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# Livestock Marketing Systems, Competitive Rivalry and Commercialization in Turkana County, Kenya

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**Abstract:** Livestock commercialization in pastoral drylands depends on market organization, capital, information, infrastructure, trader relationships and institutions under climate and security risks. This study examined livestock marketing systems and competitive rivalry in Nanam, Lokiriama and Kainuk secondary markets in Turkana County, Kenya. A mixed-methods, non-experimental design combined questionnaire data from 168 traders, 56 per market, with interviews, market observations and secondary evidence. Descriptive statistics, analysis of variance and thematic analysis examined market structure and competition. Trading was widespread but fragmented: barter, informal transactions and cash-based sale yards coexisted with Livestock Marketing Association (LMA) and co-management arrangements. Respondents reported weak organization, inadequate capital, transport constraints and poor terminal-market linkages. Competitive-rivalry scores differed significantly, $F(2, 165) = 39.966$, $p < .001$: Nanam recorded a mean of 3.62, Lokiriama 2.79 and Kainuk 2.94. Overall, 56.52% disagreed or strongly disagreed that competition was well exercised, and 60.7% rejected the adequacy of trader capital. Qualitative evidence associated stronger financial resources, information, transport and downstream networks with greater purchasing and bargaining capacity. Smaller traders could become suppliers or intermediaries rather than independent competitors. The study proposes integrated commercialization through commercially capable organizations, transparent pricing, finance, logistics, animal-health services and structured buyer relationships. Existing pastoral institutions should be progressively connected to higher-value markets, while public actors concentrate on facilitation, regulation and public goods. Success should be measured through producer and trader margins, transaction costs, buyer diversity, repeat trade, private investment and resilience, rather than market numbers or livestock sales alone.

**Keywords:** *Livestock marketing systems; Competitive rivalry; Market power; Commercialization; Market information; Pricing; Pastoralism; Turkana County; Kenya; drylands.*

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## Introduction

Livestock markets connect dispersed pastoral production with urban, regional and cross-border demand. In Kenya's arid and semi-arid lands (ASALs), livestock provide food, income, savings, social value and a store of wealth. Their importance extends beyond marketed output to wider economic and environmental services. Nevertheless, participation in trade does not ensure profitable commercialization: returns depend on transaction costs, buyer alternatives, resources and the distribution of bargaining power.

Turkana presents these challenges across extensive, climate-stressed rangelands. Recurrent drought, limited forage and water, insecurity, animal disease, long distances and weak transport raise marketing costs. Producers use local exchanges, barter, sale yards and local, external or cross-border traders to obtain cash and household necessities. These channels coexist because different households and traders face different liquidity, mobility and institutional conditions.

Prices are commonly negotiated rather than established through standardized commodity exchange. Animal species, breed, age, sex, body condition, live weight, intended use and perceived quality influence buyer preferences. Demand, seller urgency, assessment skills, information and bargaining alternatives also shape transactions. Better-informed traders can identify price differentials and source animals for particular buyers; producers without such knowledge may miss higher-value opportunities. Drought, household cash needs and threatened livestock losses can intensify pressure to accept immediate offers.

Kenya's livestock policy prioritizes commercialization, market access and institutional development. The national economic context also recognizes livestock within agricultural activity. Converting these opportunities into local benefits requires coordinated finance, information, infrastructure and buyer relationships, alongside production and resilience services.

This study assessed the structure and organization of livestock marketing in Nanam, Lokiriama and Kainuk; examined competitive rivalry and unequal market power; and considered how pricing, information and market linkages relate to commercialization and performance. It further developed a

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pathway for efficient, inclusive and commercially sustainable markets that improves producer and trader participation, market opportunities and local value capture. Pricing and buyer behaviour are examined as mechanisms within this broader market-systems analysis, rather than as separately estimated causal relationships.

