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IMPACT OF VERTICAL INTEGRATION ON TRANSACTION COST MINIMISATION IN SMALLHOLDER TEA COMMERCIAL FARMING IN TANZANIA

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Abstract

This article examines the effect of vertical integration on transaction cost minimisation in smallholder tea commercial farming in Tanzania. A structured questionnaire was used to collect quantitative data, in a cross sectional survey, which involved 393 smallholder tea growers from three districts in the Mbeya and Njombe regions. IBM Statistics Version 26 was used for descriptive and causal-effect data analysis. A multiple linear regression analysis was conducted to test the null hypothesis that vertical integration and select farmer characteristics does not minimise transaction cost. The results show that, vertical integration significantly negatively affect transaction cost (β = -0.002; P=0.000). Similarly, gender significantly, negatively influence transaction cost (β = -1.81; P=0.017). Additionally, education (β = -1.81) and farm size (β = -0.142) negatively influence transaction cost but not statistically significant at P=0.05. Conversely, age (β = 0.061), and household size (β = 0.349) positively influence transaction costs, implying that, one unit increase in these variables, leads to increased transaction cost amongst smallholder commercial farmers in Tanzania. These findings entails that, improved vertical integration's reduces transaction costs in smallholder farmer commercialisation.

Therefore, vertical integration promotion can enhance efficiency, lower transaction costs, and improve profitability. The study also highlights nuanced interactions between farmer characteristics and transaction costs. While gender, education, and farm size reduces transaction cost, a contrasting positive age and household size relationship underscore intricacies necessitating, holistic farmer approaches to reducing transaction cost. Future research can delve into the mechanisms, sustainability of vertical integration's and interplay of farmer characteristics effects on transaction costs.

Keywords: Vertical Integration, Transaction Cost Minimisation, Smallholder Tea Commercial Farming, Tanzania

INTRODUCTION

The importance of agriculture towards contributing the livelihood of smallholder farmers both in developed and developing countries cannot be understated (MA et al., 2022; Byerlee et al., 2009). Several studies indicate that farming of various cash crops like tea, cashew nuts, coffee and sisal are critical to improving economic welfare of the smallholder farmers household across the world (MA et al., 2022). Various studies indicate that tea is amongst a renown cheaper drink across the globe revered across age groups, thus its demand has been in a raise both in production and exportation. This in turn makes it to be amongst top crops in the beverage market in the world (Kumarihami & Song, 2018). For instance, over the last decade, global tea consumption per capita climbed by 2.5 percent, with significant increases in the countries producing tea, which are mostly the emerging and developing economies, specifically Latin America, Africa, East Asia and the Caribbean (FAO, 2022).

Tea is a critical driver of rural development, poverty reduction, and food security in developing countries, providing a key source of income for underprivileged communities. It contributes significantly to export revenues, with global tea output exceeding USD 17 billion and trade valued at over USD 9.5 billion. Notably, smallholders account for 60% of global production, providing critical rural employment that improves household food security and nutritional circumstances (FAO, 2022). Tea is produced in more than 15 countries across the world, and in the last decade its annual export demand has increased by approximately 0.5 percent (Kumarihami & Song, 2018). Black tea exports are expected to rise by 1.4 percent over the next ten years. This expansion is mostly due to increased shipping from numerous countries. The countries, which will contribute to this growth include Kenya, India, Sri Lanka, Argentina, Viet Nam, Uganda, and the United Republic of Tanzania (URT) (FAO, 2022).

In Tanzania, tea plays an important role as a substantial cash crop, employing roughly 50,000 people on tea fields and processing plants and indirectly affecting approximately 2 million people. Furthermore, the tea production activities include 32,000 smallholder farmers. Tanzania's government additionally earns approximately 45 million US dollars from the tea industry per annum (URT, 2023). Tea production in Tanzania is divided into two systems: one using large-scale farmers, primarily tea processor estates, and the other comprising smallholder farmers. Tanzania's total tea producing area is 23,805 hectares, with roughly 51 percent assigned to large-scale growers and approximately 49 percent attributed to smallholder farmers (URT, 2023).

