
Impact of Traders Competitive Rivalry on Supply and Demand Relations in Livestock Markets in the Drylands of Kenya

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Abstract: Globally, the livestock sector is rapidly growing and contributing 40% of the total value of agricultural output. Livestock keeping is one of the main vibrant economic sectors in many Africa countries. In Kenya, livestock contributes 12% to the national Gross Domestic Product (GDP) and 42% to Agricultural GDP. 80% of Kenya's landmass is Arid and Semi-Arid, home of about 16 million people dependent on agro-pastoral livelihoods. Though the largest Kenya region, Turkana County is the poorest, with 70% of the population depending entirely on livestock keeping. While many impediments retard the development of livestock in Kenya's drylands, using the case of Turkana County, the study objectives focused on the effects of competitive rivalry evident in many markets and its effects on the supply and demand relations, and the impact of theory integration on the supply and demand in markets. 168 primary respondents (Livestock traders) and 24 secondary respondents (Government and Civil Society employees) were sampled to participate in the study. The study results showed that competitive rivalry significantly influences supply and demand relations in livestock markets in the pastoral areas, hindering the adoption of formal business models for market organization, functionality, and better performance. As a result, livestock prices, marketing and market governance systems, coordination of livestock trade in the county, and access to cross-border markets remain negatively affected. Recommendations for application include empowerment of traders, youth, and women through business training, exposure, and introduction of adult literacy programmes to help improve the ability of the local traders to read, write, and use technology to share market information, and do transactions. Access to capital financing, infrastructure development, and organization of marketing performance will reinforce linkages between livestock production zones and various market segments. Strengthening the governance of livestock markets by promoting leadership and management practices, and enforcement of business principles will inculcate in markets ethical competition while rooting out rivalry tendencies. Supply, demand, and theory integration in livestock trade remain critical areas for future research. Despite many limitations to the growth of livestock economy in pastoral areas, the drylands still pose significant opportunities to nurture healthy and productive livestock resources that can compete in internal and external markets while attracting substantial economic returns to empower rural economies, strengthen entrepreneurship, and make pastoral livelihoods more resilient.

Keywords: Competition, Rivalry, Supply, Demand, Business Models, Market Systems

1. Introduction

Livestock keeping is the economic mainstay of pastoral communities living in the drylands of Kenya. The sector contributes 12% to Kenya's gross domestic product (GDP) and

42% to Agricultural GDP, with 11.4% of household consumption expenditure spent on livestock-driven food systems [1]. Livestock provides food, labor, income, nutrition, and a source of capital for businesses and investments. In pastoral areas, pastoralism is the predominant mode of

livestock rearing. Despite drought, insecurity, disease, and undeveloped transport and communication systems, extreme competition in livestock markets significantly affects livestock sector performance. The practice promotes rivalry among traders in different market categories, and it creates avenues for the exploitation of livestock producers and low-capital traders. It also encourages rigidity in market information sharing among business entities [8, 10].

Regulated competition in markets inspires creativity, sets good market controls, builds stakeholders' cooperation, promotes innovation and value addition [10], and creates focused and objective market operations. On the contrary, extreme competition breeds hostility, aggression, and disorganization of market stakeholders leading to imbalances in supply and demand, and poor market governance [15]. In line with the need for efficient supply and demand relations and a robust governance system for livestock marketing in drylands, two research objectives were formulated for purposes of this study, i.e. (i) assess the influence of extreme competition on supply and demand relations; and (ii) assess the effect of theory integration on supply and demand relations. Both objectives focused on livestock marketing using the context of the Turkana pastoral region of Kenya.

2. Literature Review

2.1. Overview of the Livestock Sector Performance

The livestock sector globally is dynamic and rapidly evolving. Livestock contributes 40% of the global value of agricultural output and supports the livelihoods and food and nutrition security of almost 1.3 billion people [1]. The changing trend in livestock production, marketing, and demand for products is increasing in the global markets, and countries such as Australia, China, the United States of America, and even Ethiopia and Botswana in the Africa continent have become net exporters of livestock and livestock products to global markets [2]. Commercialization of livestock farming and capitalization of markets through viable business linkages and coordination protocol enables foreign exchange and growth of trade and entrepreneurship in many parts of the world. However, based on levels of investments and business affiliations that countries and corporate entities have with potential markets, there is a recognizable inequality in supply and demand where competitive advantages of states and rivalry that exist remain a threat to the marketing of livestock resources in the global business arena [3].

2.2. Supply and Demand Relations in the Eastern Africa Markets

Livestock production zones and trade corridors in the Eastern Africa region are the primary sources of livestock supply to various markets within the region, with occasional camel export to Saudi Arabia [4]. Countries like Somalia, Ethiopia, Kenya, and Tanzania are making use of their vast rangelands to produce livestock and livestock products using

extensive and intensive farming systems. In Kenya, where 80% of the landmass is Arid and Semi-Arid (ASAL) and home for about 16 million people, capitalizes on livestock keeping as a priority economic activity [5]. Conversely, livestock trade in many regions of Eastern Africa is inhibited by extreme competition instigated by wealthy traders who often dominate all categories of livestock markets while pushing low capital traders out of business, making some of them their subordinates, mere suppliers, and workers. The imposition of low prices in markets and lack of enough capital resources for most traders limit their capacity to compete effectively, accrue significant profits, and sustain their market operations and business cash flows [6].

