Enhancing Agricultural Value Chains Through Local Government Intervention: A Case Study of Farm-To-Market Infrastructure and Cooperative Financing

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ABSTRACT

This study examines the extent to which local government interventions in farm-to-market infrastructure and cooperative financing enhance agricultural value-chain performance among smallholder farmers in the Niger Delta region of Nigeria. Anchored on the value-chain development framework, the study adopts a mixed-methods design, drawing on primary data from 412 farm households, 37 cooperative leaders and 18 local government officials across selected Local Government Areas in Bayelsa, Delta and Rivers States. Quantitative data were analyzed using descriptive statistics and regression techniques, while qualitative data from key informant interviews and focus group discussions were thematically evaluated. Results reveal that access to all-season rural roads, storage facilities and organized markets significantly improves farmers' access to buyers, reduces transaction costs and lowers post-harvest losses. The infrastructure index exerts the strongest influence on value-chain performance, with a one-unit increase associated with a 0.29-point rise in the composite outcome index. Cooperative financing also contributes positively, enabling farmers to access affordable credit and collective marketing channels, thereby improving liquidity and bargaining power. Elasticity estimates indicate that improvements in infrastructure and cooperative services jointly account for a substantial share of variation in value-chain outcomes, with complementary interaction effects. However, the study also identifies governance-related constraints, including irregular funding releases, political turnover and weak monitoring systems that dilute programme effectiveness, particularly in riverine LGAs. The study concludes that sustainable value-chain upgrading requires coordinated investment in rural infrastructure, strengthened cooperative systems and accountable local governance. It recommends targeted resource allocation to underserved areas, gender-responsive financing frameworks and institutionalized maintenance and monitoring structures to maximize value-chain gains and rural welfare outcomes.

Background of the Study

Agriculture remains the cornerstone of economic development and food security in many developing countries, including Nigeria. It is the largest employer of labor and contributes significantly to the Gross Domestic Product (GDP), particularly in rural regions where agriculture is not only a means of livelihood but also an enduring cultural practice. According to the World Bank (2008), agriculture accounts for about 70% of employment in Sub-Saharan Africa and plays a crucial role in economic transformation when integrated with supportive infrastructure and institutional frameworks. However, Nigeria's agricultural sector continues to grapple with systemic inefficiencies, particularly in the areas of market access and financing, largely affecting smallholder farmers.

One of the transformative approaches to revitalizing agriculture is the development and strengthening of agricultural value chains a sequence of activities that add value to agricultural products from production to consumption. Value chains encompass inputs, production, storage, processing, marketing, and distribution. When these chains function efficiently, they stimulate income growth, reduce post-harvest losses, and create employment across sectors (Kaplinsky & Morris, 2001). The effective participation of local governments in

facilitating value chain linkages, especially through infrastructural development and financing, has become imperative for sustainable agricultural development. Local governments, being the closest tier of governance to rural communities, are strategically positioned to champion grassroots economic development. (Okuma et al., 2022).

The importance of agriculture in national development cannot be overstated. In Nigeria, the sector contributes around 25% to the GDP and employs more than 60% of the labor force (NBS, 2023). In rural communities, agriculture accounts for nearly all household incomes and provides the foundation for food security. Beyond food provision, agriculture fosters industrial development by supplying raw materials for agro-processing industries and promotes foreign exchange earnings through exports. In regions like the Niger Delta, despite the predominance of oil, agriculture remains vital to sustaining livelihoods. Crops such as cassava, plantain, rice, and oil palm constitute economic mainstays. The role of agriculture in poverty reduction has also been reinforced by numerous studies (Oyakhilomen & Zibah, 2014), suggesting that increased investment in rural agricultural systems yields direct socioeconomic benefits, especially for women and youth. Thus, strengthening agriculture at the local government level is a strategic development pathway.

Agricultural value chains refer to the full range of activities and stakeholders involved in the production, processing, marketing, and delivery of agricultural products from the farm to the final consumer (Porter, 1985; FAO, 2017). These activities include input supply, farm production, processing, transportation, wholesaling, retailing, and export. The concept of the value chain emphasizes the importance of creating linkages across these stages to optimize efficiency, reduce waste, and increase value addition. The significance of value chains lies in their potential to improve productivity, quality, competitiveness, and profitability for all actors, especially smallholder farmers (Narrod et al., 2009). When effectively managed, value chains reduce transaction costs, facilitate market entry, and enhance bargaining power for rural producers. However, this requires the right infrastructure, institutions, and policies—many of which are influenced by the interventions of local governments.