Smallholder farmers are mostly characterised by low land size, reliance on family labour, limited access to capital, inputs, technology, and market (Zerssa et al., 2021; FAO, 2015; FAO, 2012). In the developing countries, smallholder farmers mostly live in the rural areas, which have relatively poor infrastructure and limited access to information (Gbadegesin & Popoola, 2020). Smallholder tea farmers in Tanzania have no exception in these smallholder farmer characteristics. For example, it is estimated that most of the tea smallholders in Tanzania have relatively small land size, which on average is estimated to be about 3.5 acres. They are also characterised with limited access to input, technology such as plucking mechanisation technology, and over reliance on rainfall, and farms are located in less proximity roads (IDH, 2021a; IDH, 2021b). Challenges, such as poor feeder roads suggest that farmers are likely to face relatively high transaction cost related to opportunity cost of the lost green leaf tea because of untimely delivery from the collection centres to the tea processing factories.

These challenges, amongst others shed some light on challenges which impede farmers, specifically smallholder tea farmers to meaningful engage in tea commercial farming. Profit-driven commercial farming has emerged as a primary driver of worldwide agricultural and economic progress. Various market participants have spread farming technology to rural areas globally since the twentieth century, while international bodies urge replacing subsistence-based staple agriculture with commercial farming (Gurri & Ortega-Muñoz, 2015). Commercial farming has an indispensable impact to smallholder farmers' welfare because of its merits such as improved use of technology, economies of scale, production specialisation, which contribute to the improved productivity, income, food security and overall welfare of the smallholder farmers (Jaleta et al., 2009).

A variety of factors influence the commercialisation of smallholder farmers. These include population increase, demographic changes, new technology, developing crops, infrastructure and market institution development, and non-farm sector expansion. Rising labour opportunity costs, macroeconomic and trade policies, the evolution of input and output markets,

property rights and land tenure systems, market regulations, cultural and social preferences, agro-climatic conditions, and smallholder resource endowments, which include land, labour, farming equipment, are all critical determinants to smallholder farmers' commercialisation (Technoserve, 2019; Jaleta et al., 2009). Besides, as discussed earlier, smallholder farmer are confronted with myriad challenges, including limited access to land, inputs, limited access to information, poor infrastructure such as poor roads, which results into high transport cost and consequently their commercialisation potential and participation in profitable market is limited (Gbadegesin & Popoola, 2020; Ngaruko & Lyanga, 2021; Jaleta et al., 2009). In a nutshell, transaction cost entails financial and non-financial expenditures associated with various activities involved in conducting exchanges between parties. These expenses include not only monetary fees but also the time, effort, and resources invested in the transaction process (Singh, 2002).

It is evident that transaction costs are inherent in exchange or trade activities; however, their level should remain manageable to ensure that the advantages derived from a specific exchange outweigh these costs. For instance, Rehber (2007), argued that ignoring transaction costs may lead to an overestimation of the benefits of a market exchange. In the context of farmers commercialisation, this argument entails that if transaction cost are not managed, smallholder farmers commercialisation might be difficult. Vertical integration is regarded to have the potential to cut transaction costs and improve the overall agricultural systems efficiency (Lijia & Xuexi, 2014; Fronmueller & Reed, 1996). Vertical integration implies that by consolidating production and marketing processes, chances for cost reduction and improved coordination occur, potentially leading to increased smallholder farmers performance such as productivity and profitability (Hendrickson etal.,2018; Fronmueller & Reed, 1996).