2.2.1. Organization of Livestock Marketing Activity in Turkana

Turkana County is one of the largest pastoral regions in Kenya inhabited by about 1 million people whom more than 70% of whom depend entirely on livestock for socio-economic wellbeing. For many years, livestock in this region is kept mainly for subsistence purposes [7, 8]. The few elite livestock business entrepreneurs have equally capitalized on extreme competition to focus the supply and demand of livestock and livestock products to their market advantage. While most markets operate daily, the government is promoting market days to organize livestock marketing activity to support trading at production zones, through primary and secondary markets, to tertiary and terminal markets. The market days can work well if opportunities for livestock offtakes can be explored to put livestock supply at a manageable level while increasing sales, revenue, and profits for markets and entrepreneurs [8].

2.2.2. Integration of Theory in Livestock Marketing

In many pastoral regions of Eastern Africa and Kenya as a country, livestock trading is unstructured. Trading is based mainly on buyers' and sellers' price negotiations and transactions [9]. Despite establishing formal market infrastructure, there are no formal governance systems to guide market operations. This denotes inconsistencies, irregularities, and inefficiencies in livestock marketing. Other sectors of Kenya's economy have employed several business concepts/theories and models to perfect the production, commercialization, and trading of goods and services. While livestock trade majors a lot on strategy, partnerships, and market linkages, adoption, and replication of aspects of Porters five forces model for capturing the outside-in perspectives of the industry [10]; Porters Value Chain theory for mapping of primary and support activities essential for the development of livestock product lines [11]; Porters Diamond Model for defining the competitiveness and profitability of the industry in cross border markets [12]; and business environment scanning using PESTLE tool to assess the impact of Political, Economic, Social, Technological, Legal, and Environmental aspects of livestock industry [13] will help improve structure, organization, and vibrancy of livestock marketing in pastoral areas. Therefore, grounding livestock business intents in theory, practice, and experience equally

reinforces the viability, competitiveness, profitability, and sustainability of livestock business enterprises [10, 13].

2.2.3. Significance of Business Theory in Livestock Marketing

Theories and models in any business setting are fundamental. Market development and management frameworks help assess market functionality and performance [10, 14]. Theory-based marketing of products and marketing management systems leads to optimum gains for businesses in highly competitive contexts. Theories and models help align business prospects with stakeholders' needs. As a result, consumer delight is achieved, especially if economies of scale capitalize on increasing product quality and quantity while reducing prices [15]. These outcomes will strengthen relations in supply and demand market forces while organizing market operations and stakeholder engagements even in pastoral settings.

The selected literature sources underpin the role of livestock in food, income, and nutrition security of the populations, the potential of livestock and livestock products in various market segments, and the importance of good management of livestock markets. Livestock value chain development, maximization of livestock business opportunities and alleviation of market access challenges, and integration of possible theories and

models add value to the viability of livestock production and marketing in the drylands [4, 18, 21].

3. Methodology

3.1. Sampling and Data Collection

The study participants were livestock traders operating in the sampled three secondary markets in Turkana County, i.e., Kakuma, Lokichar, and Kalemng'orok markets, with a total population size of 180 traders. Statistical sampling involved a margin of error of 2% and the desired confidence level of 95%, leading to a sample size of 168 traders, representing 93% of the study population. Twenty-four (24) tertiary participants from government and Civil Society organizations were purposively selected to participate in the study. The research instruments used were structured and semi-structured questionnaires administered directly to each study participant. In addition, various Participatory Rural Appraisal (PRA) techniques, i.e., Visualization, Ranking and Scoring, Secondary data and literature reviews, and triangulation processes, were used to generate additional information and validate the study findings (Figure 1).

