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MARKET PARTICIPATION DECISION OF BEEF CATTLE FARMERS: A STUDY OF TRANSACTION COST IMPACTS IN WETLAND AREAS OF KISHOREGANJ DISTRICT

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ABSTRACT

In Bangladesh, cattle farming provides sustainable livelihoods and food security to the rural communities, but selling in markets is key to making farming profitable. This study intended to examine the socio-demographic profile of beef cattle farmers and the key factors among transaction costs that affect market participation decisions of beef cattle farmers in wetland areas. Primary data were collected from four upazilas namely *Nikli, Itna, Mithamain*, and *Ashtagram* from Kishoreganj district, which included a total of 120 respondents, using semi-structured interview schedule. Descriptive statistics and multinomial logistic regression (MNL) analyzed socio-demographic profiles and transaction cost factors influencing beef cattle farmers' market participation in wetland areas. Most respondents were male, middle-aged (36–50 years), lacked formal education, relied on agriculture for income, and had no legal agreements. MNL results showed higher transport costs, labor costs, and longer distances reduce district market participation due to farmers' preference for affordability and convenience. Conversely, higher transport costs and distances increase terminal market participation, as farmers prioritize better prices and larger markets, though higher shed costs decrease participation due to sensitivity to operational expenses. This study provides valuable insights for policymakers to develop interventions that promote sustainable development and improve the well-being of cattle farmers in wetland areas.

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I. INTRODUCTION

1.1 Background of the study

Cattle farming, a vital component of Bangladesh's agricultural sector has enormous influence, having an effective impact upon the nation's economic viability and ensuring its food security (Rayhan et al., 2023). The sector not only contributes 1.54% to the national GDP at constant prices (Das et al., 2021) but also 20% of the workforce employed in indirect jobs and 45% engaged part-time jobs respectively (DLS, 2019). With 24.85 million cattle nationwide, this sector's enhance growth rate of GDP to 3.23% by the 2022–2023 fiscal years (BBS, 2023). This subsector contributes positively to land cultivation, manufacture and export of leather, the provision of important animal protein, and the elimination of poverty while having a small GDP share (Uddin et al., 2011). It also increases household income quickly by turning low-value inputs into high-value outputs and accumulating capital for future investments (Hafeez & Rahman, 2014). However, According to Barrett (2008), market participation is directly linked to poverty reduction and enhanced food security. Conversely, limited market participation can trap farmers in subsistence agriculture, limiting their economic opportunities and capacity for growth.

Many households face significant challenges that prevent them from participating in markets, which hampers efforts to combat poverty (UBOS, 2016). According to Downey (2024), a key challenge that hinders market participation is the burden of transaction costs, which are expenses made while buying or selling an item or service that is separate from the product's true cost. Labor entertainment, mobile fees and transport costs are some examples. Research shows that the farmers' access to infrastructure, especially roads, determines the relative sizes of transaction costs (Akramov, 2009). Limited or poor-quality road and rail linkages prevent timely access to inputs, raise input prices, and reduce access to output markets, limiting market signal transmission (Phillip et al., 2009).

These challenges are considerably more visible in wetland areas, which offer unique ecological conditions that both support and challenge agricultural activities. Particularly, wetlands support a wide range of biological groups and offer a multitude of ecosystem services, including flood mitigation, climate regulation, and water purification (Zedler & Kercher, 2005; Costanza et al., 1997). Wetlands provide abundant water resources and fertile soil can enhance productivity, offering a significant opportunity for farmers. However, wetlands are also prone to environmental challenges such as flooding and water-logging. The seasonal variability of wetlands can affect the availability of grazing land and water, leading to fluctuations in cattle health and productivity (Junk et al., 1989).

The existing literature highlights the importance of market participation in alleviating rural poverty and enhancing food security (Barrett, 2008). Studies such as those by Malaki et al. (2024) have found that repeated transactions positively influence farmers' participation in the cattle market. Economic factors such as demand trends, price fluctuations, market information asymmetry and logistical inefficiencies as key barriers (IFAD, 2011; Jabbar et al., 2010). Poor infrastructure, including inadequate road networks and transportation facilities, leading to high transportation costs and logistical challenges are significant determinants of market participation in wetland areas (Fafchamps & Hill, 2005; Barrett, 2008).