Although the potential benefits of vertical integration in minimising transaction costs are acknowledged by various scholars, the research evaluating its impact within smallholder commercial farming context, precisely in Tanzanian tea subsector, remains scanty. The distinctive features of this subsector, including cooperative structures and multiple stakeholders engagement, necessitate an evaluation of the relationship between vertical integration and transaction costs. Therefore, this study aims to bridge this research gap by evaluating how vertical integration influences transaction cost minimisation for smallholder tea farmers commercial farming in Tanzania. Specifically, this study seeks to test the null hypothesis that vertical integration does not minimise transaction cost of smallholder tea farmers commercial farming in Tanzania. The study's findings informs policy decisions, organisational strategies, and support mechanisms to enhance the economic sustainability of smallholder commercial farming in the Tanzanian tea subsector.

LITERATURE REVIEW

Transaction cost is rooted in the Transaction Cost Theory, which is part of new institutional economics. The new institutional economics assumes bounded rationality, which entails that people do not always make entirely reasonable decisions since their ability to gather and absorb information is limited (Ngaruko, 2012). This has implications for how we understand how people act and make decisions in economic system, as discussed in this paper.

Different scholars conceptualise transaction costs within the agricultural value chain in various ways. Williamson (1979) and Coase (1937), for example, classified vertical integration transaction costs as search costs (finding partners), bargaining costs (negotiating agreements), and enforcement costs (enforcing compliance). This classification improves knowledge of obstacles and costs during contract discussions and implementation, boosting the efficiency and success of vertical integration arrangements. In connection to this, Fafchamps&Hill (2005) grouped transaction costs related to agriculture in three facets, namely cost related with finding buyers (search transaction cost), cost of bargaining with buyers (negotiation costs), and transaction cost related with farming. These may entail transaction related with production, for example in the context of tea production, the same relates with transaction cost for accessing inputs and extension services. This categorisation provides important insights into the challenges that farmers and buyers face in agricultural transactions, helping to improved market efficiency and regulatory redress.

In contrast, Holloway et al. (2000), classified transaction cost in two groups, firstly those costs related to transportation and communication (tangible), and transaction costs related with uncertainties and risk (intangible). In the context of the tea value chain, the tangible costs related to communication are possibly related to searching information for price inputs, and extension services. Relatedly, transaction costs related to transport cost in the tea subsector in Tanzania may be associated with relatively higher transport cost and opportunity cost of green leaf tea loss due to delays in transportation of harvested green leaf tea from the collection centres to the tea processing plants due to poor feeder roads, mainly during rainy season (IDH, 2021a, IDH, 2021b).

Moreover, Key et al. (2000) grouped transaction cost as fixed and variable/proportional transaction cost. In the context of the tea value chain proportional or variable transaction costs may be related to cost for transporting inputs and cost for transporting green leaf tea from collection centres located close to the tea plots to the tea processing centres. In contrast, fixed transaction cost may be related with cost for negotiating services or contracts related with their engagement in tea production, for example in negotiating for the inputs loan and repayment terms. In a different view point, Key et al. (2000) also classified transaction costs as observable

transaction costs (handling, transport, storage and spoilage) and unobservable costs (intangible or fixed, which include costs like those related to information search, negotiation costs, and contract enforcement costs). Pingali et al. (2005), on the other hand, examine transaction costs based on physical location; as a result, input costs and market access costs vary depending on the farmer's location.

Various studies indicate that, smallholder farmers commercialisation is affected by various factors, including transaction cost. A study by Key et al.(2000), indicate high transaction costs as a significant factor contributing to smallholder farmers' hesitancy to participate in market activities. Likewise, a study by Baloyi (2010), which examined the challenges faced by smallholder famers in the agribusiness value chain in South Africa indicate transaction cost to be amongst determinants that affect farmers' performance. Other significant factor by this study, include, land access, production inputs access, extension services support, and human capital.

Similarly, a study by Munishi et al.(2017) in the identification of farmers performance in Tanzania, revealed access to credit and extension services to be amongst factors affecting smallholder tea farmers performance. These factors may be equated to transaction cost in the form of difficulties in accessing credit and extension services amongst the smallholder tea farmers in Tanzania. Another study conducted by Ngaruko and Lyanga (2021) on the influence of transaction costs on sunflower seed production discovered that proportional transaction costs connected with inputs, information access, and negotiation cost have detrimental effects on sunflower output. Similarly, fixed transaction costs connected with inputs information, like transport ownership and communication assets access, have a major impact on output.