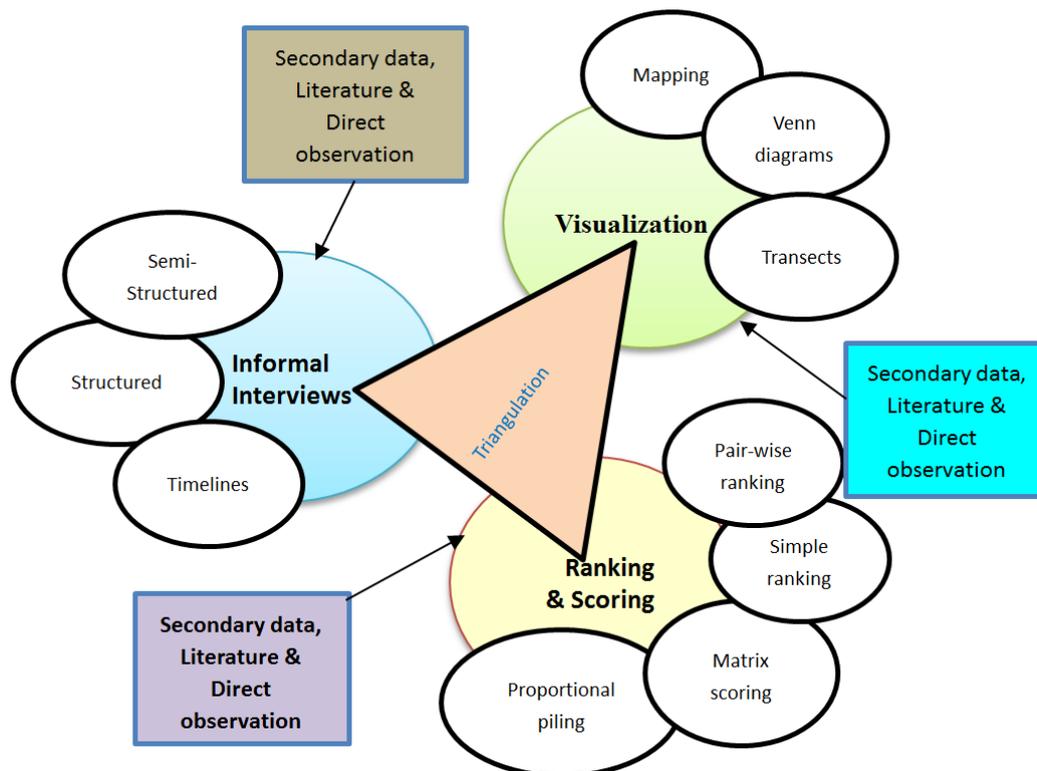


Figure 1. Participatory research techniques [16].

3.2. Data Analysis and Presentation Techniques

The analysis of quantitative data collected used standard deviation for numerical variables, frequencies, and percentages. For the categorical variables, chi-square was used to test significant differences between variables. Comparison of numeric variables between respondents in

various markets was done using the Kruskal-Wallis test followed by post hoc pairwise comparisons using the Dunn-Bonferroni approach because the data did not meet normality and homogeneity test of variance to allow the use of one-way analysis of variance (ANOVA). The significance level was set at 0.05, and Bonferroni adjustment was used to

account for multiple comparisons. Cronbach's alpha was used to assess the items' internal consistency (statements).

The one-way ANOVA was used to determine the significant difference in the study themes, while simple linear regression was used to ascertain the value of variables over others. For qualitative data analysis, content, narrative, discourse, and framework analyses, grounded theory, and application of patterns, codes, and themes facilitated categorization of data into meaningful titles, subtitles, and logical and coherent flow of the narrative assuring transferability, credibility, dependability, and confirmability aspect of study trustworthiness.

4. Results and Discussion

4.1. Demographic Characteristics of Study Participants

In Turkana County, most livestock traders are middle-aged (37 years on average) with varying differences in their ages, experiences, capital resources, and socioeconomic status. The majority of traders have spent about 13 years in the livestock trade. Equally, 75% of livestock traders are illiterate, with only about 5% of them with secondary and tertiary education. The scenario affects local traders' capacity to communicate and compete with advanced traders and entrepreneurs in other parts of the country. Compared to livestock markets in neighboring counties of Marsabit and West Pokot [20], traders' illiteracy is too high in remote markets while relatively low in markets within towns. Livestock marketing in Turkana County is male-dominated, whereby only 15% of traders are women. Youth and women are highly affected by extreme competition in markets due to their low operating capital resources, low bargaining power, and the adverse effects of socio-cultural and economic challenges. This scenario is cited in Watson and van Binsbergen (2008) and Isako et al. (2019) where the inability of youth and women to access enough

capital resources retards their competitive capacities in local and external markets.

4.2. Supply and Demand Relations in Markets

Most respondents (42.3%) agreed that season-long livestock marketing is exercised in their localities. Indeed, livestock trade in Turkana County is largely season-long. It is highly vibrant during dry seasons less in wet seasons when pastoralists focus on increasing their herds. Most (33.3%) of the respondents agreed that traders have sustained and diversified their investments through livestock marketing initiatives. Through access to cash and proceeds from livestock trade, livestock traders are investing in petty and retail businesses, which significantly contribute to the wellbeing of their households. While such trader developments in Turkana County denote progress, traders in well-commercialized livestock farming counties such as Marsabit, Wajir, Garissa, and Tana River have advanced their investments and livelihoods from livestock business proceeds. This is because of high-level livestock marketing and stakeholder business engagements [17, 19].

Most (43.5%) respondents had a neutral opinion that livestock and livestock product prices are consistent and affordable throughout the year. The livestock prices in livestock markets in Turkana are not well defined and understood by the majority of livestock producers and traders. This is contrary to livestock markets close to Kenya's major towns and cities such as Eldoret, Kisumu, Nairobi, and Mombasa, where set prices based on supply and demand forces are communicated to all markets and stakeholders. This is not happening in Turkana since the livestock marketing chain is not linked to tertiary markets [18]. The relations of season-long livestock trading, traders' diversification of livelihoods and price affordability, and consistency are presented in Table 1.

