of its structural power derives from licenses, contractual rights, receivables, and financial claims. This is consistent with evidence that governance, pricing authority and financialization shape value capture in Ghana's cocoa sector (Staritz et al., 2023; van Huellen & Abubakar, 2021). Institutionally conferred rights may therefore constitute strategic assets alongside physical resources.

Institutional and relational identity

The interaction map shows that BMI is shaped not only by internal assets and activities but also by permitted relationships within the regulated system. The SCCA defines the regulatory envelope, while transactions follow the BIP–CACD–CM sequence. The absence of a direct BIP–CM relationship makes the CACD an institutionally required intermediary.

This finding is consistent with accounts of Ghana's board-managed cocoa system (Kolavalli & Vigneri, 2017) and with studies emphasizing governance and coordination in agrifood value chains (Barrett et al., 2022; Baines, 2017; van Paassen et al., 2022). It extends firm-centered business-model perspectives by showing that institutions do not merely surround business models; they partly constitute their activities, assets, and relationships.

Overall, the results support BMI through four properties: centrality, reflected in dominant value-creation logic; distinctiveness, expressed through asset and governance configurations; coherence, shown by alignment among logic, resources and institutional role; and relative continuity, reflected in the persistence of recognizable structural patterns. Consistent with Demil and Lecocq's (2010) concept of dynamic consistency, such continuity does not imply immutability. BMI therefore offers an initial empirical operationalization of how enterprises characteristically create, coordinate, and capture value within regulated systems.

CONCLUSIONS AND POLICY IMPLICATIONS

Conclusions

This study applied the Business Model Identity framework to Ghana's regulated cocoa sector and identified four structurally distinct models: the Bean Input Producer (BIP), Statutory Composite Cocoa Agribusiness (SCCA), Composite Agricultural Commodities Distributor (CACD) and Chocolate Manufacturer (CM). Their differences arise not only from their positions in the value chain but from the distinctive combinations of value-creation logic, strategic assets, structural composition and institutional relationships through which they operate.

The sector follows a regulated BIP-CACD-CM sequence within an institutional architecture governed by the SCCA. The BIP is concentrated in tangible, seasonal production assets; the CACD combines commodity distribution with supplementary financial activities; and the CM depends heavily on fixed processing assets. The SCCA occupies a composite regulator–commercial operator position supported by licensing authority, contractual claims, and financial assets. The absence of a direct BIP–CM relationship confirms the institutionally mandated separation between primary production and processing.

These findings show that business-model identity is expressed through the alignment of value-creation logic, asset configuration, and institutional position. The BMI framework therefore provides a structured basis for diagnosing differences in capabilities, constraints and opportunities across regulated commodity systems.

Policy and practice implications

Policy interventions should recognize that the four BMIs face different structural constraints. For the BIP, the limited financial recognition of biological assets and the absence of direct processing relationships restrict opportunities for investment and

value addition. Strengthening producer cooperatives, developing appropriate mechanisms for valuing productive biological assets, and enabling farmer participation in logistics or processing ventures could broaden producers' asset and income bases.

The SCCA's simultaneous regulatory and commercial functions warrant clearer institutional safeguards to minimize potential conflicts of interest. Greater separation, transparency or independent oversight of these roles could improve accountability and create a more predictable operating environment for other sector participants.

The CACD's mandatory intermediary position could be used to expand services beyond bean aggregation. Licensing arrangements could encourage traceability, climate-smart input provision, certified-sale financing and production-data services. For the CM, policy support should address the constraints associated with capital-intensive processing through more reliable bean-sourcing arrangements, research and development incentives, and investment in cocoa by-product and waste utilization.

Limitations and future research

The findings should be interpreted in light of three limitations. First, the post-farmgate asset analysis covers 2015–2020 and therefore provides a structural profile rather than a longitudinal assessment of adaptation to recent shocks. Second, the CACD identity is based on one Licensed Buying Company and may not represent the full diversity of firms within this category. Third, the interaction map identifies formal relationships but does not quantify power, trust or value distribution across them.

Future research should apply the BMI framework longitudinally, compare multiple firms within each identity, and test it across other countries and regulated commodities. Combining BMI analysis with network analysis, value-appropriation measures and qualitative power mapping would also clarify how structural identities evolve and how their relationships shape the distribution of value.

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Competing interests

The authors declare no competing interests.

Ethics statement

Not applicable

Availability of data and materials

Data used in this study, in the form of consolidated company annual reports, were obtained with a written permission from the Ghana Cocoa Board and is available at https://cocobod.gh/resources/annual-report. Farm-level data are available on request.

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Author contributions

KAT: Conceptualization, data curation and analysis, and initial manuscript draft.

MAA: Manuscript review and supervision.