Additionally, a study by Lwezaura et al. (2017) on transaction cost related to paddy seed purchase by smallholder farmers in Tanzania revealed that farmers incur transaction cost as an additional cost in acquiring paddy seed, constituting 18% of the overall cost of paddy seed and roughly 2% of the variable cost in rice cultivation by farmers. Specific significant transaction cost identified were age, trust, seed source, farmer's location, and distance from seed source to the farmer's household. Relatedly, Munishi etal.(2017) identified education level, household engagement, farming experience, age, membership status, and access to extension and financial services all had a substantial impact on smallholder tea farmer performance. This observation suggest that farmers' unique characteristics are likely to shape their approach to recognising and managing varied transaction costs, thus can contribute to either the decrease or escalation of transaction costs.

To sum up, findings from these studies, entails that smallholder farmer's commercialisation may be affected by high transaction costs and shows the importance of

reducing the same to influence smallholder farmers commercialisation. Various scholars such as Kharchenko (2019), Grega (2018), Fronmueller and Reed (1996) argue that vertical integration have a potential to reduce transaction cost, thus contributing to improved agriculture system. In a study by Lijia and Xuexi (2014) which investigated China farmers' selling behaviour in the context of transaction costs found that vertical integration in the form of participation in cooperatives significantly reduced transaction cost, approximately 885 Yuan per participating farmer compared to farmers' who were not engaged in vertical integration. Similarly, a study by (Maina and Kavale, 2016) on the impact of vertical integration on the operational effectiveness of agricultural commodity trade in Kenya revealed that vertical integration results into reduced transaction cost through optimised use of warehousing, distribution, transport and food processing.

Likewise, vertical integration allows the organisation to reduce unreliable and ineffective activities caused by the complexities or uncertainties involved with outsourcing critical functions (Maina & Kavale, 2016). This entails engaging into legally binding contracts that cannot be simply dissolved without spending considerable costs. Relatedly, various vertical integration processes like mergers, joint venture and contracting are vital in risk associated with agribusiness, which in turn relieve transaction costs through enhanced operational management of the business system's governance of the organisation (Scudder & Byramjee, 2012). Moreover, a study by Gbadegesin and Popoola (2020) that assessed on how transaction cost of rice producers may be reduced through collective marketing found a significant reduction of transaction cost per farmer after engaging in collective marketing compared to before joining collective marketing.

The reviewed literature, amongst others acknowledges the potential benefits of vertical integration in reducing transaction costs, however studies that explores its impact on smallholder commercial farming, particularly in Tanzanian tea subsector, remains scanty. This study aims to fill this gap by examining how vertical integration affects transaction cost reduction for smallholder tea farmers commercialisation in Tanzania.

METHODOLOGY

Research Design

The study used a descriptive research design. This design helped us to assess the impact of vertical integration on transaction cost minimisation in smallholder tea commercial farming in Tanzania. The approach is useful in providing insights into patterns, trends, and attitudes within the studied population, thus forming basis in hypothesis testing (Etchegaray & Fischer, 2009).

Data Collection and Processing

This study used primary data from a cross-sectional survey of 393 smallholder tea farmers from 37 communities spread over three districts (Rungwe, Busokelo and Njombe) to assess the impact of vertical integration on minimisation of transaction cost in smallholder tea commercial farming in Tanzania. The study respondents were chosen based on their involvement or lack thereof in the vertically controlled Greenleaf tea market during the 2022 tea growing season.