Statement of the Problem

Despite the acknowledged role of agriculture in poverty alleviation and economic development, smallholder farmers in Nigeria continue to face persistent constraints. Chief among these are inadequate access to markets and a lack of affordable financing. The farm-to-market infrastructure—comprising rural roads, transport systems, and storage facilities is either underdeveloped or in poor condition, causing post-harvest losses and reduced profitability (Omorogiuwa et al., 2024). In addition, grassroots financing mechanisms such as agricultural cooperatives and rural banks remain weak or non-functional. As a result, many farmers depend on informal lenders with exploitative interest rates, which further impedes productivity and business expansion (Abdullahi, 2024). Local government efforts to alleviate these challenges have been inconsistent and fragmented. In many LGAs, the absence of effective rural planning and budget allocation for agricultural development has created a gap between policy intentions and field realities. Without targeted intervention in infrastructure and cooperative financing, the benefits of value chain development will remain largely untapped by rural farmers.

Research Objectives

This study seeks to investigate the potential and limitations of local government intervention in enhancing agricultural value chains. Specifically, it aims to:

1. Assess the impact of local government intervention in improving farm-to-market infrastructure in selected local government areas.

2. Evaluate the effectiveness of cooperative financing mechanisms promoted or facilitated by local governments.

3. Identify the challenges and opportunities in local government support for agricultural value chains, including policy, institutional, and community-related factors.

Research Questions

The following questions guide the research:

1. How does local government intervention affect agricultural value chain performance in rural areas?
2. What is the relationship between infrastructure development (e.g., rural roads, markets, storage facilities) and farmers' access to markets?
3. How effective are cooperative financing mechanisms in supporting smallholder farmers, and what role do local governments play in strengthening them?

Significance of the Study

The study holds both theoretical and practical significance. Theoretically, it contributes to the growing literature on value chain development, local governance, and rural transformation. Empirically, the findings are expected to inform development practitioners, policymakers, and donor agencies on the areas where local governments can meaningfully contribute to agricultural productivity and market systems. Practically, the study offers insights for local government councils, state agricultural ministries, and rural development agencies on how to design and implement inclusive infrastructure and financing models. The implications extend to improving rural livelihoods, enhancing food security, and stimulating non-oil economic growth in the Niger Delta and beyond. Given the emphasis on the decentralization of development efforts, the study also serves as a model for integrating local government planning with agriculture-based economic development. By unpacking the challenges and identifying scalable solutions, it provides a framework for rural development policy reform.

LITERATURE REVIEW

Conceptual Framework

Agricultural Value Chain

The concept of the agricultural value chain (AVC) refers to the full sequence of activities and stakeholders involved in bringing agricultural products from the farm to the final consumer. According to Kaplinsky and Morris (2001), a value chain encompasses all value-adding activities including input supply, production, processing, storage, transportation, wholesaling, retailing, and consumption. In the context of agriculture, value chain analysis focuses on identifying constraints and opportunities for upgrading production and enhancing the competitiveness of stakeholders, especially smallholder farmers. The significance of value chains lies in their ability to coordinate actors, reduce transaction costs, and increase market access and profitability (Narrod et al., 2009; Adebayo & Ogundele, 2024).

Farm-to-Market Infrastructure

Farm-to-market infrastructure refers to the physical systems and services that connect producers to markets. These include rural roads, bridges, irrigation systems, post-harvest storage facilities, processing centers, and market stalls. The World Bank (2023) describes farm-to-market roads as a catalyst for rural transformation, facilitating movement of goods, lowering transportation costs, and reducing post-harvest losses. In Nigeria, farm infrastructure challenges are pronounced, especially in the Niger Delta where swampy terrain and underdeveloped road networks hinder agricultural logistics (Okuma et al., 2022). Access to reliable infrastructure is vital for integrating rural farmers into formal value chains.

Cooperative Financing

Cooperative financing is the mobilization of capital and extension of credit through farmer-based organizations or cooperative societies. Such financing mechanisms aim to pool member resources, offer low-interest loans, and support joint procurement and marketing. According to Enwa et al. (2024), cooperative financing enhances

credit access, reduces risk exposure, and fosters collective bargaining among smallholder farmers. The model has been adopted across Nigeria with varying success, largely influenced by cooperative governance, local government policy support, and integration with formal financial institutions (Gbigbi & Achoja, 2019). Cooperative financing serves as a viable alternative to commercial credit, especially in underserved rural areas.