Table 1. Supply and demand relations in markets.

Percentage (%) distribution of respondents scores					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Price affordability and consistency	8.3	12.5	43.5	14.9	20.8
Diversification of livelihoods	33.3	24.4	29.8	8.3	4.2
Season-long livestock trade	42.3	30.4	17.9	7.1	2.4

An average mean score of the balance between supply and demand in the livestock markets indicated that respondents in Kakuma Livestock Market had the highest mean of 2.74 while respondents in Kalemng'orok Livestock Market had the

lowest mean 2.17. A one-way analysis of variance revealed a significant difference between the respondent scores $F(2,165) = 25.124$; $P\text{-value} = 0.000$ as presented in Table 2.

Table 2. Summary of aspects of supply and demand in markets.

Statements	N	Minimum	Maximum	Mean	Std. Dev.
Livestock marketing is season long	168	1.00	5.00	4.03	1.05
Traders diversifying their businesses and livelihoods	168	1.00	5.00	3.74	1.13
Livestock prices are consistent and affordable throughout the year	168	1.00	5.00	2.73	1.17
Overall	168	1.00	5.00	3.50	0.83
1 Kakuma Livestock Market	56	2.33	5.00	3.74	0.53
2 Kalemng'orok Livestock Market	56	1.00	4.67	2.93	0.88
3 Lokichar Livestock Market	56	2.33	5.00	3.82	0.75

Calculated $F(2,165) = 25.124$; critical $F(2,165) = 3.050$; $P\text{-value} = 0.000$.

A post hoc analysis results for Tukey's multiple comparisons indicated a significant difference in respondents' mean scores in Kakuma Livestock Market and Kalemng'orok Livestock Market, and Kalemng'orok Livestock Market and

Lokichar Livestock Market at a 5% level with no significant difference in scores for respondents in Kakuma Livestock Market and Lokichar Livestock Market as shown in Table 3.

Table 3. Post hoc multiple comparisons.

(I) Market	Two Market	(J) Market	Two Market	Mean Difference (I-J)	Std. Error	Sig.
1 Kakuma Market		2 Kalemng'orok		.80952*	.13860	.000
		3 Lokichar		-.07738	.13860	.842
2 Kalemng'orok Market		1 Kakuma		-.80952*	.13860	.000
		3 Lokichar		-.88690*	.13860	.000
3 Lokichar Market		1 Kakuma		.07738	.13860	.842
		2 Kalemng'orok		.88690*	.13860	.000

*. The mean difference is significant at the 0.05 level.

4.3. Traders Perceptions on Supply and Demand Relations

Qualitative results show that livestock supply in all markets assessed is substantial and can meet market demand needs. However, the majority of traders do not understand the relationship between supply and demand. In the Kakuma market, although livestock supply is sufficient, high prices imposed in the market hugely affect the consumption of livestock value chains. While traders can buy all animals brought to the market by herders, it takes long to sell those animals due to lack of tertiary traders from external markets. Therefore, while livestock supply to the market is advantageous to livestock producers, it is not a supply advantage to livestock traders; a typical case of imbalance between supply and demand in secondary markets. The delay in sales risks traders operating capital being held for too long in the form of livestock. The scenario reduces the frequency of local traders' purchases, sales, and ability to revolve their capital resources, compete with external traders, and accumulate profits. Other markets in Kenya's pastoral areas, particularly Isiolo, Garissa, and Kajiado markets, maximize livestock purchases from pastoralists and low-scale traders and sales at terminal markets. Such markets are advantageous to livestock keepers and different traders' categories compared to markets in Turkana County [4, 14, 18].

4.3.1. Differences in Livestock Traders Capital Resources

Traders with low capital resources mainly trade the lower grades of livestock, bringing meager net returns, while high capital traders maximize the market gains by trading higher livestock grades. The vicious cycle of not attaining a perfect balance between supply and demand has stagnated for a long time the traders' efforts to upscale livestock marketing activities and get out of the complexities surrounding supply and demand forces in livestock marketing. Traders claim not to have hit the bottom line where they find their businesses availing the right quantities and quality of livestock resources to the right markets in and out of the county at the right time. While supply and demand are technical economic variables, illiterate livestock traders find it difficult to understand the relations involved coupled with low levels of trader training and exposure [13, 21]. High-level traders with adequate training and exposure understand to some considerable degree livestock supply and

demand relations enabling them to manage livestock market dynamics, and reinforce competitiveness and profitability of livestock enterprises compared to the majority of traders operating in rural areas [4, 17].