A stratified random sampling strategy was used to achieve complete representation. Specifically, participants were divided into two clusters: contract participants (233 farmers, accounting for 59% of the sample) and non-participants (160 farmers, accounting for 41 percent of the sample). Random samples were taken from specific clusters within the 37 villages depending on the presence or absence of farmers involved in the vertically coordinated Greenleaf tea market. Within the scope of the study, this rigorous sampling technique intended to collect a varied spectrum of opinions and experiences.

Dependent variable measurement

The dependent variable in the study is transaction cost, with a focus on non-quantifiable transaction costs at the upward and downward nodes of the tea value chain—specifically, downward transaction cost (DTC) and upward transaction cost (UTC). These are added together to generate a transaction cost composite score.

DTC tackles the costs incurred by smallholder tea growers in the downstream end of the value chain, including crop production under vertical integration, such as farm preparation, planting, and management. UTC, on the other hand, includes transaction costs incurred throughout ascending activities such as harvesting, gathering, sorting, and selling. The study also employs Coase's (1937) three transaction costs; information search, bargaining, and enforcement to classify costs at the downward and upper nodes of the tea value chain.

The DTC and UTC were graded on a five-point Likert scale (1-5), as a proxy for assessing farmers' views on transaction costs. Each variable had three constructs and three indicators, for a total of six constructs (three DTC and three UTC) and twenty-four indicators (twelve DTC and twelve UTC), used to compute the total transaction (TTC) composite score, which is further used as a dependent variable in the multiple regression model (see the summarise details in Table 1).

Table 1: Dependent Variables Measurement (Transaction Cost)

Transaction Cost	Construct's Specific Indicators	Number of Indicators
	Downward TC (DTC)	
Search	(i) Contract length; (ii) Time spent learning about the contract terms; (iii) Cost of learning about contract opportunities and terms (iv) Visit to investors	4
Negotiation	(i) Contract term rigidity; (ii) Contract negotiation frustration; (iii) Time to learn about contract terms; (iv) Contract terms understanding	4
Enforcement	(i) Delays receiving service, (ii) Non-compliance reputation risk (iii) Contract enforcement time use, (iv) Fear of legal reprisal.	4
	DTC indicators	**12**
	Upward TC (UTC)	
Search	(i) Frustration with harvesting and collection dates; (ii) Visits to buyers for net payable amount; (iii) Cost to know amount payable; (iv) Waiting time for payment confirmation.	4
Negotiation	(i) Price renegotiation in response to market fluctuations (ii) Dissatisfaction with renegotiate price (iii) Time spent comprehending changed pricing system (iv) Disagreement on payment for acceptable quality delivered.	4
Enforcement	(i) Payment delays (ii) Losses resulting from the rejection of quality-based products; (iii) Product inspection time; (iv) Penalty for engaging in side-selling.	4
	UTC indicators	**12**
	Total TC indicators	**24**

Independent variable measurement

The independent variable used is farmers participation in vertical integration alongside other variables. Farmers' participation in vertical integration is represented as a dichotomous variable (coded as 1 for participation and 0 for non-participation). To evaluate farmers' participation in vertical integration, smallholder tea production per acre in tons was used. Farmers who produced less than the mean were classed as non-participants, while those who produced more than the mean were labelled as participants. Other variables, included in a model are respondent’s gender, age, household size and land size, their measurement of which are shown in Table 2.

Table 2: Independent Variables Measurement

SN	Description	Measurement
i.	Farmer's participation in vertical integration (FPVI)	Participation is measured by using production (ton) whereby, the production value above mean=participation, and below mean= otherwise.
ii.	Respondent's gender (RESGEN)	Nominal (1=Male; 0=Female/Otherwise)
iii.	Respondent's age (RESAGE)	Continous (in years)
iv.	Respondent education (RESEDU)	Nominal (1=Completed primary school; 0=Otherwise)
v.	Respondent's household size (RESHHS) (persons)	Continous (number of persons)
vi.	Respondent's Land size (acres) (RESLNS)	Continous (in acres)

Structural Equation

Building on the variables described above, a multiple linear regression model shown below was used to estimate the impact of vertical integration on transaction cost in smallholder tea farmers commercialisation in Tanzania along with other farmer characteristics.

$$TC_n = \beta_0 + \beta_n X_n + \epsilon \quad (1)$$

Whereby:

TC_n= Transaction Cost for the n^{th} farmer

β_0= Intercept, which represents TC when all independent variables are zero.