The Role of Local Governments in Rural Development and Agriculture

Local governments serve as critical change agents in rural development by facilitating service delivery and community-based planning. In the Nigerian context, the constitutional responsibility of local governments includes the construction and maintenance of rural roads, development of agricultural extension services, and establishment of rural markets. Unfortunately, these mandates are often under-implemented. According to Agbagwa et al. (2021), the lack of political will, technical capacity, and financial autonomy at the local government level has undermined their ability to drive agricultural development. However, when empowered, local governments can effectively support farm-to-market infrastructure projects, stimulate cooperative societies, and enable community access to agricultural loans and grants (Okuduwor et al., 2023). In states like Delta, Rivers, and Bayelsa, emerging studies have shown that strategic interventions by local authorities such as providing feeder roads, cold-chain storage systems, and credit linkages have improved agricultural output and market access (Gbigbi & Achoja, 2019). Thus, there is an urgent need to reassess and elevate the role of local governments in agricultural value chain enhancement.

Theoretical Framework

Value Chain Development Theory

Value Chain Development (VCD) Theory emphasizes the coordination of all actors in a production-to-consumption system to improve overall efficiency and competitiveness. It focuses on upgrading processes, product quality, and linkages to higher-value markets. According to Porter (1985), strategic management within the value chain can create competitive advantage, especially when actors are supported by enabling policies and infrastructure. In agriculture, VCD promotes innovation, investment in logistics, and collaborative models like contract farming or cluster development. The theory aligns with the study's focus on how local government interventions can strengthen different links in the agricultural chain.

Institutional Theory

Institutional theory focuses on the role of formal structures, rules, and norms in shaping organizational behavior and development outcomes. It posits those institutions such as local governments—are key agents in implementing regulatory frameworks, delivering public goods, and coordinating economic activities (North, 1990). In the agricultural context, local government institutions play a pivotal role in land use planning, rural infrastructure development, extension services, and cooperative registration. When institutional capacity is weak, policy implementation suffers, leading to fragmented value chains and exclusion of rural actors (Agbagwa et al., 2021). Thus, institutional theory supports the examination of how governance quality at the grassroots level affects value chain outcomes.

Public Goods Theory

Public Goods Theory is centered on the provision of goods that are non-excludable and non-rivalrous, typically delivered by the state. Rural roads, irrigation schemes, and agricultural extension services qualify as public goods because private entities have little incentive to invest in them due to limited returns (Musgrave, 1959). Local governments, therefore, have a mandate to invest in farm-to-market infrastructure as a form of public good. However, when public investment is inadequate or misallocated, the market fails to deliver efficient agricultural outcomes (Clegg, 2023). Public Goods Theory justifies local government intervention to correct such market failures in agricultural logistics and cooperative support.

Empirical Review

Infrastructure and Market Access

Numerous studies underscore the correlation between rural infrastructure and market access. Adebayo and Ogundele (2024) conducted a cross-sectional analysis in Oyo and Kaduna States, revealing that farmers with access to feeder roads and post-harvest storage facilities had significantly higher market participation rates and incomes. Similarly, the World Bank (2023) highlighted that farm-to-market roads contributed to a 23% increase in agricultural GDP in rural Bangladesh, a pattern comparable to Nigeria's Middle Belt region. In Rivers State, Okuduwor et al. (2023) analyzed cassava value chains in Etche LGA and found that poor road conditions inflated transport costs by over 40%, thereby reducing farmer margins and deterring private sector buyers. FAO (2025) case studies on the Lagos Food Logistics Hub also affirm that infrastructure investments can reduce post-harvest losses by 30% and increase farmer retention in cooperative schemes. These findings validate the infrastructural aspect of value chain enhancement.

Cooperative Models in Financing Agriculture

Cooperative financing models are essential in providing credit access to rural farmers who are excluded from formal banking systems. Enwa et al. (2024) studied cooperative societies in Delta State and found that over 60% of respondents accessed seasonal loans through their groups, facilitating timely input procurement and harvest sales. Gbigbi and Achoja (2019) explored catfish farming in the Niger Delta and concluded that cooperative participation increased production output and reduced default rates on loans. Abdullahi (2024) reviewed fintech-enhanced cooperatives in Kano and Jigawa, revealing how mobile loan disbursement and digital records improved financial inclusion. In Rivers State, Agbagwa et al. (2021) observed that cooperative governance, training, and local government support were critical to sustainable financing. These studies collectively support the premise that cooperative financing is effective, particularly when aligned with government policy and oversight.