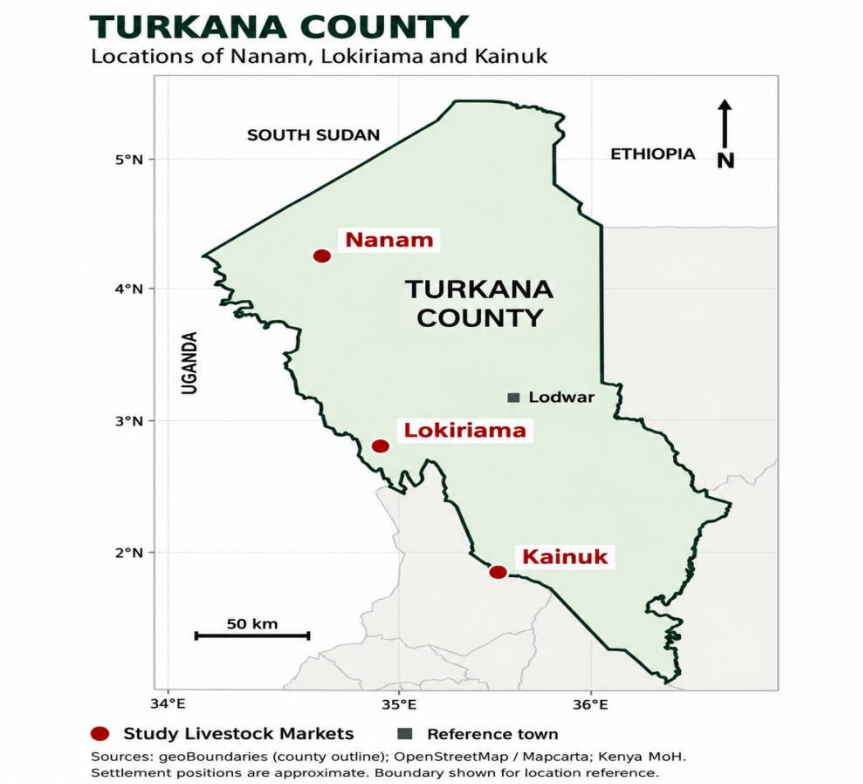



*Figure 1: Map of Turkana County showing surveyed livestock markets. Source: Researcher made.*

## Literature Review

### Market access commercialization and demand

Research in Turkana and other dryland areas identify distance, poor roads, limited facilities and weak connections to higher-value destinations as persistent barriers to livestock-market development (Watson & van Binsbergen, 2008; Nyariki & Amwata, 2019). Primary markets assemble animals from dispersed producers; secondary markets aggregate and redistribute them; terminal markets connect livestock to final demand. Related Turkana research concerns Kakuma, Lokichar and Kalemng'orok, which are distinct from the three markets examined here (Anno, Nakeno, et al., 2024).

Population growth and urbanization create demand for animal-source foods while increasing pressure to meet requirements for quality, supply and timing (Abu Hatab et al., 2019). Commercialization consequently involves predictable, profitable and coordinated participation, rather than simply more livestock sales. Barrett's (2008) review of smallholder market participation emphasizes the importance of assets, organization and transaction costs; its relevance here is conceptual, because much of that evidence concerns food crops.

Capturing demand requires production and animal selection aligned with buyer specifications, consistent aggregation and viable logistics (Ministry of Agriculture, Livestock, Fisheries and Co-operatives, 2020). Urban meat outlets, institutions, processors, regional buyers and specialized products may offer opportunities, but additional returns must exceed grading, transport, holding, compliance and coordination costs. Product perishability and declining animal condition during prolonged movement further limit the benefits of distant-market prices.

### Rivalry resources and trading margins

Turkana studies link market access and competition with secondary-market performance and examine how disruptive rivalry might be addressed (Anno et al., 2023; Anno, Ekuwom, et al., 2024). The objective is competition that improves producer choice, services and price discovery, while avoiding arrangements that concentrate benefits or exclude smaller actors.

Trader numbers alone cannot demonstrate effective competition. Better-capitalized traders can buy larger volumes, finance movement, absorb fluctuations and reach terminal buyers, while local traders may operate within narrower outlets. Northern Kenyan evidence also shows why gross purchase-sale price differences should not be equated with profit: operating costs and risks can absorb apparent margins (Roba et al., 2019).

These findings support analysis of the relationships between finance, information, mobility and market power. Investments in sale yards or trader entry may have limited effects when their users lack working capital and reliable downstream demand. Market development must therefore address the commercial services and incentives that connect individual transactions across the chain (Kenya National Bureau of Statistics, 2025).

### Information institutions and resilience

Information asymmetry influences bargaining because producers may know immediate offers but lack destination prices, quality requirements and buyer alternatives. Evidence from grain markets in Niger and fisheries in India indicates that mobile

communication can improve market coordination, which can help improve livestock marking in Turkana (Aker, 2010; Jensen, 2007). Local benefits depend on whether actors can use information through finance, aggregation and transport.

Collective marketing can pool small, irregular consignments, coordinate sales and reduce costs. Supply nevertheless reflects household assets, production and market conditions, as pastoral and agro-pastoral evidence from Ethiopia illustrates (Abebe et al., 2025). Associations require trust, accountability and services worth financing. Ostrom (1990) provides a useful institutional perspective on collective action, although common-resource governance does not itself establish the profitability of trader cooperatives. Informal networks can also sustain trade where formal institutions are weak, as Little's (2003) account of Somalia illustrates.

Drought increases household cash needs while reducing animal condition and potential prices. Kenyan evidence highlights the interaction of livelihood conditions, drought, insecurity and channel choice (Ndiritu & Gichuki, 2025). McPeak (2004) distinguishes income and livestock-asset shocks in northern Kenya, cautioning against assuming that all shocks produce identical sales responses. Shikuku (2025) addresses livestock-marketing risks in African drylands. Planned commercial sales and distress sales must therefore be distinguished when evaluating market participation and herd recovery.