X_n=Coefficients that represent the change in the TC for a one-unit change in the relevant predictor variable while holding the other variables constant.

ϵ = error term

By introducing specific independent variables indicated in Table 2, equation 1 may be structurally rewritten into equation two as follows:

$$TC_n = \beta_0 + \beta_1 FPVI_n + \beta_2\, RESSGEN_n + \beta_3\, RESAGE_n + \beta_4 RESEDU_n + \beta_5 RESHHS_n + \beta_6 RESLNS_n + \epsilon \quad (2)$$

Whereby:

FPVI=Farmer's participation in vertical integration

RESGEN=Respondent's gender

RESAGE=Respondent's age

RESEDU=Respondent education

RESHHS=Household size

RESLNS=Respondent's land size

Data Analysis

The collected data was cleaned in excel and imported in SPSS IBM Statistics for Mac Version 26 for analysis. Descriptive analysis of independent and dependent variables was done by using measures of central tendency to improve data comprehension. Moreover, a multiple linear regression model was used to analyse the impact of vertical integration and farmer characteristics (gender, age, education, household size, and land size) on transaction cost reduction among Tanzanian smallholder tea farmers. The significance level of 0.05 was employed for accepting or rejecting null hypotheses. Prior running the analysis validity and reliability tests were undertaken and passed, similarly, critical multiple linear regression model assumptions, specifically autocorrelation, homoscedasticity, collinearity and normal distribution of errors were checked and passed.

RESULTS AND DISCUSSION

Descriptive Results

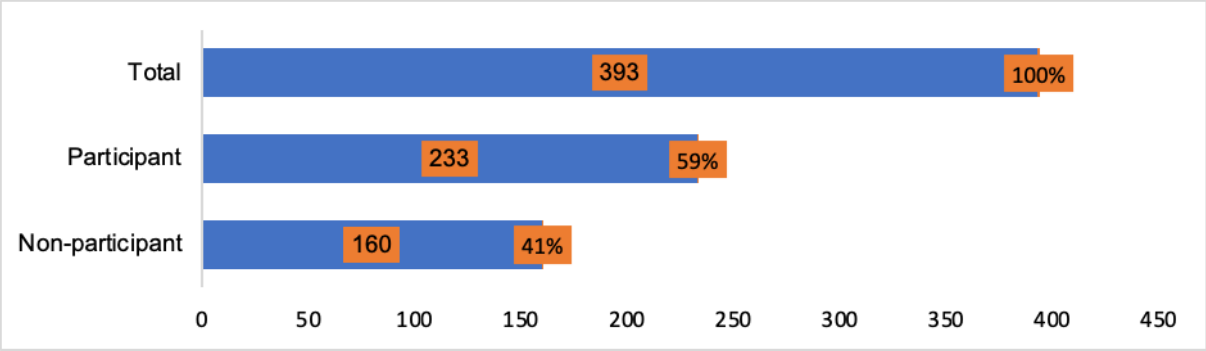
The study involved more male (57%) respondents than females (43%). Most participants, comprising 86 percent of the sample, were adults (35 years and older), while youth (18-34 years) accounted for only 14 percent of the participants. This corresponds with earlier research indicating that limited participation of youth in tea farming in Tanzania (CARE International in Tanzania, 2023; Munishi et al., 2017). The study results show that, the majority (90%) of the surveyed smallholder tea growers had a primary school education, with a minority (10%) not having completed elementary school, which is above the overall primary school completion rate in Tanzania (68%) and 65 percent in the developing countries (Evans et al., 2023). The average household size of survey respondents is 5.2 individuals, surpassing the national average of 4.6 individuals (URT, 20219). The average farm size of the surveyed smallholder tea farmers is 1.5 acres of tea farms. Delving into land size categories, majority of the respondents (92%) had farm size ranging from 0.25 acres to 2.5 acres (see Table 3). These results suggest that, most of the smallholder tea farmers involved in this survey have relatively small tea farms.

