

Determinants of Governance Structure Choice among Beekeepers in Northern Uganda

Irene L. Akidi^{1,2*}, Patience M. Mshenga¹, Basil Mugonola²

¹Department of Agricultural Economics and Agribusiness Management, Faculty of Agriculture, Egerton University, Nakuru, Kenya

²Department of Rural Development and Agribusiness, Faculty of Agriculture and Environment, Gulu University, Gulu, Uganda

Email: *lynnetteireneakidi@yahoo.com

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Abstract

The study provides an understanding of how smallholder beekeepers in northern Uganda select among alternative governance structures. Primary data was collected from a random sample of 408 beekeepers in Lira, Kitgum, and Yumbe districts. A multivariate Probit model was used to establish the factors that determine the choice of governance structure selected by the beekeepers. Results from a multivariate Probit model analysis showed that the choice of governance structure was significantly influenced by training, distance to the market, social capital index, education, annual income, land for beekeeping, and the various attributes of a transaction. However, the beekeeper's age and beekeeping experience had no significant effect on the choice of governance structure chosen by the beekeeper. The study suggests that further research is needed into the impact of selected governance structures on a beekeepers' income.

Keywords

Multi-Governance Structure, Governance Choice Factors, Multivariate Probit Model, Transaction Costs, Northern Uganda

1. Introduction

Several households in Sub-Saharan Africa (SSA) are living in poverty [1]. These households depend on agriculture for their livelihood. However, agriculture is currently facing several challenges key among them being climate change. Due to changes in climatic conditions, smallholder farmers in Sub-Saharan Africa can no longer continue to only grow traditional crops nor keep traditional lives-

tock. They have been forced to search for alternative crops and livestock which can withstand low and unreliable rainfall as well as diversify their farm enterprises. One such alternative livestock enterprise is apiculture. Currently, apiculture is being promoted in many countries. It is not only being promoted as a livelihood strategy, but also an opportunity to conserve the environment through the sustainable use of forest resources.

In terms of apiculture production, China is the leading producer of honey in the world, with an annual production of 444,000 MT [2]. In Africa, Ethiopia leads in terms of production with a contribution of 2.7% and 21.7% to world production and Africa, respectively [3]. For Uganda, only 2.7% of the total households in Uganda were reported to own beehives, with an estimated annual production of 2600 tonnes [4].

In Uganda, beekeeping is popular in the northern part of the country. This is because the region is arid and semi-arid. Farmers in this region suffer from adverse effects of climate change with only one rainy season to grow crops. As such, beekeeping is an attractive enterprise through which farming households can supplement their income.

Beekeeping in Uganda has recently gained popularity by government and non-governmental organizations as a livelihood diversification strategy for the rural poor. This is an enterprise with great potential since Uganda is naturally endowed with various floral diversity and conducive agro-ecological zones, which makes it not only suitable for bees, but also honey of various flavours. As such, governmental and non-governmental organizations (NGOs) are promoting beekeeping in various ways. The Government of Uganda (GoU) has introduced apiculture extension services as a way to promote the enterprise through the Plan for Modernization of Agriculture (PMA) program [5] [6].

Several studies have, in recent times, been conducted on this sub-sector in Uganda though it still lags in terms of research compared to the other livestock types. These studies [7]-[14], majorly focused on the adoption of beekeeping, production constraints and contribution of beekeeping to the livelihood of the various households engaged in the enterprise. Less attention is placed on chain-governance between the beekeepers and other actors of the chain, and yet this poses a massive challenge for beekeepers in terms of transaction costs.

Governance structures are referred to differently as governance mechanisms, vertical co-ordination, collaboration, distribution channels, or market arrangements in various kinds of literature. Governance structures are, therefore, referred to as a set of rules that govern a transaction [15]. Economic agents tend to select a governance structure that will enable them to minimize costs incurred on a transaction [16].

The governance structures that govern business transactions range from spot markets to vertical integration [17]. For spot markets, transactions are typically determined by price incentives, while for vertical integration, they are determined by the intensity of resource control and ownership, in between the two

lies the intermediary structures (**Figure 1**).

The choice of governance structure made by the farmers has a significant influence on determining the costs incurred during a transaction [15]. When a firm sets up specific assets, the fear of opportunistic behaviour sets in [18]. This assertion, therefore, postulates that the governance structure selected acts as a safeguard in which business partners engage to control inter-firm exchanges and reduce exposure to opportunistic behaviour.