Commercialization also interacts with rangeland condition, mobility, animal health and resource governance. Retaining unproductive animals or expanding herds without adequate forage can increase ecological pressure; strategic off-take and better herd quality may support resilience. Odhong et al. (2025) examine rangeland management and marketing alongside adaptive capacity, food and nutrition security and greenhouse-gas emissions in extensive livestock systems, while Ndiritu et al. (2025) emphasize policy implementation and institutional coordination in Kenya's pastoral systems.

### Analytical framework

Game-theoretic reasoning interprets strategic bargaining and repeated cooperation among producers, traders and buyers (Gibbons, 1992). Porter's (2008) competitive-forces perspective considers rivalry, buyer and supplier power, substitutes and entry barriers. North (1990) helps explain how formal rules and informal institutions shape economic exchange. These are interpretive lenses, not estimated structural models. A market-systems perspective connects core transactions with finance, transport, veterinary services, information, organizations, weighing, grading, regulation and cross-border institutions under climatic and social uncertainty.

The figure below integrates game-theoretic reasoning, Porter's competitive forces and a market-systems perspective to explain livestock market performance in pastoral settings. It shows how actors' strategies and competition interact with core transactions, supporting services, infrastructure, and formal and informal rules, while being shaped by climate shocks, mobility, information gaps and social relationships. These interactions influence market efficiency, competitiveness, inclusion, resilience and household incomes, with feedback and adaptation informing improved strategies, investment, policy and governance.

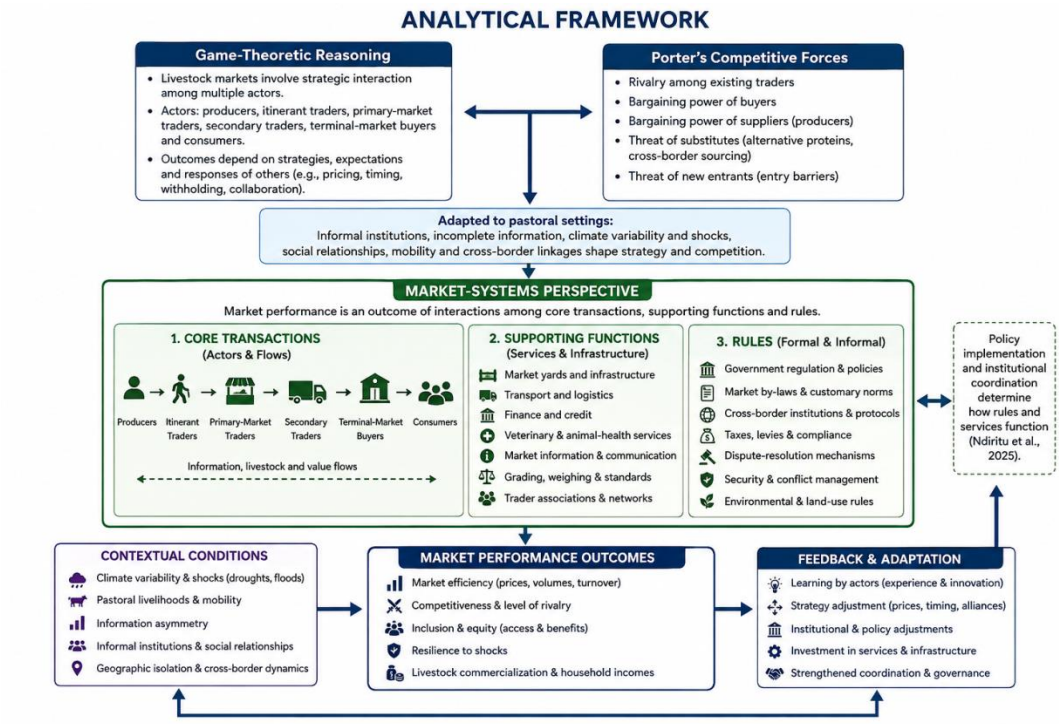



*Figure 2: Analytical framework applied to the study. Source: Researcher made.*

## Methods

### Design, participants and evidence

The study used a mixed-methods, non-experimental design in Nanam, Lokiriama and Kainuk secondary livestock markets. Quantitative evidence came from 168 livestock traders, with 56

respondents in each market. Qualitative material comprised interviews with traders and government and civil-society personnel, observations of market operations and secondary evidence. Questionnaires combined closed and open-ended items; interviews addressed livestock production, marketing, pricing, competition and policy.

The reported overall Cronbach's alpha was .832, major analytical scales exceeded .79, and the test-retest coefficient was .821. These coefficients indicate reported instrument consistency and stability; they do not independently establish representativeness, causal validity or the accuracy of individual transactions.