While numerous studies have explored market participation in general, such as Haile et al. (2022) mentioned that the smallholder's market participation was enhanced by raised agricultural production levels. Hoq et al. (2021) revealed that per capita consumption of a household is

affected by a number of variables due to market participation. Kyaw et al. (2018) present that smallholder rice farmers' market participation ability is limited by institutional, technological, and socioeconomic reasons. Moono (2015) highlighted that access to credit and asset ownership has a direct effect on the market participation. Ismail et al. (2015) suggests that farm households use strategies to reduce market participation as much as possible when the transactions costs are high. Cai & Ma (2015) revealed that transaction costs, which are influenced by distance and type and have a substantial effect on the choice of contract enforcement. Maina (2015) mentioned that transaction costs variables that significantly influenced the marketing channel choice. However, there is a dearth of research on the unique challenges faced beef cattle farmers' of wetland areas, particularly in the Kishoreganj district.

Given the importance of cattle farming in rural economies, as well as the distinct environmental and infrastructural challenges of wetland regions, it is essential to explore what transaction costs influence market participation decision *(choice among different market outlets such as nearest, distance and terminal)* in such contexts. To the best of our knowledge, no research has been done on the impact of transaction cost on market participation. Therefore, the research aims to answer the question of what are the factors among transaction costs those affecting the decision of market participation. Practically, this study can lead to various beneficial outcomes for several stakeholders (Farmers and Policymakers). Theoretically, this research contributes to the broader discourse on socio-demographic factors along with transaction costs' impact in market participation.

1.2 Conceptual Framework

Transaction costs consists transportation, labor, market fees, middleman commissions and infrastructure-related barriers such as poor road connectivity and access to support services (Fafchamps & Hill, 2005: Akramov, 2009; IFAD, 2011). Market participation by beef cattle farmers in wetland areas enhances income through access to urban markets while utilizing abundant natural grazing resources, decreasing production costs (Barrett, 2008). It also fosters rural employment, increases resilience to economic shocks and access to essential inputs and services that contribute to long-term livelihoods and national economic growth (Fafchamps & Hill, 2005; IFAD, 2011). Cattle farmers market participation determined by various factors, including demographic characteristics (such as gender, age, education, and family size), and socioeconomic factors (such as herd size, yearly expenditure, and major income sources). This study investigates transaction costs' impacts on beef cattle farmers' market participation decisions in wetland areas, focusing on the Kishoreganj district. This integrates theoretical insights from transaction cost and empirical evidence from wetland-specific studies. This conceptual framework illustrates the key variables (material and non-material costs items) such as transport cost, labor cost, middleman commission, market fees, and others that shape this decision-making process among different market outlets such as nearest, distance and terminal. The nearest market refers to the village market or its surroundings, a distant market refers to markets in the same or different upazila, and the terminal market refers to the Kishoreganj district market.