4.3.2. Livestock Markets and Production Zones

Trading of livestock in markets is strongly linked to the production rate at the field level. Slow sales in markets remain risky to market weight animals awaiting to be supplied for sale. Such risks include but are not limited to the impact of drought, loss of body weight, condition and value, disease, high cost of feeding, migration to insecure areas, raids, and animals used for sociocultural needs, e.g., marriages and dowry payments. Producers and traders' inability to sell their market weight animals is a huge challenge to the supply chain and the management of supply and demand of livestock and livestock products across markets. According to McPeak and Barret (2001), climate shocks, price volatility, disease outbreaks, widespread violence in pastoral areas, and fragility of livelihoods impede livestock production outcomes. Findings in Watson and van Binsbergen (2008) underscore fewer resilience strategies and the livestock domestication in Turkana hindering livestock marketing opportunities hence the continued cycle of poverty among livestock keepers despite owning large numbers of livestock.

4.3.3. Livestock Marketing in Various Market Categories

The majority of the study participants felt that introduction of market days would affect the secondary and cross-border markets due to fear of setting market days in a livestock-marketing context that already experiences high supply than demand. This scenario will likely make livestock aggregation too high, thus widening the existing gaps between supply and demand market forces. Many traders also feel that setting market days at production areas may reduce herders' access to markets to provide solutions to their daily financial needs. Findings in Kyeyamwa et al. (2008) contrast with the supply and demand situation in Turkana as livestock markets in rural Uganda are strongly linked to terminal markets through well-functioning market days. With organized livestock trading, enlightenment of business stakeholders, and access to tertiary markets, the market day arrangement in Turkana may allow herders to sell their stocks in bulk. Slightly

more than half of the study respondents felt that livestock prices are not consistent and indeed high throughout seasons. In reference to Kenya's dwindling economy, lack of enough financial resources is a risk to traders and livestock businesses. In many markets in Turkana County, households complain of a lack of access to meat products in the butcheries due to high prices. The irony of the high cost of livestock value chains in Turkana, despite being a livestock production zone, hinder sales of livestock and livestock products. On average, meat prices in Lodwar Town of Turkana County are 30% percent higher as compared to many rural markets in the country [18, 20].

4.3.4. Livestock Marketing Regulatory Frameworks

Lack of regulatory frameworks hinders the cherished harmony in supply and demand relations in various markets. Regarding livestock population and the county production potential, livestock supply is substantial and can meet demand needs for local markets, local consumers, and substantially provide surplus livestock and products to external markets. High prices in the Kakuma market do not attract external (tertiary) traders making livestock offtakes impossible. Livestock prices in Lokichar and Kalemng'orok markets are fair, attracting tertiary traders and permeating local traders' access to tertiary markets. An increase in numbers of unsold animals put traders operating capital into dormancy, increase costs of keeping livestock waiting for a sale, reduce prices further, and deny producers opportunities to sell the available market weight animals. Although regulatory frameworks are not in force in the Turkana livestock marketing context, several pastoral regions in the Horn of Africa, e.g., Ethiopia and North Eastern Kenya, have developed local

frameworks guiding their marketing activities [4, 17-18]. Crafting and enforcing formal and informal regulatory frameworks in Turkana livestock markets will help create comprehensive, viable, ethical, and sustainable livestock trading etiquettes for inclusivity, fair share trading, and reduced incompatibilities among market stakeholders [4, 18, 20].

4.4. Theory Integration in Livestock Marketing

The majority of the study respondents (64.9%) agreed with the statement "Competition is improving livestock marketing and innovation in the county," 25.0% had a neutral opinion, while 10.2% were not in agreement with the statement. As pronounced by many respondents, the critical benefit of competition is that it enables livestock traders to become dynamic and tactful in the conduct of livestock business. It makes traders understand their markets better to maximize the available season-long business opportunities. Equally, the majority of respondents were neutral to the statement, "Corporate theories are applied in livestock marketing." Only 20.3% of respondents agreed with the statement, while 44.1% disagree, and 35.7% expressed a neutral opinion. While this scenario could be typical of Turkana, where there is no transparent livestock marketing system, other potential drylands in the Horn of Africa have invested in the vibrancy of livestock markets, source livestock from extensive and intensive livestock farming systems, and operate within the approved business modalities [13, 19, 21].

Respondents' scores on competition, theory application, and marketing strategies are presented in Table 4.

Table 4. Theory and livestock production and marketing.

Percentage (%) distribution of respondents scores					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Working strategies	6	13.7	24.4	37.5	18.5
Corporate theories application	3	17.3	35.7	26.2	17.9
Competition improving markets	38.1	26.8	25	4.2	6

The overall sample scored a mean of 3.00 with a standard deviation of .86 on all three statements. A significant difference in the three markets' Scoring was observed since the calculated F-ratio (20.528) was more significant than the critical F-ratio (3.05). Lokichar Livestock Market scored the highest (mean of 3.40 with a standard deviation of 0.59). The

second-ranking market was Kakuma Livestock Market scoring the highest (mean of 3.11 with a standard deviation of 0.85). The last market in the ranking was Kalemng'orok Livestock Market (mean of 2.48 with a standard deviation of 0.85), as presented in Table 5.

Table 5. Parameters for theory integration in livestock production and marketing.