**Analysis and interpretation**

Descriptive statistics summarized trader characteristics and perceptions of trading systems. Analysis of variance (ANOVA) examined differences in competitive-rivalry scores among markets, with a significance threshold of .05. Non-parametric tests were used where assumptions were not met. Tukey post-hoc comparisons identified the market pairs responsible for significant differences. Qualitative evidence was analyzed thematically to explain patterns in organization, resources, relationships and institutional capacity.

Interpretation combines the two evidence streams while keeping their roles distinct. Survey percentages describe respondents' assessments; interviews and observations explain perceived mechanisms and experiences. The observational, cross-sectional design supports associations and contextual explanations, not experimental estimates of effects. Suggested interventions are implications of the evidence rather than tested programme outcomes.

**Scope of reported results**

The principal quantitative results concern trading arrangements, organization, capital, terminal-market movement and competitive rivalry. Qualitative analysis adds four connected themes: hybrid and fragmented exchange; capital and information inequalities; cooperation and changing rivalry; and institutional constraints on commercialization. Results are consolidated below to avoid counting repeated descriptions of the same finding as independent evidence.

The three study markets constitute the empirical scope. Other Turkana market locations cited in the literature provide context rather than additional observations in this sample. Likewise, the wider network described in the manuscript as 51 markets is not the survey population actually covered.

## Results

**Trading arrangements and market integration**

Livestock trading was widely recognized: 70.5% agreed that it was practiced locally, comprising 38.3% agreement and 32.2% strong agreement. The remaining 29.5% did not affirm the statement. Local traders were recognized by 60.8%, including 33.5% agreement and 27.3% strong agreement. They connect producers to wider markets by purchasing animals, providing liquidity and facilitating aggregation, although their presence does not establish adequate commercial capacity.

Barter remained relevant to 42.7% of respondents: 12.5% agreed and 30.2% strongly agreed. Modern sale-yard trading was recognized by 46.4%, comprising 25.0% agreement and 21.4% strong agreement. The combination indicates a hybrid system in which traditional exchange, informal negotiation and formal facilities coexist. Neither sale-yard availability nor cash transactions had fully displaced other arrangements.

Terminal-market integration was weak. A combined 63.0% rejected the statement that local traders transported animals to terminal markets: 21.5% disagreed and 41.5% strongly disagreed. This perception indicates limited onward connections rather than an absence of local trading. Restricted buyer alternatives can prevent local supply from accessing stronger downstream demand.

Overall organization attracted similarly negative assessments. A combined 59.46% disagreed that marketing was well organized, consisting of 26.25% disagreement and 33.21% strong disagreement. Thus, the main organizational challenge concerns coordination and service capacity within an active livestock economy.

Capital was another substantial constraint: 60.7% disagreed that traders had adequate capital, including 14.3% disagreement and 46.4% strong disagreement. Working-capital shortages can restrict purchases, consignment size, transport, holding time and the ability to wait for suitable buyers. These mechanisms are supported by qualitative accounts rather than separately quantified effects.

Taken together, the results distinguish participation from integration. Trading is common, local intermediaries remain important and formal facilities are emerging, but capital, organization and terminal-market connections lag behind. Improving commercialization therefore requires complementary financial, logistical, informational and institutional capabilities.

Reported percentages are retained at their original precision. Their item-specific denominators and weighting are not provided, so respondent counts and unreported response categories cannot be reconstructed reliably from the total sample of 168.

**Competitive rivalry across markets**

The overall competitive-rivalry mean was 3.12 (SD = 0.63), described in the manuscript as moderate. Nanam recorded the highest score, 3.62 (SD = 0.49), followed by Kainuk, 2.94 (SD = 0.44), and Lokiriama, 2.79 (SD = 0.62). Each market contributed 56 respondents. The variation indicates that traders did not experience a uniform competitive environment.

ANOVA identified significant differences, $F(2, 165) = 39.966$, $p < .001$. Tukey comparisons showed significant differences between Nanam and Lokiriama and between Nanam and Kainuk; Lokiriama and Kainuk did not differ significantly. These findings establish an association between market location and reported rivalry, without demonstrating which local conditions caused it.

A separate assessment of whether competition was well exercised was predominantly negative. Overall, 56.52% disagreed or strongly disagreed, comprising 23.38% disagreement and 33.14% strong disagreement. Positive responses totaled 30.15%, including 10.5% agreement and 19.65% strong agreement. The reported positive and negative totals leave 13.33% outside those categories; its response label is not specified.

The two measures address different questions. A higher rivalry score describes perceived competitive intensity; it does not automatically establish transparent pricing, fair access or superior producer welfare. Likewise, multiple traders can be present while competing with markedly unequal resources.