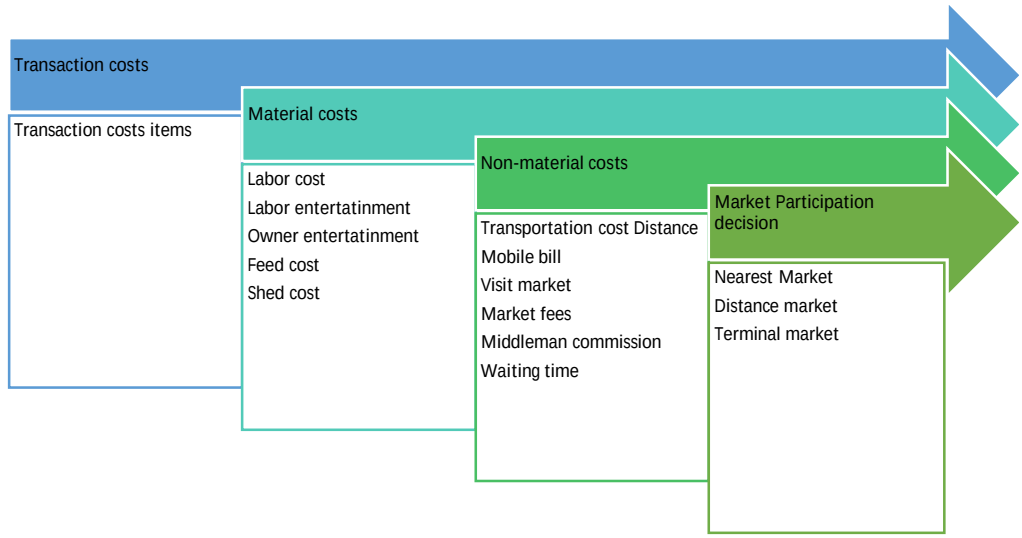

Figure 1: Conceptual framework

II. MATERIALS AND METHODS

2.1 Study Area

In this particular investigation, the study area selected was the Kishoreganj district. The geographical area of Kishoreganj is about 2,689 square kilometers. There are 13 upazilas in this area (Kishoreganj, 2025). This wetland district is renowned for rearing livestock in nearly every house. Figure 2 represents the geographical location of the study. Kishoreganj is situated in the northeastern part of Bangladesh in the Dhaka division.

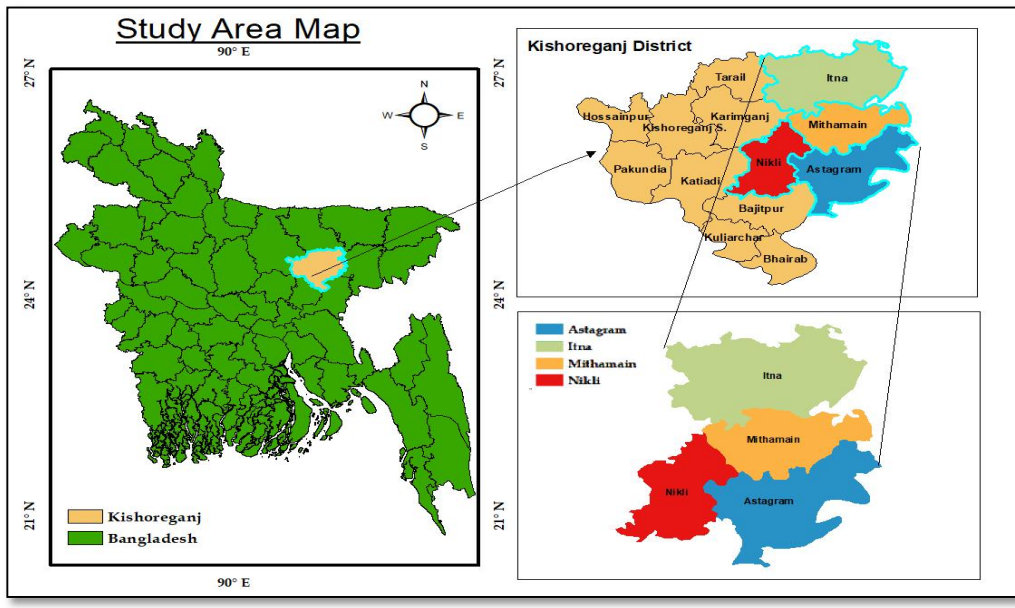

Figure 2: Study area's map

The district's high concentration of cattle farms makes it an ideal location for studying market participation decisions (Mahmud & Mahmud, 2018). Wetlands, rich in biodiversity and ecosystem services, can influence farming practices and market participation (Haroon & Kibria, 2017). Studying market participation in this area can provide insights into economic factors driving decisions and their impact on livelihoods (Nath et al., 2024) and laying the groundwork for future research on market participation (Mahmud & Mahmud, 2018).

2.2 Sampling Procedures

The study involved 120 beef cattle farmers from Kishoreganj districts in northeastern Bangladesh, using a purposive sampling method. The method targeted those with expertise in cattle farming, particularly in waterlogged areas like Nikli, Itna, Mithamain, and Ashtagram as illustrated in Table 1. A uniform sample size was taken from each upazila, as almost every household rears cattle in Kishoreganj.

Table 1: Distribution of the sample

Upazila	Sample size
Nikli	30
Itna	30
Mithamain	30
Ashtagram	30
Total	**120**

2.3 Collection of Data

The data for this study were gathered using a semi-structured interview schedule that comprised both closed and open-ended questions. The primary focus of the questions revolved around the

socio-economic characteristics of cattle farmers and the transaction costs in beef cattle farmers' market participation. Before full-scale implementation, the tool underwent pretesting with a subset of farmers to evaluate clarity, time requirements, and content relevance. Feedback from this pilot phase informed required modifications to the questionnaire. Face-to-face interviews with respondents in the study area were used to collect data. Before collection of data, objectives clearly explained by qualified enumerators to the respondents. Field data are gathered during April to June 2024, a period carefully selected to ensure the information's reliability and relevance. Secondary data were collected from the BBS, Department of Livestock Services, journals, publications and online resources. To minimize errors, data were initially recorded in local units and subsequently transformed to appropriate standard units for analysis.