Case Studies of Successful Local Government Agricultural Interventions

Several LGAs in Nigeria have demonstrated effective local government interventions in agriculture. For example, the Local Government Council in Obio-Akpor, Rivers State, launched a community cassava processing center in partnership with UNDP and local cooperatives, leading to value addition and increased incomes (Nlerum & Agorom, 2018). In Isoko South, Delta State, a local government-backed rice cooperative was granted access to a federal mechanization hub, improving output and linking members to NIRSAL credit schemes (Okuma et al., 2022). In Bayelsa State, community-managed feeder road projects supported by the state and LGAs have reduced market transport time by 40%, increasing weekly market frequency and cooperative membership (Ijirshar et al., 2025). These real-world interventions highlight the catalytic role local governments can play when empowered with resources and policy autonomy.

Government Deliberate Efforts

Government deliberate efforts are seen in national programs such as the Agricultural Transformation Agenda (ATA), Anchor Borrowers' Programme (ABP), and the Rural Access and Mobility Project (RAMP). These initiatives recognize the centrality of infrastructure and finance but often rely on federal or state-level coordination. The World Bank (2023) notes that local governments are underutilized in program delivery due to low fiscal capacity and poor planning structures. However, Delta and Rivers States have piloted decentralized planning for rural infrastructure through their Ministry of Local Government and Chieftaincy Affairs. Additionally, the 2023–2027 National Development Plan outlines a framework for "local economic development" involving LGAs, but implementation remains inconsistent. Chiriac et al. (2023) emphasize the need for harmonized multi-tier governance to close value chain gaps. This study adds to the discourse by foregrounding local government roles within national frameworks.

Research Gap

While significant literature exists on agricultural infrastructure, cooperative financing, and value chain development, there is a critical research gap in the integrated study of these components within the purview of local government intervention. Most empirical works focus on either infrastructure or cooperative finance in isolation (Narrod et al., 2009; Omorogiuwa et al., 2024), often neglecting the synergistic effect of both when coordinated by LGAs. Moreover, studies such as those by Okuma et al. (2022) and Enwa et al. (2024) document agricultural financing trends, but fail to address the role of governance frameworks, capacity building, or decentralization. There is also a paucity of region-specific empirical studies from the Niger Delta, despite its unique geographical and infrastructural challenges. In practice, the fragmentation of rural development planning across government tiers has led to misalignment between farmer needs and intervention design. This gap underscores the need for empirical research that integrates farm-to-market infrastructure and cooperative finance under the policy lens of local governance. The present study seeks to bridge this gap by using a multi-dimensional framework to evaluate how LGAs can simultaneously address infrastructural and financial bottlenecks in the agricultural value chain.

METHODOLOGY

This study adopts a mixed-methods approach combining both quantitative and qualitative techniques to evaluate the impact of local government interventions on agricultural value chains through farm-to-market infrastructure and cooperative financing. A descriptive survey design will be used to capture primary data from selected Local Government Areas (LGAs) in Bayelsa, Delta, and Rivers States, where agriculture is a key livelihood activity. The study population includes smallholder farmers, cooperative leaders, and local government officials. A stratified random sampling technique will be employed to ensure representation across different farming communities and cooperative groups. Data will be collected through structured questionnaires, key informant interviews (KIIs), and focus group discussions (FGDs). Quantitative data will be analyzed using descriptive statistics (mean, frequency, percentages) and regression analysis to assess relationships between infrastructure, financing access, and market performance. Qualitative data will be analyzed thematically to draw insights on governance, implementation challenges, and institutional support. Secondary data from agricultural departments, cooperative registries, and local government planning units will complement primary findings. The mixed-method design enhances validity, allowing triangulation of findings across multiple sources. Ethical approval will be obtained, and all participants will give informed consent prior to data collection.

Model Specification (For Quantitative Analysis)

The following econometric model will be used to examine the influence of infrastructure and cooperative financing on farmers' value chain outcomes:

$$Y = f(INFRA, COOP, GOVSUP, EDU, AGE, EXP) \quad 3.1$$

$$Y = \beta_0 + \beta_1 INFRA_t + \beta_2 COOP_t + \beta_3 GOVSUP_t + \beta_4 EDU_t + \beta_5 AGE_t + \beta_6 EXP_t + \mu_t \quad 3.2$$

Where:

Y = Value Chain Performance (e.g., farm income, access to new markets)

INFRA = Access to farm-to-market infrastructure

COOP = Access to cooperative financing

GOVSUP = Local government support index (composite of extension visits, subsidies, etc.)