Statements	N	Minimum	Maximum	Mean	Std. Deviation
Competition is improving innovation in livestock marketing	168	1.00	5.00	3.87	1.15
Corporate theories are applied in livestock marketing	168	1.00	5.00	2.61	1.06
Formulated livestock marketing strategies are working	168	1.00	5.00	2.51	1.12
Overall	168	1.00	4.67	3.00	.86
Kakuma Livestock Market	56	1.00	4.67	3.11	0.85
Kalemng'orok Livestock Market	56	1.00	4.33	2.48	0.85
Lokichar Livestock Market	56	2.33	4.67	3.40	0.59

Calculated F (2,165) = 20.528; critical F (2,165) = 3.050; P-value = 0.000.

The Tukey HSD's post hoc analysis results showed no significant difference between Kakuma and Lokichar Livestock Markets in the Scoring since the mean difference of -.286 was not significant. (Table 6).

Table 6. Multiple comparisons using Tukey HSD.

(I) Market	Two Market	(J) Market	Two Market	Mean Difference (I-J)	Std. Error	Sig.
1 Kakuma Market		2 Kalemng'orok Market		.63095*	.14640	.000
		3 Lokichar Market		-.28571	.14640	.128
2 Kalemng'orok Market		1 Kakuma Market		-.63095*	.14640	.000
		3 Lokichar Market		-.91667*	.14640	.000
3 Lokichar Market		1 Kakuma Market		.28571	.14640	.128
		2 Kalemng'orok Market		.91667*	.14640	.000

*. The mean difference is significant at the 0.05 level.

4.4.1. Significance of Theory Integration in Marketing

Qualitative results show that in all markets, there are no formal business models applied except Livestock Marketing Associations (LMA). Livestock trade is grounded on the ability of buyers and sellers to interact and transact. New market entrants, i.e., traders from other regions and their capital resources, heighten rivalry in markets permeated by low entry barriers. Local markets face the risk of takeover by external entrepreneurs. With their growing competitive advantage and business niches, local traders are likely to turn into minion traders in their native markets.

Trekking is the mode of taking animals to markets within the county, and there is no information system to guide communications and sharing of information on the performance of various markets in the region. As pinpointed in Watson and van Binsbergen (2008) following the 2007 livestock market access study in Turkana, there was no single livestock trader in Turkana that owned a truck for taking animals to the market. This remains the case to date. On the contrary, a few traders in livestock markets in other counties own trucks to access terminal markets and for hire by fellow traders. In addition, livestock trade in Turkana is not grounded on theory and principles of enterprise and institutions management. The lack of a transparent livestock trade system is a recipe for market inefficiencies and blind spots affecting the viability of livestock business intents, resources, and decision-making outcomes. Study respondents were confident that the mode of livestock trading in Turkana County of Kenya still requires lots of investment reforms and business models to structure livestock marketing activity. This change can be accelerated by learning from Kenya's drylands' most functional and potential markets [2, 20].

4.4.2. Traditional Systems of Livestock Trading

Livestock traders from primary markets exchange essential consumables like staple foodstuffs, i.e., maize, sorghum, sugar, salt, veterinary inputs, beads, and clothing for animals at livestock production areas. The collected animals trek to primary and secondary markets for exchange with cash. While the barter system is simple and free from complex problems of the monetary system, including foreign exchange challenges, most pastoralists feel overexploited due to a lack of a standard measure of value and divisibility of goods being exchanged. Lack of access to cash makes barter trading more subsistence-oriented as pastoralists cannot meet other household needs such as medical services, school fees, unable to realize the actual economic returns of their livestock

resources and slowed diversification of livelihoods. Barter trading builds on subsistence livestock farming than the market economy promoted by trading in government-licensed markets using currencies. Numerous market studies acknowledge the existence of barter trading, but its impact on the value of commodities traded, formalization of livestock marketing systems and strategies, growth of markets, and delight of business stakeholders are gross [2, 4, 17, 20]. While barter trading exists, in recent years, it has not received recognition and formalization as a universal means of trading in markets.

4.5. Hypothesis Testing Results

Testing Null hypothesis (H_0 1): Traders' competitive rivalry does not significantly influence livestock Supply and Demand relations in pastoral areas.

Results in Table 7 reveal that traders' competition and rivalry significantly affect the balance between supply and demand in the livestock market in pastoral areas at a 5% level. The calculated F-ratio (1, 166) for the fitted model was 5.914, with a probability value of 0.016. The R^2 was 0.029, indicating that traders' competition and rivalry contribute 2.9% to demand and supply. The coefficient of traders' competition and rivalry of 0.245 implies that a one-unit increase in traders' competition and rivalry results in a 0.245 increase in demand and supply. Based on these results, the null hypothesis was rejected; thus, Alternative hypothesis (H_a) Traders competitive rivalry significantly influence livestock Supply and Demand relations in pastoral areas.

Table 7. H_0 1 testing results.

Variable	Coef.	Std. Err.	T	P>t
Constant	2.737	.320	8.551	.000
Trader's competition and rivalry	.245	.101	2.432	.016

F (1, 166) = 5.914, Prob> F = 0.016, R-squared = .034, Adj R-squared = .029.