Qualitative accounts linked greater purchasing capacity to working capital, external buyer networks, transport and knowledge of destination demand. Better-resourced traders could acquire larger volumes, absorb holding and movement costs and wait for advantageous conditions. Smaller traders often needed rapid sales to recover funds, limiting their negotiating options. Some became suppliers or intermediaries for larger actors.

Nanam's higher score may reflect differences in accessibility, trader concentration, livestock volumes, finance, buyer diversity or external connectivity, but those explanations were not isolated statistically. Market-specific diagnosis is therefore warranted before adopting a uniform intervention.

The evidence supports strengthening effective participation rather than treating trader entry as sufficient. Finance, information, aggregation, transport and buyer relationships could improve smaller actors' ability to compete, while maintaining the potential benefits that external buyers bring to producers. The study does not establish that equal capital or trader protection is a necessary condition for beneficial competition.

The figure below illustrates livestock trading arrangements, market integration, and competitive rivalry across the surveyed markets. It shows that livestock trading is active locally, with 70.5% of respondents affirming its practice and 60.8% reporting local traders' participation in marketing, but connections to wider markets remain weak. Only 15.5% agreed that local traders transport animals to terminal markets, 20.6% considered livestock marketing well organised, and 14.3% reported adequate trader capital. Meanwhile, 42.7% indicated continued use of barter, while 46.4% reported trading in modern sale yards, suggesting uneven market modernisation. These findings highlight the need to strengthen access to finance, market coordination, trading infrastructure and linkages with terminal buyers to translate local trading activity into a more integrated and competitive livestock market system.

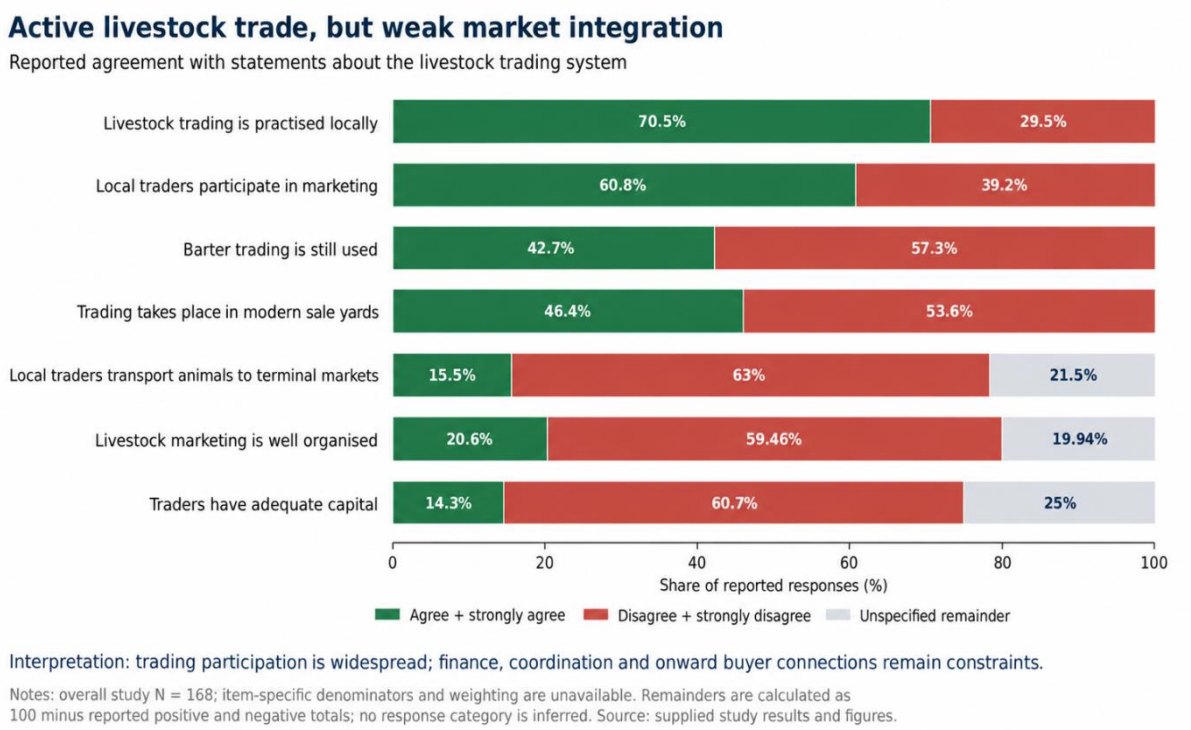



*Figure 3: Trading arrangements, marketing arrangements, and competitive rivalry in markets.*

The figure below illustrates trader capabilities, relationships and institutional pathways to market integration across the surveyed markets. It shows significant differences in competitive rivalry across the three livestock markets (N = 168), with Nanam recording the highest mean score (3.62), followed by Kainuk (2.94) and Lokiriama (2.79), against an overall mean of 3.12. Nanam differed significantly from both other markets, while Kainuk and Lokiriama did not differ significantly. Nevertheless, perceptions of how competition operates were predominantly unfavourable: 56.52% disagreed that competition was well exercised, compared with 30.15% who agreed, while 13.33% were unspecified. These findings indicate that stronger rivalry does not necessarily translate into fair market access, transparent pricing or improved producer welfare.