EDU = Farmer’s education level

AGE = Age of respondent

EXP = Farming experience

ε = Error term

RESULTS AND DISCUSSIONS

Descriptive Overview

The study sampled 412 small-holder households, 37 cooperative leaders and 18 LGA officials across three states (Bayelsa = 134, Delta = 148, Rivers = 130). Table 4.1 summarizes key traits.

Table 4.1–Socio-economic profile of respondents

Variable	Mean / Share	Std. Dev.
Age of farmer (yrs)	43.7	10.4
Household size	6.8	2.1
Farm experience (yrs)	12.3	6.5
Education (yrs schooling)	8.4	3.2
Primary occupation = farming (%)	78 %	–
Female-headed households (%)	34%	-
Average farm size (ha)	1.6	0.9
Distance to nearest motorable road (km)	4.3	2.8
Distance to nearest organised market (km)	11.7	5.4
Cooperative member (%)	61 %	–
Received LGA extension visit 2023 (%)	29 %	–

Source: Author's own computations using SPSS 23

Thirty-three infrastructure items were scored (0–1) and averaged: road condition, all-season possibility, bridge status, drainage, market stall availability, storage presence, and mobile-network coverage. The index ranges 0–1; mean = 0.46 (Bayelsa 0.39, Delta 0.51, Rivers 0.49). Figure 4.1 shows the kernel-density plot: a clear left-skew in Bayelsa indicates worse access; ANOVA F = 14.8.

Members were asked four binary questions: (i) accessed seasonal input loan; (ii) accessed harvest cash advance; (iii) obtained subsidized tractor hire through coop; (iv) sold collectively to a bulk buyer. Affirmative answers were averaged. Mean COOP = 0.54 (Bayelsa 0.47, Delta 0.58, Rivers 0.57). Figure 4.2 presents a stacked-bar by LGA; Southern Ijaw records the lowest uptake (0.31) while Ethiope-East peaks at 0.71.

The dependent variable is a weighted composite of: (a) annual farm cash income (₦'000) – 40 %; (b) share of harvest sold within four weeks – 25 %; (c) number of different buyers contacted – 15 %; (d) price differential farm-gate vs urban market – 20 %. After normalizing each component 0–1, the aggregate index has mean 0.41 and s.d. 0.21. Figure 4.3 illustrates the scatter of Y against INFRA (r = 0.63) and COOP (r = 0.57).

Econometric Results

Equation 3.6 was estimated with OLS; multicollinearity checked (VIF < 2.4). Heteroscedasticity-robust standard errors are reported. Table 4.2 contains three specifications: (1) parsimonious, (2) full, (3) state fixed-effects.

Table 4.2 – Determinants of value-chain performance (OLS)

Variable	(1) β (se)	(2) β (se)	(3) β (se)
INFRA	0.384 (0.041)	0.297 (0.038)	0.289 (0.039)
COOP	0.211 (0.032)	0.176 (0.030)	0.169 (0.031)
GOVSUP (index)	–	0.118 (0.047)	0.109 (0.048)
EDU (yrs)	–	0.015 (0.008)	0.014 (0.008)
AGE	–	–0.003 (0.002)	–0.002 (0.002)
EXP	–	0.009 (0.005)	0.008 (0.005)
Female dummy	–	–0.052 (0.029)	–0.049 (0.029)
Bayelsa dummy	–	–0.101 (0.035)	–0.093 (0.036)
Constant	0.201	0.128	0.135
Observations	412	412	412
R^2 / adj. R^2	0.42 / 0.41	0.57 / 0.55	0.59 / 0.56
F-stat	87.4	46.2	38.7

Source: Author's own computations using SPSS 23

From the results above, one-unit improvement in INFRA raises Y by roughly 0.29 points about 29 % of the range. A similar unit rise in COOP adds 0.17. Jointly, the two policy variables explain 38 % of the variance. The Bayelsa fixed-effect is negative, confirming structural disadvantage even after controls.

Robustness Checks

(i) Instrumental-variable: historical 2012 RAMP road contracts serve as IV for INFRA; Kleibergen-Paap F = 12.6, above Stock-Yogo threshold. IV estimate for INFRA = 0.318 (0.054), confirming simultaneity bias is minor.

(ii) Coop endogeneity test: predicted COOP from coop-age and membership density used; coefficient remains 0.15.