When the definition of governance structures employed in [15] is used, there is difficulty incorporating social control or relational ties and trust in the exchange relationship. Social relationships through relational norms are an essential element of a transaction in that they can act as an avenue for higher product quality and better economic performance [19]. Therefore, in a more accommodative definition, Governance structures are defined as formal and informal laws and norms established to guide the relationship of transacting partners [15]. The formal laws are those that are written and established by transacting parties according to specific processes, while informal laws and norms are established to guide the relationships of the transacting partner [20].

The factors that influence governance structures range from socio-economic down to institutional factors. Therefore, selecting a governance structure that minimizes costs for the apiculture farmers calls for an understanding of the various factors that influence the choice of governance structures.

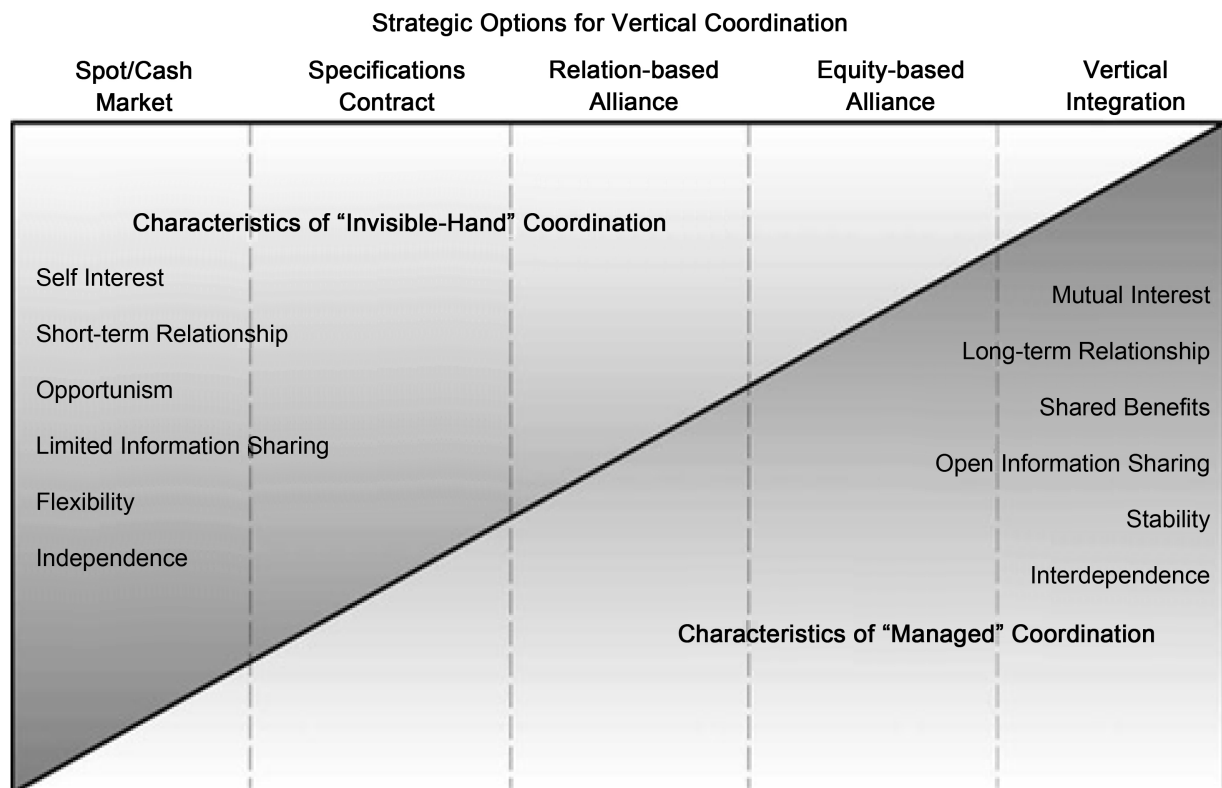


Figure 1. Continuum of governance structures. Source: Peterson *et al.* (2001).