Table 3: Tea Landholding Categories (N=393

Category	Frequency	Percentage
<0.25	5	1.0
0.25-2.5	361	92.0
2.6-5	27	7.0
Total	**393**	**100.0**

This paper used production level to denote level of participation in vertical integration, with farmers scoring mean classified as participants and below mean as non-participants. During the previous season, the mean yield of green tea leaves per acre was 3.3 tons. When comparing farmers above mean score as participants and non-participants in vertical integration, the proportion of participants is 59 percent while that of non-participants is 41% (see Figure 1).

Figure 1: Vertical Integration Participation Based On Production Volumes (N=393)



On the other hand, the overall composite score mean of Total Transaction Cost (TC) is about 74. Comparing the mean downward and upward composite transaction score, the mean downward transaction cost mean (4) is statistically higher than upward transaction cost mean (32) at the 5 percent precision level. This suggests that farmers view the upper node of the tea value chain as more difficult in terms of transaction costs and complexity when participation in vertically integrated markets (see Table 4).

Table 4: Transaction Cost Analysis Description

Transaction Cost	Variables	Mean	Median	Mode	Minimum	Maximum
Downward	Search	9	9	8	4	14
Transaction Cost	Negotiation	16	16	16	12	20
	Enforcement	16	16	16	12	20
	Total DTC	**41**	**41**	**40**	**30**	**52**
Upward	Search	9	9	9	5	13
Transaction Cost	Negotiation	10	10	10	4	20
	Enforcement	13	13	14	5	20
	Total UTC	**32**	**32**	**34**	16	**44**
Total TC		**74**	**74**	**79**	**55**	**91**

Estimation of Impact of Vertical Integration on Transaction Cost Minimisation

The multiple regression model was statistically significant at P=0.05, implying that the observed results are not due to chance rather to the effect of vertical integration and other variables on transaction (see Table 5).

Table 5: Multiple Linear Regression Results

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
(Constant)	77.512	2.865		27.054	0.000	71.879	83.145
Participation in vertical integration	-0.002	0.000	-0.218	-4.403	0.000*	-0.003	-0.001
Gender	-1.81	0.757	-0.122	-2.392	0.017*	-3.297	-0.322
Age	0.061	0.034	0.093	1.785	0.075	-0.006	0.127
Education	-0.161	1.227	-0.007	-0.131	0.896	-2.572	2.251
Household size	0.349	0.202	0.089	1.73	0.084	-0.048	0.746
Farm size	-0.142	0.46	-0.015	-0.308	0.758	-1.046	0.762

(a) Dependent Variable: Total TC; (b) Predictors: (Constant), Participation in vertical integration, household size, farm size, education, gender, age; (c) Sig.F Change 0.000; (d) *Predictors significance level at P<0.05

The results indicate a significant negative effect (β = -0.002) of vertical integration on transactions cost (P < 0.05). The negative coefficient suggests that as vertical integration increases, transaction cost related to smallholder farmer commercialisation decrease, while the precision level of 5 percent emphasizes the statistical significance of this relationship. The inverse relationship between vertical integration and transaction cost in smallholder farmers commercialisation, resonates with other previous studies on the same topic. For instance, a study by Gbadegesin and Popoola (2020) in Tanzania found that vertical integration through collective action contributes to the reduced transaction cost. Similarly, a study by Lijia and Xuexi (2014) in China revealed vertical integration to have significant impact on reducing transaction cost to the participating farmers unlike otherwise. Likewise, Maina and Kavale (2016) in a similar study in Kenya found vertical integration to be critical in reducing transaction cost to smallholder farmers. Moreover,

Scudder and Byramjee (2012), revealed that vertical integration contributes to improved operational management of the business system's governance of the organisation leading to overall reduction of transport cost.