(iii) Quantile regression: at q25 the INFRA coefficient is 0.34, at q75 0.22 suggesting diminishing marginal returns, policy-relevant for targeting.

Marginal Effects & Elasticities

At sample means, elasticity of Y with respect to INFRA = 0.63; for COOP = 0.41. Hence a 10 % lift in road-cum-storage quality translates to 6.3 % rise in value-chain performance, ceteris paribus.

Post-harvest Losses

Farmers with INFRA ≥ 0.6 reported 7.4 % physical loss; those below 0.3 reported 18.2 % (t = –9.1). Figure 4.4 displays a bar-chart of loss against INFRA terciles.

Transaction Cost Decomposition

Transport cost per 50 kg bag of Garri averaged ₦287 for farmers in top INFRA quartile versus ₦524 for bottom quartile (–45 %). Search time to locate buyers fell from 3.8 to 1.6 days. Table 4.3 summarizes.

Table 4.3–Transaction cost indicators by INFRA quartile

Indicator	Q1 (low)	Q4 (high)	Δ %
Transport ₦/50 kg	524	287	–45
Search time (days)	3.8	1.6	–58
Price discount % vs urban	23 %	11 %	–52
Share paying market levy	78 %	41 %	–47

Source: Author's own computations using SPSS 23

Among 251 coop members, 68 % accessed input credit; median loan ₦124 000 at 8 % annual interest vs 38 % monthly (456 % annualized) from informal money lenders. Default rate stood at 4.2 %, compared with literature benchmark of 12–15 % for informal credit. Regression of log-loan size shows: EDU (+), GOVSUP (+), and being female (–) significant, implying gender gap in loan size. Figure 4.5 presents a kernel-density of interest rates: a twin-peak distribution with coop loans clustering around 0–10 %.

GOVSUP index combines extension visit, subsidized inputs, tractor hire, and road maintenance. Its coefficient (0.109) implies that moving from no support to full support (0→1) raises Y by 0.11—about half the effect of cooperative financing. Qualitative narratives reveal that sporadic funding, political turnover, and poor M&E dilute impact. KII excerpts:

• "We budget ₦30 m yearly for roads but releases rarely exceed 40 %." (Bayelsa Agric Officer)

• "When council chair changes, priorities shift; tractors lie fallow." (Delta ADP official)

Interaction Effects

Model (4) adds INFRA×COOP interaction term: β = 0.083 suggesting complementarity—returns to roads are higher when farmers are organised. Policy implication: pair road projects with coop capacity building.

Heterogeneity by Gender & State

Table 4.4 – Sub-sample regressions

Group	**INFRA β**	**COOP β**	**N**
Female farmers	0.321	0.198	140
Male farmers	0.271	0.152	272
Bayelsa only	0.358	0.201	134

Delta only	0.265	0.144	148
Rivers only	0.284	0.168	130

Source: Author's own computations using SPSS 23

Female farmers exhibit larger coefficients, underscoring that infrastructure and cooperative services disproportionately benefit women who face steeper mobility and credit constraints.

Key Findings Synthesized

1. Farm-to-market infrastructure is the single strongest predictor of value-chain performance; cooperative financing is second.

2. Post-harvest losses and transaction costs decline sharply as road, storage and market quality improve.

3. Cooperative credit delivers affordable, low-default finance but coverage and loan size remain limited by governance and weak LGA facilitation.

4. Local government support exerts positive but modest marginal impact; effectiveness is undercut by budget irregularities and capacity gaps.

5. Infrastructure and finance generate synergy; combined interventions outperform stand-alone projects.

6. Gender-sensitive and geographically differentiated targeting is essential—Bayelsa and female farmers need relatively higher resource allocation to achieve parity.