2. Literature Review

2.1. Effects of Social Capital on Governance Structures of Smallholder Farmers

The study of social capital gained popularity in the field of research, and it took a stroll in the study by [21] when he looked at its effect on economic development. By definition, social capital consists of networks of actors and the norms and values being distributed in these networks [22]. Uganda is no exception, and several studies ranging from medicine to agriculture have been conducted in this area. These are summarised below.

A study conducted on agricultural producer groups in Poland investigated the influence of trust and informal governance structures on relationship and satisfaction of farmers concluded that; trust plays a vital role in enhancing cooperation. Trust is perceived as an essential aspect of solving commitment problems that more often resort to close interpersonal relations to govern collaborative actions [23]. [24] reported this same finding. Trust is essential to complement or facilitate market interactions in instances where formal institutions are weak [25]. These studies, however, contradict the findings by [26], who reported that trust and risk behavior had insignificant effects on the choice of the governance structure. This, however, poses issues since they only use trust as a measure of social relations and yet other aspects are also involved. Social capital is divided into cognitive and structural aspects. This, therefore, leaves a lot to be desired.

[27] reported that bridging social capital affected the actors' assessment of their access to information in policy forums but a negative effect on their perception of cooperation and procedural fairness in forums. In contrast, measures of bonding social capital had a positive effect on cooperation and procedural fairness, but no effect on information access. The results suggest that forums of social capital have separate potentially opposing effects on distinct measures of the performance of adaptation policy forums. This finding is similar to [28] who reported that long-term relationships with mutual trust, relational embeddedness, and relational commitment, each contribute to the overall alliance performance.

Trust was further explored by [29], who reported that an additional problem with cooperatives is that there is often a lack of trust and social capital among farmers and villagers so that collective action is hindered already at the initial stage. Thus, Gardner and Lerman conclude that the evidence for cooperatives in agricultural production is still unfavourable. Hence this can pose a challenge for the cooperative form of governance. Further, still, opportunism was found to be dealt with by adopting a more trusting social orientation of reciprocity when doing business in which relational norms would bind trading parties and hence discourage opportunistic behaviours [30] and [31].

In the same vein, a study carried out in the Italian wine chain reports that cooperatives have also been formed in the wine industry from both the grower side

and also the winery side that rely on trust, and relational dimensions to leverage the territorial value and to mitigate power [32]. However, [33] trust was a requirement for both spot and contract transactions in the wine chain. Since weak legal systems are not the most effective way to protect contractual agreements against opportunistic behaviour, wineries operating in such an environment are advised to complement their contractual relationships (monitoring and incentives) with socioeconomic-based relationships (trust). In contrast, wineries operating in a productive legal environment are advised to be thorough and meticulous during the contract formulation process.

However, most CF arrangements in developing countries remain as simple verbal agreements predicated on social capital such as reputation and relationship-specific incentives [34]. Such informal arrangements are less costly for agribusiness firms and provide both parties with the option to opt-out of the arrangement. Further still, [35] reported that transparency in quality assurance systems is imperative to maintaining smallholders' trust in CF arrangements, especially as they adjust to stricter quality requirements in increasingly competitive value chains for high-value products. They found out that firms appear more likely to fabricate quality testing or speciously reject perishable commodities on the grounds of quality when supply is guaranteed from a large pool of smallholders.

2.2. Socio-Economic Factors that Determine the Choice of Governance Structures

Various socio-economic factors studied in the literature concerning the choice of governance structures and these include: the attainment of formal education, trust, experience in production, distance from the market, training, membership in innovation platform, leadership training, enforcement of internal control practices, bulking and market distance and size of the executive committee among others. [36] made use of a Multivariate Probit model to evaluate the multi-modes of governance structures among producers and processors of rice in Benin. The model allows taking into account the multiple choices of modes of governance by the actors. The attainment of education was found to be positive and significantly associated with formal contracts and associations [36] and [37]. This corresponds to [38] who made use of a multinomial logit model to determine factors that affect the choice of governance structure chosen by honey farmers in Ethiopia.

Experience in production and distance from the market were found to positively and significantly influence, spot markets, association, and relational governance forms, respectively [24]. More experienced farmers would prefer to trade at spot markets compared to their inexperienced counterparts. It is, however, also reported that the younger honey producers preferred contracts compared to the older ones [38].