2.4 Data Analysis

A rigorous analytical procedure that was designed explicitly to satisfy the predetermined objectives has been applied to the data collected throughout this research work. Then, data analysis was executed using the Microsoft Excel, STATA programs and results presented by various formats (such as tabular and textual representations). First, a descriptive statistic of some selected variables of the respondents was estimated. It included the percentages, frequencies and graphs to identify the farmer's profile or socioeconomic characteristics of beef cattle farmers of the wetland areas. Then, to address the factors affecting the market participation decision considering transaction costs the multi-nominal logistic regression model was used. Multinomial Logistic Regression (MNL), also known as Multinomial Logit Regression, is a classification method used when the dependent variable is nominal with more than two possible discrete outcomes. The logistic transformation of the odds (logit) serves as the dependent variable, represented as follows:

$$\log\left(\frac{P(Y=K_{distance,\ terminal})}{P(Y=K_{nearest})}\right) = \beta_0 K + \beta_{1K}X_1 + \beta_{2K}X_2 + \beta_{3K}X_3 + \beta_{4K}X_4 + \beta_{5K}X_5 + \beta_{6K}X_6 + \beta_{7K}X_7 + \beta_{8K}X_8 + \beta_{9K}X_9 + \beta_{10K}X_{10} + \beta_{11K}X_{11} + \beta_{12K}X_{12} \quad \text{------ (1)}$$

Where,
(Y=k) is the probability of the dependent variable (Market participation) being in category k
(Y=k_0) is the probability of the dependent variable being in the reference category k_0
β_{0k} is the intercept for category k
β_{ik} is the coefficient for the ith predictor variable for category k
X_1 = Transport cost (Tk/beef cattle), X_2 = Labor cost (Tk/beef cattle), X_3 = Labor entertainment (Tk/beef cattle), X_4 = Distance (km), X_5 = Mobile bill (Tk/beef cattle), X_6 = Visit market (Tk/beef cattle), X_7 = Market fees (Tk/beef cattle), X_8 = Middlemen commission (Tk/beef cattle), X_9 = Time value (Tk/beef cattle), X_{10} = Owner entertainment (Tk/beef cattle), X_{11} = Feed cost (Tk/beef cattle), and X_{12} = Shed cost (Tk/beef cattle)
This model properly handles scenarios with multiple discrete outcomes and allows for the examination of how predictor variables affect the odds of a result relative to the reference category (Hosmer et al., 2013).

III. RESULTS AND DISCUSSIONS

3.1 Socio-economic and Demographic Profiles of the Respondents

The socioeconomic characteristics of the respondents have significant impacts on farm output, marketing, and marketing choices about where and when to sell products. According to Beegle (2016), demographic characteristics significantly influence household economic behavior, such as consumption, production, and market participation. These characteristics—such as age, gender, education, and household size—shape economic choices and responses to market signals.

Table 2: Socio-economic and demographic profiles of the respondents

Items	Frequency (n=120)	Percentage (%)	Items	Frequency (n=120)	Percentage (%)
Gender			***Major income sources***		
Male	111	92.5	Agriculture	60	50
Female	9	7.5	Dairy farming	29	24.2
Age			Business	13	10.8
Young (up to 35)	31	25.8	Fishing	2	1.7
Adults (36 to 50)	63	52.5	Auto-van driver	5	4.2
Old (above 50)	26	21.7	Poultry	3	2.5
Education			Others	8	6.7
No education	56	46.7	***Yearly HH expenditure (USD)***		
Primary (Class 1-5)	38	31.7	Low (up to 122)	8	6.7
Secondary (6-10)	16	13.3	Medium (123 to 404)	96	80
Higher secondary (11-12)	10	8.3	High (above 404)	16	13.3
Household size (Members)			***Herd size***		
Small (1 to 4)	22	18.3	Small (1 to 3)	18	15
Medium (5 to 7)	84	70	Medium (4 to 5)	69	57.5
Large (above 7)	14	11.7	Large (above 5)	33	27.5