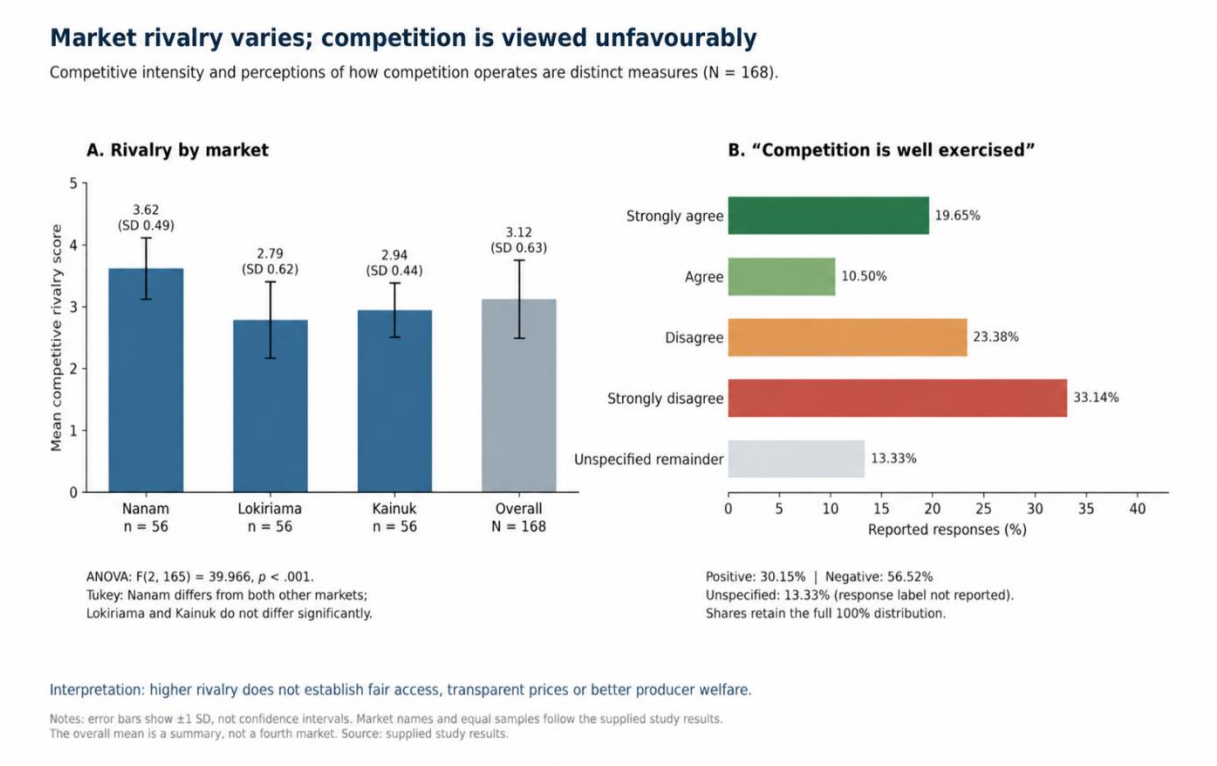



*Figure 4: Trader capabilities, relationships and institutional pathways to market integration.*

**Hybrid exchange and unequal competitive capacity**

Interviews and observations described commercialization as new arrangements layered onto existing pastoral institutions. Animals move through informal exchanges, barter, primary and secondary markets, sale yards and relationships with downstream traders. In remote areas, livestock exchanged for food, household goods and other necessities enable transactions when cash and formal financial services are scarce. Barter consequently retains an adaptive role, although heterogeneous exchange values can obscure price comparison.

Sale yards provide recognizable assembly points for buyers, sellers, inspection and transaction coordination. Nevertheless, facilities can continue to depend on personal relationships and individual negotiation. Informants perceived physical infrastructure as more developed than the commercial and institutional links supporting it. Vehicles, transport costs, insecurity and weak relationships with large buyers restricted onward movement even when livestock were locally available.

Fragmentation was geographical and commercial. Dispersed producers offered small consignments at different times according to cash needs, herd composition and seasonal conditions. Traders differed in mobility: some served local markets, while others reached secondary, terminal or external destinations. These differences influenced access to demand and opportunities to capture value.

