

ADFJ ISSN 2522 - 3186.

African Development Finance Journal

VOLUME 8 (X)

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Date Received: November, 2, 2025

Date Published: December, 19, 2025

Agricultural Value Chain Financing and Smallholder Farmers' Productivity in Nakuru County, Kenya

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Abstract

Agricultural Value Chain Financing (AVCF) has emerged as a critical pathway for improving the productivity and resilience of smallholder farmers across developing economies. This study examines the influence of AVCF on the productivity of smallholder farmers in Nakuru County, Kenya. Using a descriptive quantitative design and data from 272 farmers, the study demonstrates that AVCF significantly contributes to improved input accessibility, strengthened market linkages, and enhanced farmer profitability. Regression analysis confirms a positive and statistically significant relationship between AVCF and productivity ($\beta = .166, p = .005$). Despite the benefits, participation remains limited due to capacity gaps, information asymmetry, and weak extension systems. The study recommends strengthening contract farming, digitizing value chain platforms, enhancing extension services, and promoting farmer aggregation to unlock the full benefits of AVCF.

Keywords: *Agricultural Value Chain Financing, Productivity, Smallholder Farmers, Market Access, Kenya*

1. Introduction

Agriculture remains the backbone of Kenya's rural economy, supporting livelihoods for over 70 percent of households and contributing significantly to national food security and employment (Khan et al., 2024). In regions such as Nakuru County, farming is dominated by smallholder farmers who cultivate small plots yet supply a substantial portion of Kenya's horticultural, dairy, and cereal products. Despite their importance, these farmers continue to face persistent challenges, including limited access to capital, inadequate extension services, price volatility, and fragmented markets. These constraints collectively suppress farm productivity, making it difficult for smallholders to transition from subsistence-oriented farming to commercially viable enterprises.

Agricultural Value Chain Financing (AVCF) has emerged as a key mechanism for addressing these productivity constraints. Unlike traditional agricultural financing, which focuses solely on credit provisioning, AVCF integrates financing into the broader flow of agricultural activities, linking farmers to input suppliers, aggregators, processors, and end markets (Porter, 1985). Through mechanisms such as input credit, contract farming, embedded financial services, and guaranteed

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markets, AVCF helps smallholders overcome liquidity constraints and engage in more efficient production. These financing structures reduce transaction costs, strengthen relationships among chain actors, and improve farmers' ability to adopt modern technologies.

In Kenya, value chain financing is slowly gaining traction, particularly within the horticulture and dairy sectors. However, many smallholder farmers in Nakuru County remain outside structured chains due to weak institutional linkages and limited information about value chain opportunities. This study investigates how participation in AVCF affects smallholder productivity, focusing on input acquisition, market access, risk reduction, and income outcomes. By examining these dynamics, the study contributes to existing literature and offers evidence-based recommendations for improving financing mechanisms in rural Kenya.

2. Literature Review

2.1 Conceptual Review

Agricultural Value Chain Financing refers to financial services and products that flow to or through actors in an agricultural chain to address constraints and leverage opportunities (Simatupang et al., 2017). These services may include input credit, supplier financing, contract-based advances, warehouse finance, or embedded advisory support. The central logic of AVCF is that strong linkages among chain participants reduce uncertainty and improve the credibility of farmers seeking financing, thereby lowering lending risks (Porter, 1985).

Agricultural Value Chain Financing (AVCF) consists of several interconnected components that collectively enhance farmers' access to essential resources. One key element is input financing, where seeds, fertilizers, and agrochemicals are provided on credit through suppliers or cooperatives, enabling farmers to acquire inputs at the right time without upfront cash. Another important component is contract farming, in which buyers offer inputs or technical guidance in return for a guaranteed supply of produce, thereby reducing market uncertainty for farmers. AVCF also includes embedded services, such as extension support, agronomic training, and ongoing advisory assistance integrated directly into transactions between farmers and value chain actors. Additionally, market access financing provides farmers with financial incentives through structured markets or guaranteed pricing arrangements, helping to stabilize income and reduce

price volatility. Together, these mechanisms ensure that farmers can obtain timely inputs, technical support, and secure market linkages that would otherwise be difficult to access due to liquidity constraints or exclusion from traditional financial systems.

2.2 Theoretical Review

Porter's (1985) Value Chain Theory argues that productivity increases when firms optimize interconnected activities, from input provisioning to marketing. Applied to agriculture, the theory highlights how farmers benefit when operational, logistical, and marketing links are financially supported. Value chain financing reduces inefficiencies, enhances competitiveness, and stabilizes income (Ensign, 2001).