Table 2 presents an overview of the socioeconomic and demographic profiles of the study's respondents, highlighting key characteristics such as gender distribution, annual household expenditure, age, education level, household size, herd size, and primary income sources. The majority of cattle farmers are male (92.5%), while only 7.5% are female. In terms of age distribution, 25.8% of the respondents are young (up to 35 years), 52.5% are adults (36 to 50

years), and 21.7% are older (above 50 years). Educational attainment is notably low, with 46.7% of respondents having no formal education. Regarding household size, 18.3% of households are small (1 to 4 members), 70% are medium-sized (5 to 7 members), and 11.7% are large (more than 7 members). Herd sizes also vary, with 57.5% of farmers managing medium herds (4 to 5 animals), 27.5% managing large herds (more than 5 animals), and 15% managing small herds (1 to 3 animals). Agriculture is the primary source of income for 50% of the respondents, followed by dairy farming (24.2%), business (10.8%), and other sources including fishing, poultry, and driving. In terms of annual household expenditure, the majority (80%) fall into the medium expenditure category (USD 123 to 404), while 13.3% have high expenditures (above USD 404), and 6.7% have low expenditures (up to USD 122).

3.2 Decrepitation of the Variables

Table 3 provides a summary of key explanatory variables reflecting the economic context of cattle farmers in Kishoreganj. All costs are expressed in monetary terms (BDT). Yearly household expenditures vary widely, with a mean of BDT 31,383.85. Substantial variation is also observed in several marketing-related costs, including transportation, labor, market visits, middleman commissions, market fees, and shed costs.

Table 3: Summary statistics of the explanatory variables

Variables	Minimum	Maximum	Mean	Std. Deviation
Yearly expenditure	12090	122900	31383.85	16745.38
Transport cost	0	2500	869.53	601.40
Labor	0	5000	585.00	476.18
Labor entertainment	0	250	82.58	55.51
Distance	0	300	22.66	40.99
Mobile bill	0	300	112.46	58.74
Visit market	0	2200	100.21	61.918
Market fees	0	1000	836.67	439.38
Middleman commission	0	750.00	188.70	245.18
Time value	0	750.00	283.24	160.36
Entertainment	0	320	110.08	76.40
Shed cost	0	500	208.52	105.68

The presence of zero (0) values across many of these variables indicates that some respondents did not incur those specific expenses. This typically reflects differences in marketing behavior — particularly for farmers who sold their cattle at the farmgate, thereby avoiding costs such as transport, labor, market-related activities, and middleman commissions. For example, a zero-transport cost implies direct farmgate sales. The table also distinguishes between labor entertainment and owner entertainment, the latter referring to expenditures by the cattle owner, such as hospitality during cattle transactions. These variations illustrate the heterogeneity in cost structures among cattle farmers and underscore the influence of marketing channels on overall expenditures.

3.3 Market participation

Figure 3 illustrates cattle farmers' preferences regarding their choice of cattle selling locations. The most preferred option is the nearest haat, selected by 91.26% of farmers. This preference is driven by minimal transportation costs, ease of access, and the frequent occurrence of market days, making it a convenient and cost-effective choice. Approximately 26.67% of farmers prefer the district market, which offers relatively stable prices and a balance between accessibility and financial return. Participation in terminal markets, such as Dhaka, is notably low at 8.33%, primarily due to higher logistical costs. Although terminal markets offer better prices and access to a larger consumer base, farmers' participation remains limited because of intense competition and barriers to entry. On the other hand, farm gate sales are also a popular choice, with 66.00% of farmers opting to sell directly from their homes. This option reduces transportation costs, ensures quick payments, and eliminates many of the logistical challenges associated with market-based selling.