Working capital repeatedly distinguished presence in a market from competitive capability. Local traders could know producers and available animals yet lack funds for sufficient purchases. Better-capitalized competitors could finance larger consignments and longer holding periods. Some small traders bought limited quantities and resold to larger actors, gaining an outlet but remaining dependent on their liquidity and downstream access.

Information reinforced these differences. Connected traders knew wider demand, prevailing destination prices and potential buyers; producers and smaller traders often knew only local offers. This asymmetry affected their ability to compare alternatives and negotiate. Market information therefore operated as a commercial resource and source of bargaining power.

Respondents emphasized that information has limited practical value without the means to act on it. A higher terminal price offers little advantage when transport, working capital or minimum consignment volumes remain unattainable. Local knowledge and producer relationships can complement larger traders' finance and destination networks, but cooperation may also create dependency. Strengthening competition requires these capabilities to develop together rather than delivering information as an isolated service.

**Trader relationships and institutional capacity**

Trader relationships combined cooperation and rivalry. Familiarity and repeated dealing reduced uncertainty between producers and local traders. Traders also shared information, advanced funds, coordinated transport and facilitated buyer access. At local and primary levels, these arrangements helped transactions proceed despite individual liquidity constraints.

At higher market levels, aggregation, movement and holding required larger financial commitments. Secondary traders could purchase quantities beyond the capacity of small local traders, creating vertical dependence. Tertiary or external traders sometimes purchased directly from producers, bypassing intermediaries. Such entry could widen producer choice and improve immediate offers while reducing local traders' business opportunities. Its consequences therefore differed across actors.

Networks also had two effects. Trusted relationships lowered transaction costs, but established participants could enjoy preferential access to information, suppliers and buyers. Newcomers and smaller traders could struggle to obtain equivalent connections. Competition consequently operated within interdependent networks rather than among entirely independent businesses.

Livestock Marketing Associations (LMAs) and co-management arrangements supported sale-yard operations, coordination and movement toward cash-based exchange. Their institutional presence was useful, but respondents identified limited capacity for capital mobilization, commercial governance, aggregation and negotiation with large buyers. Administrative organization alone did not supply members with viable business services.

Respondents favored stronger organizations capable of pooling resources, collective marketing, transport coordination, market intelligence, finance access and quality assurance. Commercially governed cooperatives were considered a possible model where local conditions supported them. Their viability would depend on trusted management, accountability, member incentives and demonstrable benefits that members would support financially.

Institutional development was understood as gradual and demand-led. Government and development partners could establish infrastructure, provide public information, improve regulation and facilitate relationships, while commercial actors increasingly assumed trading functions. Permanent external operation of core businesses could weaken sustainability.

Across the four qualitative themes, active trade coexisted with weak integration. Informal institutions, larger external traders and collective arrangements each offered useful functions and possible constraints. The proposed transition connects these resources through transparent agreements, shared logistics and wider buyer access, retaining adaptive pastoral institutions while improving commercially meaningful outcomes.

## Discussion

### Participation, integration and pricing

The findings show why market activity should be distinguished from profitable commercialization. Sale yards create trading locations, yet livestock may remain in thin local markets when working capital, transport and buyers are unavailable. The combination of widespread trade and perceived weak terminal movement is consistent with Turkana's established market-access constraints (Watson & van Binsbergen, 2008). Improving isolated facilities is unlikely to resolve failures in the links between them.

Barter, cash transactions and negotiated relationships perform different functions. Formalization can improve records, standards and transparency, but informal mechanisms can supply liquidity and trust where formal services are limited. Development should build on useful existing practices, while making costs, quality and pricing easier to compare. This interpretation is consistent with institutional analysis and evidence of resilient informal exchange elsewhere in the region (Little, 2003; North, 1990).

Negotiated prices reflect animal attributes, destination demand and the seller's alternatives. Better information and assessment skills may improve bargaining, but actual gains depend on affordable logistics, working capital and available buyers. Communication evidence from other commodities supports testing information services rather than assuming their effects transfer automatically to pastoral livestock (Aker, 2010; Jensen, 2007).

### Competition capabilities and value capture

The rivalry results indicate spatial differentiation, while qualitative evidence explains how finance and networks may shape competitive capacity. Stronger rivalry in Nanam cannot by itself establish better margins or fairer value distribution. Measures of competition quality should include producer offers, buyer alternatives, payment reliability and the costs of switching channels.

External buyers may increase producer choice even when they threaten local intermediaries. The practical response is to develop local traders' capabilities and commercially useful roles, not infer that restricting external entry would benefit producers. Local sourcing knowledge can complement downstream finance, but purchasing terms and service charges should make the allocation of benefits visible.

Gross trading spreads also require careful interpretation. Transport, holding, losses, fees and uncertainty can absorb apparent returns (Roba et al., 2019). Consequently, interventions should assess net margins and risk alongside prices and volumes. The study supports these priorities but does not directly estimate profits, concentration ratios, buyer conduct or causal price effects. Its evidence identifies constraints and plausible mechanisms requiring transaction-level validation.