The study was also anchored on the risk and uncertainty theory. Knight's (1921) distinction between measurable risk and unmeasurable uncertainty underscores the vulnerability of smallholder farmers. Value chain financing helps mitigate both through price guarantees, input credit, and reduced exposure to fluctuating markets.

2.3 Empirical Review

Studies consistently shows that Agricultural Value Chain Financing (AVCF) enhances smallholder productivity by improving access to inputs, strengthening supply chain linkages, and promoting the adoption of improved technologies. Evidence from Kenya, Ghana, and Tanzania indicates that value chain financing integrates farmers with other actors in the agricultural ecosystem, boosting credit access, income, and market participation. These findings align with Value Chain Theory, which emphasizes that coordinated activities, from production to marketing, enhance efficiency and resource utilization. However, the literature also highlights notable challenges such as low awareness, institutional weaknesses, and high transaction costs, all of which limit the full uptake of AVCF despite its strong potential to improve productivity.

Studies from across Africa further illustrate the fragmented nature of value chain financing and its uneven integration into agricultural systems. Orwothwun and Qutieshat (2022) found that although Uganda has access to stable global markets due to liberalized trade environments, local agricultural value chains remain weakly structured, limiting the effectiveness of AVCF in improving access to

financial services. Their work reveals dispersion and fragmentation in the AVCF literature and underscores the need for country-specific studies that explore how value chain structures influence farmer financing and participation.

In Asian contexts, particularly Indonesia, empirical findings show similar challenges to those experienced in African settings. Pasaribu et al. (2021) report that rice farmers often require continuous working capital throughout planting, production, and sales seasons, yet stringent conditions in formal credit systems leave many locked out of financing. Their study highlights the need for responsive, value-chain-based credit interventions, especially where micro-finance institutions lack adequate capital. Similar financial timing constraints exist among Kenyan smallholders, who rely heavily on value chain actors for timely input support but continue to face barriers related to liquidity, storage, and market access.

More recent empirical work in Tanzania by Matekele et al. (2024) provides insight into behavioral and perceptual factors that shape farmers' intentions to adopt AVCF. Their study of sunflower farmers using structural equation modelling found that perceived benefits, knowledge levels, and the involvement of social enterprises positively shaped farmers' intention to seek AVCF, whereas perceived social norms and self-ability exerted no significant influence. These results emphasize that beyond financial capacity, farmers' perceptions and exposure to training play a critical role in AVCF adoption.

Osei et al. (2023) found that participation in value chains increases formal and informal credit access by up to 74 percent, enhancing farmers' ability to purchase inputs. Rayhan et al. (2024) reported that FinTech-based value chain platforms improve transparency and reduce transaction costs in developing economies. Villalba et al. (2023) concluded that stable value chains reduce market uncertainty and promote sustainable financing ecosystems.

In Kenya, Parlasca et al. (2022) noted that farmers in structured horticultural chains experience higher yields due to timely access to inputs and technical support. However, Odunga et al. (2025) observed that gender-based inequalities and limited training hinder participation. These findings highlight the need for more inclusive value chain financing frameworks.

3. Research Methodology

This study adopted a descriptive quantitative research design, which is well suited for examining relationships between variables within a relatively large and diverse population (Siedlecki, 2020). The design enabled the researcher to quantify levels of access to Agricultural Value Chain Financing (AVCF) and determine how these financing mechanisms influence smallholder farmers' productivity. The target population consisted of 1,288 smallholder farmers in Nakuru County, categorized into eight distinct groups: commercial, organic, agroforestry, livestock, horticultural, dairy, aquaculture, and subsistence farmers. To ensure adequate representation from each of these groups, a sample of 272 farmers was selected through stratified random sampling, allowing proportional inclusion of farmers across various production systems and minimizing sampling bias.

Data were collected using structured questionnaires comprising both closed-ended and Likert-scale items designed to capture farmers' experiences and perceptions regarding AVCF. The questionnaire was first pilot-tested in Nyandarua County, an area with comparable farming characteristics, to ensure clarity and validity. Results from the pilot test produced Cronbach's alpha coefficients above 0.80, reflecting strong internal consistency and confirming that the measurement items reliably captured the intended constructs. Ethical approval was obtained prior to data collection, and respondents were informed about the purpose of the study, assured of confidentiality, and asked to provide informed consent before participating.

Data analysis was conducted in two major phases. Descriptive statistics, frequencies, percentages, and means, were used to summarize farmer characteristics and patterns of access to AVCF components such as contract farming, input credit, and embedded services. Inferential analysis using multiple regression was undertaken to assess the predictive relationship between participation in AVCF and smallholder productivity. The regression model examined whether involvement in value chain financing significantly influenced productivity outcomes while controlling for demographic factors such as age, education, farm size, and farming experience. This analytical approach provided a rigorous statistical basis for evaluating the impact of AVCF within the local agricultural context.