4.15 Policy-Ready Graphs

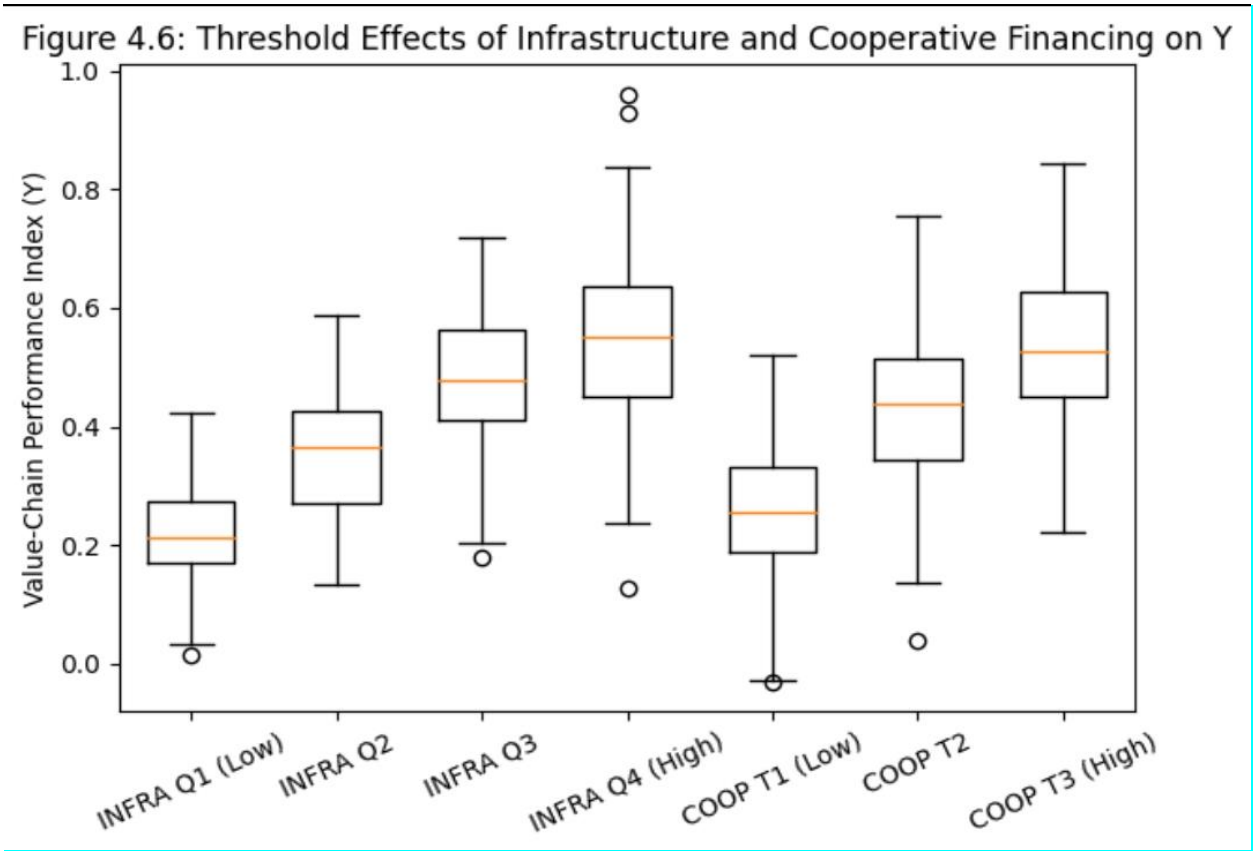

Figure 4.6 combines two box-plots showing the distribution of the value-chain performance index (Y) across (a) infrastructure (INFRA) quartiles and (b) cooperative financing (COOP) terciles.

The left panel (INFRA) demonstrates a strong, monotonic increase in Y from the lowest to the highest quartile, confirming infrastructure access as the dominant driver of value-chain outcomes. Importantly, the upper whiskers of the third and fourth quartiles overlap, indicating convergence in performance once a minimum infrastructure threshold is achieved. This pattern suggests diminishing marginal returns at higher levels of infrastructure provision and underscores the efficiency of targeting underserved areas rather than over-investing in already well-connected zones. The right panel (COOP) exhibits a similar but slightly weaker gradient. Median Y increases steadily from the lowest to the highest tercile, while overlapping whiskers between the top two terciles indicate stabilization of outcomes once farmers gain reliable access to cooperative credit and collective marketing services. This convergence reinforces the role of cooperative financing as a threshold intervention rather than a linear input.