In the context of current study, these results suggest that participation in vertical integration have a potential of reducing transaction cost related to specific challenges facing the smallholder tea farmer like limited access to inputs (fertiliser and herbicides), extension services access, good agricultural practices application, operational inefficiencies, and market access. Vertical integration in the tea value chain, may include combining several forward and backward stages of the agricultural value chain into a single business, may result in simpler processes, fewer intermediaries, and increased operational efficiency. As a result, transaction costs for activities such as transportation of inputs and green leaf tea, procurement of inputs, and marketing may be reduced.

Delving into other farmer characteristics, the regression outcomes indicate that farmer characteristics such as gender, education level, and farm size are negatively associated with transaction costs. The specific regression coefficients are gender (β = -1.81), education (β = -1.81), and farm size (β = -0.142), respectively. Besides, in these variables it is gender only which was statistically significant at 5% precision level. This finding aligns with other scholars like Lwezaura et al. (2017) and Munishi etal. (2017) who argue that some farmer characteristics, including education level positively affect farmers performance, suggesting optimised operation and relatively lower transaction cost.

In the context of smallholder tea farmers commercialisation, these results suggest that the educated smallholder tea farmers may have more knowledge and abilities in resource management, negotiation, and market understanding. This increased knowledge can lead to better-informed judgements and more efficient management practices, resulting in lower transaction costs. Relatedly, it is likely that gender equity is expected to affect transaction costs through inclusion, empowering farmers, improving skills, and resource use. This encourages efficient practises, which reduces expenses. Equal opportunities for men and women innovations expand on these advantages. On farm size, it may imply that larger farms frequently benefit from economies of scale. Therefore, it is likely that as smallholder tea farm size increases, so does the production volumes. Farmers with higher output volumes may have better bargaining leverage, cheaper transportation costs, and improved market access, resulting in lower transaction costs.

Further analysis, however, demonstrates a positive relationship between age (β = 0.061), and household size (β = 0.349) and transaction costs, but this association is not statistically significant at P=0.05. This contrasts previous research by Lwezaura et al. (2017)

and Munishi et al. (2017), which found that age has a favourable impact on farmer performance. This contradiction shows that, while elderly farmers may perform better in general, their success may be accompanied by increased transaction costs. This link may be the result of a variety of variables, including operational decisions, resource allocation, or market entry initiatives. To appreciate the larger consequences of age and household size in the context of agricultural practises and efficiency, it is critical to evaluate both smallholder farmer performance and transaction costs.

CONCLUSION AND RECOMMENDATIONS

The study finds that vertical integration has a significant negative influence on transaction costs. As a result, as vertical integration grows, transaction costs in smallholder farmer commercialization fall. This is consistent with previous study findings, which emphasise the critical significance of vertical integration in lowering transaction costs. Promotion of vertical integration initiatives, has the potential to improve operational efficiency and lower transaction costs for smallholder farmers. Policymakers, tea subsector stakeholders, and farmers could consider working together to encourage vertical integration practises, with the goal of improving market access, lowering costs, and increasing overall profitability. Future research can delve into how vertical integration affects transaction costs, including mechanisms and sector/regional comparisons. Additionally, studying integration's long-term sustainability and scalability can inform policymaking and stakeholder collaboration. In the context of farmer characteristics, findings underscore the nuanced interaction of farmer characteristics and transaction costs. While gender, education and farm size align with expectations, the positive relationship of age and household size with transaction cost contrasts prior research. This inconsistency highlights the complexity of factors influencing both farmer performance and transaction costs. To optimize transaction cost reduction, farmers should consider a holistic approach considering their individual circumstances, while policymakers and researchers should further investigate the nuanced relationships between farmer characteristics and transaction costs for effective agricultural interventions.

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