Further still, [36] reported that formal contracts are used more by producers

and processors that belong to an innovation platform. This is because farmers were more organized and empowered to engage in contracts. They added that the quantities of paddy produced and sold are more stable informal contracts than in spot markets and informal contracts. This result is complemented by [38], who observed that farmers that produced more substantial volumes of honey moved on to contracts to enable them to secure a stable market.

In their study, [39] examined factors influencing the effectiveness of second-tier rural producer organizations (RPO) in linking farmers to the market. The study employed an OLS regression technique. RPO effectiveness was found to be positively related to the size of the RPO and leadership training. The effectiveness was further related negatively by the proportion of RPO leadership who had undergone leadership training, enforcement of internal control practices, bulking distance, and size of the executive committee. However, they did not look at how present governance structures influence the effectiveness of the RPO.

2.3. Attributes of a Transaction

A study [24] conducted a study to investigate the factors that affect the choice of governance structure used by farmers in Benin and made use of a multivariate Probit model. The study identified four governance structures being used by the farmer that is spot markets, relational, outgrowing, and associational governance structures. The human-specific investment was found to be negatively and significantly related to spot market governance structures but significantly and positively correlated with relational based governance structures. A more hierarchical governance structure was found to be positively correlated with transaction connectedness. The results further revealed that for farmer associations' governance structure is positively and significantly influenced by the difference in the form of institutional support received by farmers. Spot market transaction arrangements, the quantity, and price are often agreed upon at the moment and place where transactions take place.

Further still, [40] employed a Logit model to analyze the factors that influence the choice of governance structures utilized by Brazilian farmers. Their findings indicated that: uncertainty, frequency, and asset specificity agreed with the theory. Asset specificity had the most significant impact on the probability of the farmers to adopt a specific governance structure. These findings were concomitant to those of [41], who reported that production uncertainty increases farmers' preference for contracts while behavioral uncertainty increases, farmers are less likely to engage in contracts. The logistic model used by [40] does not take into account the fact that some farmers may make use of 2 or more structures, and this makes the study miss out on information that may be important.

[42] examined the various governance structures employed along the pig value chain in the districts of Masaka, Kamuli, Mukono, and Kampala in Uganda. The study established that the pig value chain is characterized by spot market transactions with limited contractual or hierarchical arrangements. However, the

study never considered the influence of farm and farmer characteristics on the choice of governance structures by the farmers and traders. Therefore, this leaves out a great deal of information on the role of socio-economic in determining the choice of governance structure selected.

2.4. Analytical Methods Used in Determining the Choice of Governance Structures

Various models have been made use of in determining the factors that influence the choice of governance structures. These models include multinomial Logit [38], instrumental variable regression Probit model [41], multivariate Probit [24], and [36] and the OLS [39]. However, the multinomial Logit, though easy to estimate, violates the independence of irrelevant assumptions (IIA) in the face of choices. This assumes that residuals in each of the equations are uncorrelated, which is unlikely true and can lead to biased estimates. The OLS model assumes that any change in the dependent variable increases linearly with the independent variable, and the marginal effects of the independent variables remain constant. This also leads to biased and inconsistent estimation. The challenge of identifying instrumental variables that fulfill all the assumptions makes the use of the instrumental variable regression Probit is inevitable. The paper, therefore, made use of the multivariate Probit that simultaneously models the influence of explanatory factors on each of the governance choices made and allows for the IIA assumption to hold. On the variable side, the study estimated social capital using different proxies and used the social capital index in the regression equation instead of the only trust as other studies have done.

2.5. Theory of Transaction Costs

In literature, the prevailing theory for explaining governance issues is Transaction Cost Economics (TCE) originally put forward by [43] and [44] and further expanded by the proponents of the New Institutional Economics (NIE). TCE offers a set of normative rules for choosing particular governance arrangements [45], which affects transaction costs economizing results [16]. Generally, governance structure aims at mitigating all forms of contractual hazards found between the partners in order to minimize the production and transaction costs [46]. In NIE literature governance structure has been defined as the institutional matrix that encapsulates the configuration of multi-stage business arrangements within a given strategic network [47]. [48] indicates that a governance structure consists of a collection of rules or institutions, and constraints structuring the transactions between the various stakeholders in the value chain. Notably, when the absolute value of transaction cost is expected to be high, the exchange partners will tend to apply a more intense and stable governance structure to reduce the transaction costs. Transaction cost economics is not only about managing transaction costs, but also the choice of organizational form that often vary according to the specific types of exchange activities. For example, hierarchical

governance structure emerged due to market failures in less developed economies. However, high transaction costs can also be an entry barrier to smallholder farmers from participating in transaction/exchange or market. The choice of governance structure is influenced by factors related to asset specificity, uncertainties both either behavioural or environmental, that should be analyzed together and not in isolation [49] [50].