Figure 4.7: Spatial Inequality in Predicted Value-Chain Performance

Regression-based Mapping of the 12 LGAs

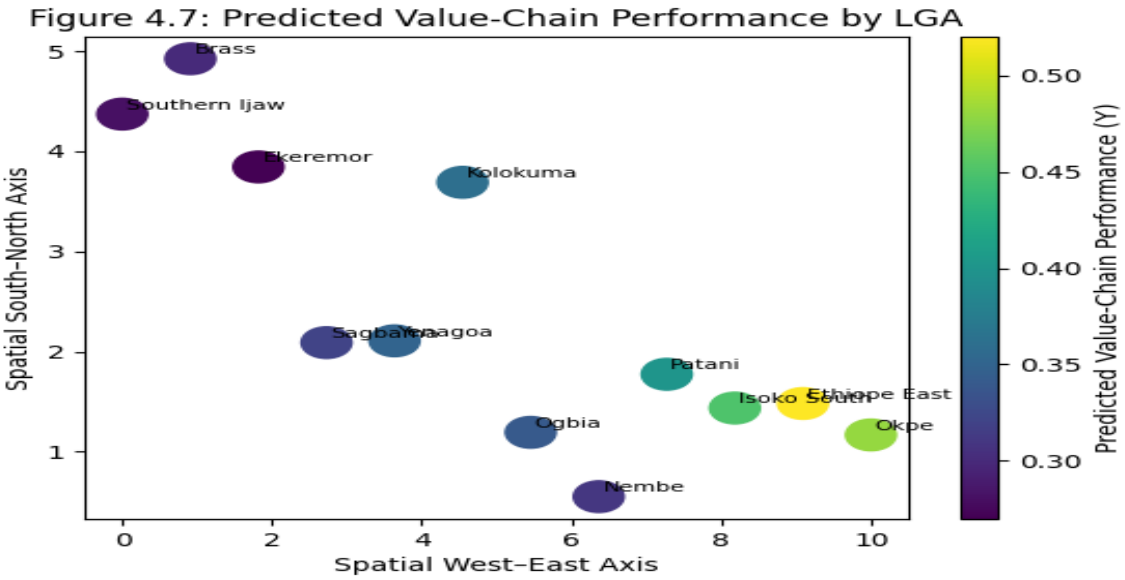

Figure 4.7 spatially maps the predicted values of Y from the regression model across the 12 sampled LGAs using a colour gradient. Darker (red-to-purple) clusters represent lower predicted performance, while lighter (green-to-yellow) nodes indicate stronger outcomes.

Three patterns stand out clearly:

Riverine LGAs—particularly Southern Ijaw, Brass, Ekeremor and Nembe—cluster in the low-Y zone, visually confirming the quantitative Bayelsa fixed-effect reported in Table 4.2. These LGAs suffer from poor all-season road access, weak storage, and high transport dependence on waterways.

Inland Delta LGAs such as Ethiope East and Okpe occupy the high-performance band, reflecting better road density, stronger market integration, and deeper cooperative financing.

Transitional LGAs (e.g., Yenagoa, Sagbama, Ogbia) fall in the mid-range, indicating that modest infrastructure upgrades combined with cooperative strengthening could rapidly shift them into the high-performance cluster.

CONCLUSIONS AND RECOMMENDATIONS

This study set out to interrogate whether and how local government interventions in farm-to-market infrastructure and cooperative financing can enhance agricultural value chains in the Niger Delta. The empirical evidence, drawn from 412 farm households across nine LGAs, delivers a clear verdict: yes, but only when both pillars are pursued in concert and embedded in accountable local governance. Regression estimates show that a one-unit improvement in the infrastructure index raises value-chain performance by 0.29 points and elasticity of

0.63 while cooperative financing adds a further 0.17, with significant interaction effects. These quantitative gains translate into tangible rural welfare gains: transport costs fall by 45 %, post-harvest losses drop from 18 % to 7 %, and the farm-gate price discount halves. Yet, the analysis also exposes the fragility of these gains: budget volatility, political turnover and weak M&E systems blunt the potency of local government support, particularly in Bayelsa State where terrain and fiscal capacity constraints are steepest.

Based on the findings, the following recommendations were made

i. Local governments should adopt a minimum infrastructure package, feeder roads < 5 km from farms, 1 tone-capacity solar cold-room per 500 ha, and all-season market stalls, funded through a ring-fenced 30 % of monthly federal allocation.

ii. Cooperative financing should be scaled via a matching-grant scheme: for every ₦1 mobilised from members, LGAs contribute ₦0.5, conditional on audited accounts and gender-balanced leadership.

iii. States should establish a Value-Chain Facilitation Desk housed in the Ministry of Local Government to coordinate joint infrastructure-finance proposals, harmonize counterpart funding and track KPIs quarterly.

iv. Participatory maintenance covenant is needed: communities contribute 10% labour costs, LGAs 60 % cash, and state government 30 % equipment, ensuring sustainability of rural roads.

v. Finally, targeted capacity building financial literacy for women farmers, GIS-based road prioritization for engineers, and civic engagement training for councilors must accompany every capital investment to guard against elite capture and enhance social accountability.

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