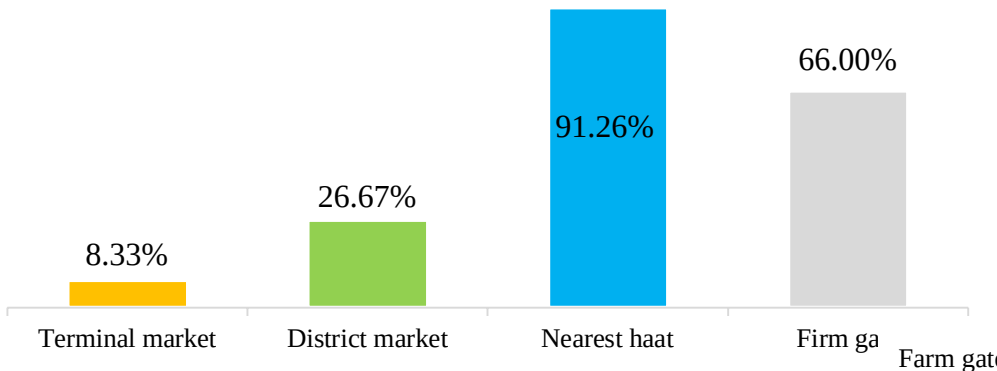

Figure 3: Distribution of market participation of the cattle farmers

3.4 Transaction cost factors influencing market participation

Table 4 presents the results of a Multinomial Logistic Regression (MNL) analysis. Here, independent factors in the analysis were transaction costs including transport cost, labor cost, labor entertainment, distance, mobile bill, visit market, market fees, middleman commission, time value, entertainment, feed cost and shed cost. The analysis reveals those factors affecting market participation for district and terminal markets compared to the nearest haat.

Table 4: Responsible transaction costs to affect the market participation decision

Participation		B	Std. Error	Wald	Sig.	Exp(B)
District market	Intercept	-5.589	2.863	3.813	.051	
	Transport cost	-.003	.001	4.339	**.037**	1.002
	Labor cost	-.002	.001	4.568	**.033**	1.002
	Labor entertainment	-.034	.018	3.367	.067	.967
	Distance	-.218	.100	4.760	**.029**	1.243
	Mobile bill	.010	.011	.849	.357	1.010
	Visit market	-.001	.013	.004	.953	.999
	Market fees	.000	.003	.000	.986	1.000
	Middleman commission	.000	.003	.013	.909	1.000
	Time value	.004	.004	.712	.399	1.004

	Entertainment	-.011	.010	1.197	.274	.990
	Feed cost	-.009	.006	2.056	.152	.991
	Shed cost	.009	.009	1.001	.317	1.009
Terminal	Intercept	-5.013	4.083	1.508	.220	
market	**Transport cost**	.006	.003	5.718	**.017**	1.006
	Labor cost	.001	.003	.013	.911	1.000
	Labor entertainment	-.025	.021	1.369	.242	.976
	Distance	.231	.104	4.890	**.027**	1.260
	Mobile bill	.022	.014	2.363	.124	1.022
	Visit market	.016	.017	.891	.345	1.016
	Market fees	-.002	.004	.370	.543	.998
	Middleman commission	-.009	.005	3.136	.077	.991
	Time value	.002	.008	.070	.791	1.002
	Entertainment	-.022	.013	2.867	.090	.978
	Feed cost	-.002	.009	.035	.851	.998
	Shed cost	-.024	.013	3.307	**.049**	.976
	Reference market	*Nearest-haat*				

For District Market participation, transport cost, labor cost, and distance were found to have a negative impact. In the case of 'District Market Participation' the coefficient for transport cost is -0.003, with a standard error of 0.001, and it is significant (p = 0.037). The Exp(B) value of 0.998 indicates that for each unit increase in transportation cost, the odds of participation in the district market decrease by around 0.3%. This negative relationship suggests that higher transportation costs prevent farmers from participating in the district market, most likely because the increased expenses make it less economically viable. With a standard error of 0.001, the labor cost coefficient is -0.002, which is statistically significant (p = 0.033). The Exp(B) value of 0.998 implies that for each unit increase in labor cost, the chance of participating in the district market declines by around 0.2%. Farmers are likewise discouraged from selecting the District Market due to greater labor costs. Moreover, the coefficient for distance is -0.218, with a standard error of 0.100, which is significant (p = 0.029). The Exp(B) value of 0.804 indicates that for each unit increase in distance, the odds of District Market participation decrease by approximately 19.6%. This negative association implies that longer distances diminish the participation chance in the district market.