Testing Null hypothesis (H_0 2): Traders' competitive rivalry does not significantly influence emerging livestock production and marketing theories in pastoral areas.

Results in Table 8 reveal that the coefficient for trader's competitive rivalry was not statistically significant. The F-ratio (1, 166) for the fitted model was 2.652, with a probability value of 0.105. The results confirm that the trader's competitive rivalry did not significantly influence livestock production and marketing theory. Based on these results, the null hypothesis was not rejected. Thus, a trader's competitive rivalry has no significant effect on theory for

livestock production and marketing.

Table 8. H₀₂ testing results.

Variable	Coef.	Std. Err.	T	P>t
Constant	2.465	.334	7.380	.000
Trader's competitive rivalry	.171	.105	1.628	.105

F (1, 166) = 2.652, Prob> F = 0.105, R-squared = .016, Adj R-squared = .010.

The fact that traders' extreme competitive in markets significantly affect the relationship between supply and demand forces in livestock markets makes it a real problem with profound impact on pastoral economy, markets' performance, purchase of livestock, and consumption of livestock products across markets. Therefore, it is determined that regulating competition will improve the balance between supply and demand market forces, hence making livestock markets more attractive, profitable, and vibrant throughout the seasons.

5. Conclusion

In line with the study results, the following statements present the study conclusion:

- a. The study results strongly agree with the research problem and statement underscoring the effects of extreme competition on supply and demand relations in livestock markets. This problem is significant, deeply rooted, denying livestock producers, traders, and product consumers the ability to meet their needs through markets. Competitive rivalry is a common challenge experienced in many markets across Kenya and the Horn of Africa.
- b. The lack of a formal marketing system hinders the growth of livestock markets in Turkana as there is no robust marketing governance system in place. The market system in Turkana is based on willing buyer-willing seller agreements. Lack of a formalized marketing system makes livestock marketing largely informal, unprogressive, and uncompetitive. However, livestock markets in drylands that are strongly linked to tertiary traders and terminal markets have formalized livestock marketing systems that encompass the interests of the majority of livestock business stakeholders.
- c. Factors causing imbalances in supply and demand forces and effects of lack of business models integration in livestock marketing in pastoral areas remain critical impediments to the functionality and performance of livestock markets. Lack of business models limits the scope, rationale, and protocol for livestock marketing activity in drylands. Marketing systems are prerequisites. They reinforce coordination, order, and linkages among business stakeholders. Sound marketing systems regulate and rationalize the behavior of market stakeholders, thus creating a conducive environment for all to invest and benefit from market opportunities.
- d. The study results affirm that competitive rivalry exists, and its effect on livestock market access and

opportunities in pastoral areas are significant. High capital traders are taking advantage of low-level traders at different market levels. In Turkana County, the most affected livestock trader category is secondary market traders. Due to incapacity to transact with tertiary markets, these traders are easily outcompeted by external tertiary traders who have made them mere suppliers. This is the opposite in a number of vibrant livestock markets in Kenya's drylands where traders operate in the form of cooperatives, put their resources in a pool, with a joint address to issues of transport and access to information. As a result, they have maintained their performance, including competing at tertiary market levels.

- e. There were no cases of conflicting study results with past studies encompassing aspects of the study objectives. This means that challenges related to supply and demand in markets and lack of appropriate marketing system are real, observable, interpretable, and many stakeholders have felt the impact over a long time. Motivated by markets' performance in other ASAL counties of Kenya, challenges affecting livestock marketing in Turkana need to be addressed. This begins with the transformation of the local traders to shift their livestock keeping and trading intents towards a commercialized market economy.
- f. The study found out that many resolves established in the past studies have not been realized regarding the study problem. Findings and recommendations from the past studies dating back to about two decades in Kenya's drylands are still current and relevant. This is because the priority actions have not been fully undertaken. The Government of Kenya, Civil Society organizations, and trader associations need to embark on implementing the many resolutions posed through research to transform livestock production and marketing in Turkana.
- g. The increasing dynamism of livestock production and marketing in pastoral areas shows the need for in-depth research, consolidation of the identified actions to improve the livestock sub-sector, and the need for committing resources to realize the cherished livestock development outcomes in drylands. In Marsabit, Garissa, and West Pokot Counties, respective County Governments through County directorates of Livestock Production and Trade, have increased funding for livestock marketing activities with subsidies to enable local traders to venture tertiary markets with full capacity to compete. Turkana County because of huge government funding and donor interest in promoting pastoral livelihoods can equally invest in livestock production and growth of markets.
- h. Competitive rivalry is a real problem of livestock marketing in drylands and pastoral areas of Kenya. Multidisciplinary approaches are required to minimize it while building a reasonably competitive business environment. Traders capacity gaps identification, management of diverse challenges to livestock marketing,

improving access to capital finance, formulation of livestock marketing policy, and the development of livestock marketing system will help leverage livestock sub sector performance in drylands leading to socioeconomic development of pastoral communities and their domains.