Asset specificity is the transferability of assets (physical and human resources) that support a given transaction. Transactions not supported with high asset specificity are prone to hold-up problems making the market players opt for low-cost governance structure. Behavioural uncertainties include performance evaluation and information asymmetry problems, including bounded rationality. Bounded rationality and opportunism are two crucial assumptions of TCE, which show that it is costly to identify untrustworthy individuals' *ex-ante* [51] and further indicate that all exchanges are costly. The market actors are rationally bounded (there are incompleteness and asymmetry of information) and tend to be opportunistic. Under these two conditions, market transactions are characterized by hazards; thus, measures must be taken to mitigate the losses arising from high market transaction costs.

Due to uncertainty, the exchange partners may find it challenging to write market contracts, leading to opportunism. Therefore, the governance of exchange agreements between economic actors is costly, and governance forms/ structure varies depending on the ability to facilitate exchange and the attributes of the transaction environment [52]. This may make the partners use an internal governance structure that minimizes transaction costs such as communication, negotiation and co-ordination cost.

3. Materials and Methods

The cross sectional study focused on three beekeeping districts in Northern Uganda these are; Yumbe in west Nile, Lira in mid-north, and Kitgum district in the northeast as the significant producers of hive products in the Northern region of the country. The 3 districts were purposively selected based on the predominance of beekeeping and a total of 408 beekeepers as calculated from the formula in [53] for determining the sample size for a finite population with a confidence coefficient of 95% were interviewed. A multi-stage sampling technique was used to establish the sample for this study. The first stage involved a purposive selection of the three districts that is Lira, Yumbe, and Kitgum. Secondly, sub-counties with the most significant number of beekeepers were randomly selected. In the third stage, sampling, according to proportion, was used where sub-counties with more beekeepers were sampled more. The respondents in each of the sub-counties were then selected using simple random sampling.

Analytic Approaches

The study intended to explain the effect of transaction attributes, social capital,

institutional environment and socio-economic characteristics on governance structure choice. As one actor can be involved in one or more types of governance structure, it was appropriate to use a Multivariate Probit model to analyse the determinants of governance structure of the beekeepers (Equation (1)). A *Multivariate Probit* estimates M-equation Probit models, by the method of maximum simulated likelihood [54]. The variance-covariance matrix of the cross-equation error terms has values of 1 on the leading diagonal, and the off-diagonal elements are correlations to be estimated. The *Multivariate Probit* evaluates the M-dimensional Normal integrals in the likelihood function. For each observation, a likelihood contribution is calculated for each replication, and the simulated likelihood contribution is the average of the values derived from all the replications. The simulated likelihood function for the sample as a whole is then maximized using standard methods. A detailed description of this model is shown in [55] and [56].

In this model, the governance structure is considered as a system of a multiple choice equation ($i = 1, \dots, 4; j = 1, \dots, n$) respective to each type of governance structure.

The first estimation of the social capital was done by determining the structural and cognitive social capital, which was used to estimate the social capital index for the apiculture farmers in northern Uganda. The social capital index was then incorporated into the MVP as one of the explanatory variables.

The model is stated in Equation (1).

$$Goverstr_{ij} = \alpha_{oj} + \beta_{1j}TransAttrib_{ij} + \beta_{2j}InstEnv_{ij} + \beta_{3j}Charact_{ij} + SCI + \varepsilon_{ij} \quad (1)$$

where:

α_{oj} is the coefficient to be estimated, $Goverstr_{ij}$ is the governance structure j choice by a farmer I , $TransAttrib_{ij}$ is the transaction attribute I by farmer j , $InstEnv_{ij}$ is the institutional environment, $Charact_{ij}$ are beekeepers' characteristics, SCI is the social capital index, ε_{ij} is the error term.