On the other hand, transportation cost and distance show a positive association in terminal market participation. Transport cost coefficient is 0.006, with a standard error of 0.003, and is statistically significant (p = 0.017). The Exp(B) value of 1.006 implies that for each unit rise in transport cost, the probabilities of participation in the terminal market increases by around 0.6%. Besides, distance has a significant coefficient (p = 0.027) of 0.231 with a standard error of 0.104. According to the Exp(B) value of 1.260, the likelihood of Terminal Market involvement rises by roughly 26% for every unit increase in distance. This shows that farmers are willing to pay higher costs and travel longer distances to reap the economic benefits of terminal markets. However, shed cost hurts participation; the coefficient is -0.024, with a standard error of 0.013 and it is statistically significant (p = 0.049). The Exp(B) value of 0.976 implies that with every unit rise in shed cost, the probability of participating in the terminal market declines by around 2.4%. This negative association indicates that higher shed costs inhibit market participation due to the additional expenses outweighing the perceived benefits. As a whole, these results highlighted the

different roles that transaction costs play in affecting market participation decisions, while emphasizing the significance of affordability and accessibility for district markets as well as the perceived benefits of terminal markets despite more costs.

IV. DISCUSSION

This study reveals that beef cattle farmers' market participation in Kishoreganj's wetland areas is influenced by socioeconomic characteristics and transaction costs. Most farmers (91.26%) prefer selling at the nearest haat due to low transportation costs and convenience. District markets attract 26.67% of farmers, but high transport costs, labor costs, and longer distances deter participation. Terminal markets, chosen by only 8.33%, show higher participation despite increased transport costs and distances, as farmers prioritize better prices and larger customer bases. However, shed costs negatively impact terminal market participation. Socioeconomic factors like age, education, household size, and herd size also shape market choices, with education positively affecting participation and age having a negative influence.

Market participation by beef cattle farmers in wetland areas is critical for enhancing economic resilience, ensuring food security, and meeting Bangladesh's animal protein demand, which remains significantly undersupplied at 22.0 gm per head daily against a requirement of 120 gm (DLS, 2011). As Kibona and Yuejie (2021) emphasize, active market engagement is vital for improving farmers' income and addressing protein deficits. This study's findings align with this perspective, demonstrating that socioeconomic and demographic factors, combined with transaction costs, significantly determine market participation.

The multinomial logistic regression analysis highlights the dual role of transaction costs. In district markets, high transport costs, labor costs, and longer distances significantly discourage participation, reflecting farmers' sensitivity to affordability and convenience. These findings align with Eyasmin and Ghosh (2024) and Negassa and Jabbar (2008), who note that long distances and high transport costs reduce market participation. Similarly, Ouma et al. (2010) identify household location, market information, and distance to urban centers as critical transaction cost factors. The preference for haats (91.26%) in this study underscores the importance of proximity and low costs.

In contrast, terminal markets show a positive relationship between participation and higher transport costs and distances. Farmers are willing to incur these costs due to the economic advantages of higher prices and access to larger customer bases, as seen in the 26% increase in participation odds per unit increase in distance. This aligns with Bellemare and Novak (2017), who argue that farmers accept higher transaction costs when economic returns are substantial. Kibona and Yuejie (2021) and Magesa et al. (2014) further support this, noting that distant markets often yield higher profitability for smallholder farmers. However, shed costs negatively impact terminal market participation, with a 2.4% decrease in odds per unit increase, highlighting farmers' sensitivity to operational expenses.

In summary, this study underscores the interplay of socioeconomic characteristics and transaction costs in shaping beef cattle farmers' market participation. Education and household size facilitate engagement, while age and high costs in district markets pose barriers. Terminal markets offer opportunities despite higher costs, but operational expenses like shed costs remain a concern.

These findings, supported by existing literature, highlight the need for targeted interventions to reduce transaction costs and enhance market access for sustainable livelihoods in rural Bangladesh.

V. CONCLUSION

Transaction costs significantly shape beef cattle farmers' market choices in Kishoreganj's wetland areas. High costs create barriers to participating in district markets, but farmers accept them in terminal markets for better profits and access to more customers. To improve farmers' livelihoods, policymakers should focus on reducing these costs. For instance, building better road networks can lower transportation expenses, making it easier for farmers to reach markets. Similarly, providing affordable transport options can encourage greater market participation. Additionally, offering subsidies for labor and shed costs can reduce financial burdens, enabling more farmers to engage. Alongside this, robust support systems in wetland areas can further assist farmers. By implementing these measures, a more inclusive market environment can be created. As a result, more farmers can participate and connect with profitable markets. Ultimately, these efforts will support individual farmers and contribute to the economic growth of rural Bangladesh.

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