6. Recommendations

6.1. Recommendations for Application

With regards to the study findings and the corresponding possible solutions, the following recommendations are prioritized for application:

- a. To improve the state of demographics of livestock marketing stakeholders in Turkana County and similar areas in Kenya's drylands, there is a need to invest in women and youth empowerment to maximize livestock business opportunities available in their localities. This includes encouraging non-pastoral entrepreneurs with substantial capital resources but not interested in livestock business to take up the challenge and improve the competitive capacities of livestock traders in the local and external markets.
- b. There is a need to introduce adult literacy programmes to enable the current 75% illiterate livestock traders to read and write. Illiteracy is a huge factor in the underdevelopment of pastoral areas. Encouraging parents and children to participate in educational programmes will empower human resources to communicate, innovate, diversify, protect, and manage their livestock enterprises.
- c. The Directorate of Livestock Production of the Turkana County Government to make livestock trade in the county season-long with all market categories being functional. The market days need to be organized well and made accessible and affordable to tertiary traders. This will improve market performance, livestock offtakes, and traders' cash flows. It will also make livestock prices fair and can reduce the gap between supply and demand in markets.
- d. Strengthening stakeholder engagements and coordination is critical for the efficiency and effectiveness of livestock marketing in drylands. The platform will empower stakeholder planning, communications, and enforcement of resolutions for livestock marketing in the county. The roles and responsibilities will be defined and synergistically undertaken, leading to proper organization and coordination of livestock marketing activity.
- e. Livestock marketing should be grounded on business concepts, theories, and models that proved efficient and effective in other sectors of the economy. This will structure, organize, and inculcate sound governance systems in many livestock markets. Aspects of Porters five forces model, Porters Value Chain theory, Porters Diamond Model, and PESTLE tool for continuous evaluation of business environments and risk

management should be integrated into the livestock marketing system. With theory integration, stakeholders' enlightenment on supply and demand relations in markets will be created as well as making them more risk-averse.

- f. Complaints and feedback mechanisms can help traders and livestock producers report tendencies of competitive rivalry in markets. The livestock marketing authorities will use the reports received as evidence for mitigation. This will help strengthen ethics and sanity in the livestock business operations.
- g. Based on traders capital resource differences, experiences, and socioeconomic status, allocation of jurisdictional markets to all traders and organization of livestock trading systems will give all itinerant, primary, secondary, and tertiary traders equal chances to make sales and profits eliminated discriminatory tendencies as well as minimize rivalry.
- h. The Government and Civil Society organizations to regularize livestock market research in pastoral areas. This will improve the mobilization of market needs for objective programming. Through research, market operations will be perfected, and traders getting enlightened on the state of their native markets and the viability of the available business opportunities.

6.2. Recommendations for Future Research

As described in the research findings, a lot more needs to be done for the cherished vibrancy, competitiveness, profitability, and sustainability of livestock production and marketing in Kenya's drylands and pastoral areas as follows:

- a. Assessment of the benefits of value addition to livestock production and marketing through breed and genetic improvement. For many years, trading local and inferior breeds has limited chances for local traders to compete in external markets while accruing more economic returns from such markets. The assessment will identify potentially improved breeds that can adapt to dryland production conditions.
- b. Measuring and defining the impact of market and non-market forces in pastoral areas and the relationship between the current supply and demand will guide markets and stakeholders towards creating a balance that equates supply to the real demand in the local and external markets. This knowledge will help minimize the current disproportionate relations between supply and demand forces in livestock markets.
- c. While many corporate theories and models are recommended for application in the livestock industry, researching the scope of knowledge and applicability of such concepts in drylands and pastoral areas will strengthen the objectivity and impact on livestock production and trade.
- d. Determination of the livestock marketing potential of East Africa's trade corridors and trade routes in the regional economy are critical areas for future research. This will strengthen outcome and action mapping to consolidate stakeholder roles and livestock production

and trade management across markets in the Eastern Africa region.

- e. Livestock Marketing Associations (LMA) is the informal livestock governance system currently used in most markets in the pastoral regions of Kenya. Despite its benefits, the model is weak on resource mobilization and equity in livestock markets. Focusing on transforming LMA to Livestock Marketing Cooperatives (LMC) will strengthen the financial and business elements of the livestock enterprise, enabling traders to improve their competitive and comparative business advantages.
- f. Lomidat Slaughterhouse Cooperative facility was established in Turkana in the year 2009 but became nonfunctional in 2013. A study is required to focus on the socio-economic and political factors that led to the closure of the facility operations. Restoring Lomidat livestock value chain processing facilities' functionality will improve sales and consumption of various livestock products in the county and beyond.
- g. Exploration of the factors making important livestock diseases and conditions in pastoral areas more recurrent and prevalent and the effects of local livestock husbandry practices on livestock production performances will provide solutions to animal health and productivity challenges which are critical parameters for livestock trade. This will also facilitate the attainment of the long-time agenda of making Turkana County a 'Livestock Disease Free-Zone.'
- h. Researching the role of women and youth in livestock production and trade in Kenya's drylands will empower all livestock traders to actively contribute to the economy of pastoral areas through livestock trade and investments.

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