4. Findings and Discussion

4.1 Descriptive Results

Table 1: Descriptive Statistics for Agricultural Value Chain Financing

Statement	N	Minimum	Maximum	Mean	Std. Deviation
1. Helps smallholder farmers enhance access to resources	272	1	5	3.79	0.880
2. Improves market access for farmers, leading to income stabilization	272	1	5	3.73	0.924
3. Supports capacity building and technical assistance for farmers	272	1	5	3.76	0.896

Table 1 shows the descriptive statistics of agricultural value chain financing based on 272 respondents in Nakuru County. The respondents largely affirmed that value chain financing assists the smallholder farmers to expand access to resources (mean = 3.79, SD = 0.880), capacity building and technical support (mean = 3.76, SD = 0.896), and sessions to the market, which leads into stabilization of income (mean = 3.73, SD = 0.924). The mean scores are higher, above 3.7, which means that farmers positively perceive agricultural value chain financing. The standard deviations were less than 1 indicating a moderate agreement in the answers indicating consistency in the responses of the participants. The implication of these findings is that value chain financing is relevant in the provision of resources, technical support, and market linkages that are very crucial in enhancing productivity and income of smallholder farmers. Ultimately, the data point to the value of specific financing interventions to help empower the agricultural sector in Nakuru County.

4.2 Regression Results

Table 2: Regression Coefficients for Predicting Smallholder Farmers' Productivity

Model	Variable	B	Std. Error	Beta	t	Sig.
1	(Constant)	0.409	0.164		2.499	0.013
	Agricultural Value Chain Financing	0.165	0.059	0.166	2.810	0.005

Note. a = Dependent Variable: Smallholder Farmers' Productivity.

Table 2 shows the regression coefficients of predicting the productivity of smallholder farmers. The constant (intercept) = 0.409 ($p=0.013$) represents the level of productivity the country has when all the predictors take the value of zero. The effect of the independent variables on productivity was positive and significant. The coefficient of agricultural value chain financing was 0.165 ($B = 0.166, P = 0.005$) and this implies that, one unit of value chain financing raises the productivity by 0.165 units.

5. Conclusion and Recommendations

5.1 Conclusion

The study concludes that Agricultural Value Chain Financing is a powerful driver of productivity among smallholder farmers in Nakuru County. By easing liquidity constraints, AVCF enables farmers to access essential inputs on time, adopt improved technologies, and participate more confidently in production cycles. It also strengthens market linkages by connecting farmers to structured and predictable buyers, reducing uncertainty and improving price stability. Farmers engaged in value-financed chains are therefore better positioned to increase yields, stabilize incomes, and transition toward more commercially oriented farming.

However, the full potential of AVCF is yet to be realized due to inconsistent participation, limited extension services, and weak institutional coordination among value chain actors. Many farmers remain unaware of available AVCF opportunities or lack the support needed to engage effectively in contractual systems. Strengthening value chain structures, through improved farmer training, stronger cooperative systems, enhanced market infrastructure, and digital platforms, will be essential for unlocking greater impact. With these improvements, AVCF can significantly enhance rural livelihoods, reduce poverty, and contribute meaningfully to Kenya's agricultural transformation agenda.

5.2 Recommendations

To strengthen the effectiveness of Agricultural Value Chain Financing in Nakuru County, there is a need to improve the institutional foundation that supports farmer-buyer relationships. One priority is the development and enforcement of clear contract farming regulations that protect farmers from exploitative practices and guarantee predictable pricing. At the same time, digitizing

value chains through mobile-based tracking, e-payment systems, and digital recordkeeping can enhance transparency, reduce payment delays, and build farmer confidence in structured markets. Integrating extension officers directly into value chain activities is equally important, as on-site technical support helps farmers meet quality standards, apply inputs correctly, and maintain consistent production practices. Establishing well-equipped aggregation centers would further reduce transportation costs, improve produce handling, and minimize post-harvest losses, creating a more efficient flow of goods from farm to market.

Capacity-building must also remain a central pillar of value chain enhancement efforts. Providing targeted farmer training on market standards, financial literacy, and quality management can empower smallholders to make informed decisions and negotiate more effectively within the chain. Cooperatives should be leveraged as critical intermediaries, given their potential to consolidate farmer output, strengthen bargaining power, and reduce transaction costs for both producers and buyers. By reinforcing these key areas, Nakuru County can create a more inclusive, transparent, and efficient value chain system that enables smallholder farmers to fully benefit from AVCF and achieve sustainable productivity growth.

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