4. Results and Discussions

4.1. Farmer Characteristics

This subsection discusses results on farmer characteristics. Of the 408 beekeepers sampled, Yumbe district had the highest number of beekeepers, while Kitgum had the lowest number of beekeepers (Figure 2). The sampling was done according to the proportion of beekeepers in the three districts where the district with the highest number of beekeepers was sampled more. Yumbe district had the highest number of beekeepers surveyed with the lowest number from the district of Kitgum (Figure 2).

A majority (85%) of the beekeepers were male and the rest females. The high number of males might be attributed to the fear of bees by females highlighted by both men and women during the focus group discussions. As indicated in Table 1, the beekeepers had an average age of 40.5 years, an indication that most

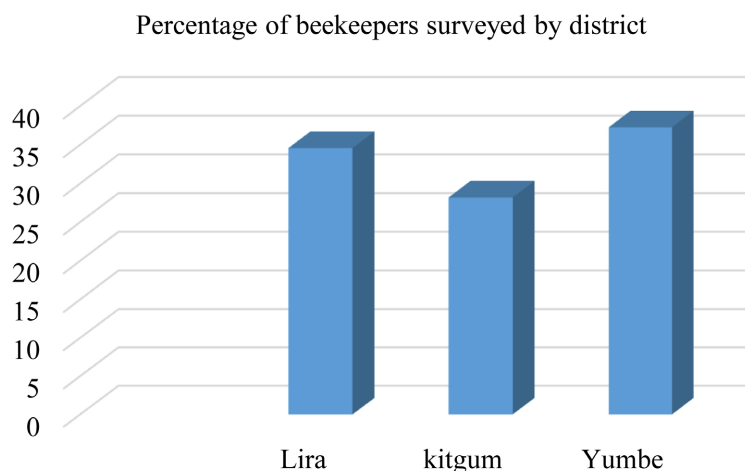


Figure 2. Percentage of households surveyed by district.

beekeepers were still in the most productive stages of their life. The beekeepers had an average of 7 years of formal education, indicating that at least most beekeepers had attained the primary level certificate. There were more traditional beehives owned (17 hives) as compared to the modern beehives (1 hive). Land ownership, on average, was 12.7 acres with beekeeping taking on the least land size as compared to both crop and animal production.

4.2. Institutional Characteristics of Sampled Households

Extension services usually play an essential role in transmitting new and improved farming techniques and innovations. Extension contacts are also needed to get feedback from beekeepers about the experience and challenges they faced with the latest innovations while communicating with researchers for the improvement of existing technologies. Since apiculture is one of the sub-sectors within agriculture, results of the training show that majority of the beekeepers have not received training in marketing and processing as compared to actual primary beekeeping practices (**Figure 3**).

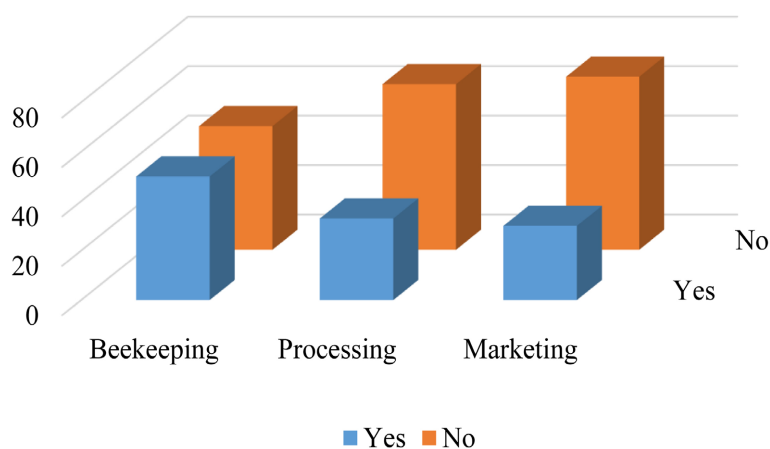


Figure 3. Percentage of beekeepers trained.

Further still, results showed that training in the three districts of the study was significant at 1% (**Table 1**). It reflected the importance of training in beekeeping aspects in the whole study area. Since extension through training is delivered through farmer groups in the community, there is a need for beekeepers to be able to work within groups. Results for group membership were analyzed for the study area, and they show that structural social capital is significant at 1% for

Table 1. Summary of beekeeper characteristics.