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APPENDIX A

JUSTIFICATION OF STUDY AREA AND ACTOR SELECTION

A1: Justification for on-farm study area: Eastern Region

The selection of the Eastern Region as the primary area for on-farm data collection is based on a confluence of agronomic, socio-economic, and methodological rationales, making it a critical case for studying business models under climatic and institutional stress.

a. Agronomic Representativeness and Climate Vulnerability: The region is a major cocoa-producing area with diverse micro-climates and farm sizes. Critically, it was severely impacted by the prolonged El Niño-induced drought of 2015-16, which drastically reduced yields and stressed farmer livelihoods (Maguire-Rajpaul et al., 2020; Owusu et al., 2019). Studying actors in a region with recent exposure to a major climate shock allows for analyzing the resilience and adaptive capacity inherent to different business models, a core dimension of the BMI framework.
b. Institutional Saturation: The Eastern Region has a high density of COCOBOD extension services, LBC operations, and farmer co-operatives (Codjoe et al., 2025). This ensures that the sampled on-farm actors are fully embedded within the regulated institutional envelope, allowing the study to precisely trace how the formal rules set by post-farmgate actors (like COCOBOD and PBC Ltd) shape on-farm business logic.
c. Methodological Practicality: The region's accessibility and well-defined administrative structure facilitated the multi-stage random sampling process, ensuring a statistically robust and logistically feasible survey of farm households (Knottnerus, 2003; Cochran, 1977).

A2: Justification for post-farmgate actor selection

The purposive selection of COCOBOD, PBC Ltd, and CPC Ltd is fundamental to diagnosing a regulated commodity sector. Each actor represents a distinct, mandatory node in the value chain whose business model is expressly shaped by the regulatory framework. It is important to clarify that these actors are selected for analytical representativeness rather than empirical representativeness (Seawright & Gerring, 2008).

a. COCOBOD: This is the architect of the ecosystem. Its selection is non-negotiable for a study of a regulated sector. Analyzing COCOBOD reveals how the regulatory framework actively designs the business landscape for all other actors, setting prices, defining quality, and allocating rights.
b. PBC Ltd: As a Licensed Buying Company, PBC Ltd represents the core regulated "Distributor" interface between the state and farmers. It was selected because its history as a former division of COCOBOD provides a unique case of deep institutional embeddedness. Its business model demonstrates how an entity operationalizes COCOBOD's mandates, navigating the constraints and opportunities of the licensing regime to create value through aggregation, logistics, and risk management.

Cocoa Processing Company (CPC) Ltd: This actor represents the critical downstream "Creator" logic within the regulated chain. CPC Ltd is selected because its majority state ownership (by COCOBOD) creates a direct vertical integration link within the regulated system. Studying its model illuminates the sector's strategy for value capture beyond the raw bean, revealing the opportunities and dependencies faced by processors operating under a dominant regulator that is also a primary supplier and shareholder.

APPENDIX B

ASSET CLASSIFICATION PROTOCOL

The three financial ratios calculated in this study – TIAR, FCAR, ONAR – require explicit classification of balance sheet items. The protocol draws on International Financial Reporting Standards (IFRS) asset definitions but adapts them for the BMI analysis. Assets were classified by economic function and contribution to value creation rather than strictly by financial-statement presentation.

Tangible vs. Intangible Assets

- Tangible Assets: Property, plant and equipment (including land, buildings, machinery, vehicles and equipment); investment property; inventories; and biological assets (e.g., cocoa trees).
- Intangible/Contractual Assets: Patents, licenses, trademarks and goodwill; contract rights and receivables; cash and cash equivalents; financial investments; leasehold interests; and right-of-use assets.

For the purposes of BMI analysis, receivables, cash holdings, and financial investments were grouped with intangible assets because they represent non-physical claims, rights, or financial resources rather than tangible productive assets. This treatment is analytical rather than a strict accounting classification. In regulated commodity systems, these assets often reflect institutional entitlements and contractual claims that play an important role in shaping business model structure.

Fixed vs. Current Assets

- Fixed Assets: Assets expected to provide economic benefits beyond one year (or one operating cycle), including property, plant and equipment, long-term investments, intangible assets and long-term receivables.
- Current Assets: Assets expected to be realized, sold or consumed within one year (or the operating cycle), including cash and cash equivalents, short-term investments, inventories, trade receivables due within one year and prepayments.

Operating vs. Non-Operating Assets

- Operating Assets: Assets directly employed in the entity's primary value creation activities[1].
- Non-Operating Assets: Assets held primarily for investment, strategic diversification or purposes outside core operations, including investment property, passive equity holdings and long-term financial investments.
- This protocol was applied consistently across all actors to enable meaningful comparison across business model identities.

[1] For COCOBOD, this includes licensing infrastructure, quality control facilities, and receivables from cocoa sales. For PBC Ltd, this includes warehouses, haulage equipment, and procurement-related receivables. For CPC Ltd, this includes processing machinery, inventories of beans and semi-finished products, and trade receivables from customers.