## Commercialization pathway and recommendations

### Build the commercial foundations

Strengthen producer and trader organizations around services members need: aggregation, collective sales, intelligence, finance access, quality assurance and buyer negotiation. Reinforce LMAs and co-management structures; consider cooperative conversion only where governance, incentives and business feasibility justify it. Judge performance through delivered services and member benefits rather than registration or membership totals.

Develop working-capital and asset-finance products suited to livestock purchases, transport and holding costs. Prioritize the viable business needs of low-capital local traders and groups so they can assemble economic consignments and access wider outlets. Financial support should be linked to commercial records, repayment capacity and realistic transaction margins.

Invest in feeder roads, sale yards, holding grounds, water points, loading facilities, animal-health services and weighing and grading along livestock corridors. Design these assets as a connected logistics system. Reliable vehicles, handling and dispatch arrangements are as important as market premises.

Provide timely information on prices, supply, demand, buyer specifications, destination markets and transport costs. Combine mobile and digital services with locally accessible communication. Transparent animal assessment, live-weight measurement and quality standards should strengthen price discovery and comparability.

**Integrate buyers and scale viable services**

Link producers and local traders systematically to secondary and terminal traders, processors, institutional buyers and regional or cross-border outlets. Buyers should communicate volume, animal characteristics, quality and timing requirements. Aggregation and purchasing agreements should coordinate supply, logistics and payment, while preserving opportunities for alternative buyers.

The proposed sequence is local strengthening, aggregation, secondary-market integration, terminal-buyer relationships, viable value addition and diversification, regional or cross-border expansion, and commercially sustainable scaling. Advancement should follow demonstrated demand and financial performance. Specialized products and processing should be assessed for net additional value after investment, operating and compliance costs.

**Sustain inclusion resilience and public functions**

Integrate early warning, feed and water security, animal health, planned off-take and drought-responsive finance to reduce distress sales. Expand women's and youth enterprises in core and supporting market functions. Public actors should progressively concentrate on infrastructure, regulation, public information, veterinary services and facilitation, while private and producer organizations manage commercial operations. Progress should be measured through margins, transaction costs, consistent volumes, repeat buyers, buyer diversity, private participation, local value capture and resilience to climate and market shocks.

## Conclusion, limitations and future research

**Conclusions**

Turkana's livestock economy is active but commercially fragmented. Barter, local networks and cash-based sale yards coexist, while weak organization, inadequate capital and limited terminal-market access constrain value capture. Competitive rivalry differs significantly among Nanam, Lokiriama and Kainuk; unequal finance, information, transport and buyer connections influence the opportunities available to smaller actors. Cooperation helps livestock move but may also create dependency.

Sustainable commercialization requires commercially capable institutions and stronger links from producers through local and secondary traders to terminal, regional and cross-border demand. Existing pastoral arrangements should be connected to transparent pricing, aggregation, finance, logistics, animal health and quality assurance. Success depends on profitable, repeatable and resilient participation, not simply more market facilities or animals sold.

**Limitations**

Evidence covers three secondary markets and cannot represent the wider 51-market network referenced in the manuscript. The cross-sectional design and partial reliance on perceptions prevent causal interpretation. Transaction-level prices, costs and profits, longitudinal outcomes and disaggregated inclusion benefits remain unmeasured. Reporting gaps in sampling, fieldwork timing, qualitative sample size, ethics and item denominators further constrain replication and interpretation. The proposed pathway has not been evaluated as an intervention.

**Priorities for future research**

1. Collect longitudinal transaction data on live weight, species and animal characteristics, purchase and sale prices, transport and holding costs, losses and margins to explain pricing, profitability and value distribution.
2. Test whether mobile and real-time information improves prices and bargaining when capital, aggregation and transport constraints are considered together; assess accessibility and actual use, rather than platform availability alone.
3. Examine the feasibility of commercially strengthening LMAs or converting them to cooperatives, including governance, trust, member incentives, capital mobilization, collective sales, logistics and lasting buyer relationships. Assess women's and youth participation and benefits within these enterprises.
4. Distinguish planned and distress sales over drought cycles by tracking timing, volumes, destinations and herd recovery. Evaluate early warning, off-take, feed, water, animal health, insurance and drought-responsive finance.
5. Assess diversification into processors, institutional markets, specialized products and regional or cross-border trade. Investigate consumer preferences, grading, animal-health standards, regulations, trade barriers, transaction costs, investment viability and the distribution of any additional value among producers, local traders and downstream businesses.

**Disclaimer**

- The views stated in this article are those of the author and do not necessarily represent those of any of the entities mentioned.

**Interest Conflicts**

- The author declares no conflict of interest whatsoever in this publication.

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