Variable name	Mean (Spot market)		Mean difference	Pooled (N = 408)
	Users n = 259	Non-users n = 149		
Age	40.4 (0.888)	41.3 (1.173)	1.23 (1.47)	40.49 (0.708)
SCIB	27.77 (0.332)	29.24 (1.074)	1.47 (0.924)	28.50 (0.446)
Education	7.177 (0.214)	6.799 (0.324)	−0.379 (0.374)	7.039 (0.180)
Annual income	9.7e05 (73,692)	1.6e05 (170,909)	7.2e04 (1,610,892)***	1,239,917 (79,751)
Land beekeeping	0.8897 (0.059)	1.459 (0.108)	0.570 (0.149)***	1.097 (0.073)
Modern hives	1.637 (0.360)	0.523 (0.169)	−1.113 (0.492)**	1.230 (0.238)
Traditional hives	12.416 (1.107)	25.416 (3.429)	12.999 (2.981)***	17.164 (1.466)
Beekeeping experience	6.46 (0.487)	7.51 (0.533)	1.047 0(.759)	6.846 (0.366)
Variable name	Mean (Verbal contract)		Mean difference	Pooled (N = 408)
	Users n = 259	Non-users n = 149		
Age	41.55 (1.047)	39.42 (0.949)	−2.132 (1.414)	40.49 (0.708)
SCIB	28.87 (0.789)	27.72 (0.412)	−1.155 (0.892)	28.303 (0.446)
Education	7.034 (0.274)	7.044 (0.235)	0.010 (0.361)	7.039 (0.181)
Annual income	1.4e06	1.05e05	−3.7e05 (158,600)**	1.2e06 (79,751)
Land beekeeping	1.271 (0.130)	0.923 (0.063)	−0.347 (0.145)**	1.097 (0.072)
Modern hives	1.532 (0.426)	0.9261 (0.210)	−0.606 (0.476)	1.230 (0.238)
Traditional hives	22.024 (2.634)	12.256 (1.182)	−9.768 (2.897)***	17.164 (1.467)
Beekeeping experience				
Variable name	Mean (Producer organization)		Mean difference	Pooled (N = 408)
	Users n = 259	Non-users n = 149		
Age	39.33 (8.293)	40.49 (0.711)	1.165 (8.299)	40.49 (0.708)
SCIB	35.796 (4.621)	28.248 (0.448)	−7.548 (5.216)	28.30 (0.446)
Education	9.333 (1.855)	7.022 (0.182)	−2.311 (2.111)	7.039 (0.180)
Annual income	3.1e06 (149,776)	1.2e06 (79,427)	−1.8e06 (929,998)**	1.2e04 (79,751)
Land beekeeping	2.5 (1.040)	1.087 (0.729)	−1.412 (0.852)*	1.098 (0.072)
Modern hives	0 (0)	1.239 (0.240)	1.239 (2.792)	1.230 (0.238)
Traditional hives	56.333 (39.486)	16.874 (1.448)	−39.459 (17.076)**	17.164 (1.466)
Beekeeping experience				

Lira and Kitgum and not significant at all for the district of Yumbe. Such participation enhances the exchange of information and sharing of experiences among farm households. The social groups were very diverse regarding their members and activities, including for-example self-help groups for women, youth groups, merry go round, farmers group, village savings, and loans association (VSLA) or church groups among others. These provided an avenue for not only training but also credit for the beekeepers. Accessibility to the market was measured in terms of distance to the market. The distance to the market was found to be statistically significant (1%) for Yumbe and Kitgum, however not vital for Lira. The mean distance for the districts was 10.07 km, with beekeepers from Kitgum having to travel the longest distance to the market.

4.3. Governance Structures Employed by Sampled Beekeepers

Various governance structures can be used to carry out a transaction. In the study area, three types of governance structures these are; spot market, verbal contracts, and producer associations were used (Figure 4). The beekeepers in Lira majorly used spot market, while those in Yumbe mostly made use of verbal contracts. Spot markets were the most popular in the study area. These involve beekeepers harvesting their hive products walk to the markets, and sell them to one or various individual customers. While producer associations were the least popular and only used in Yumbe. The producer associations are found in villages that were far from town and had limited access to information. Here, the beekeepers sell to producer organizations that instead act like intermediaries.

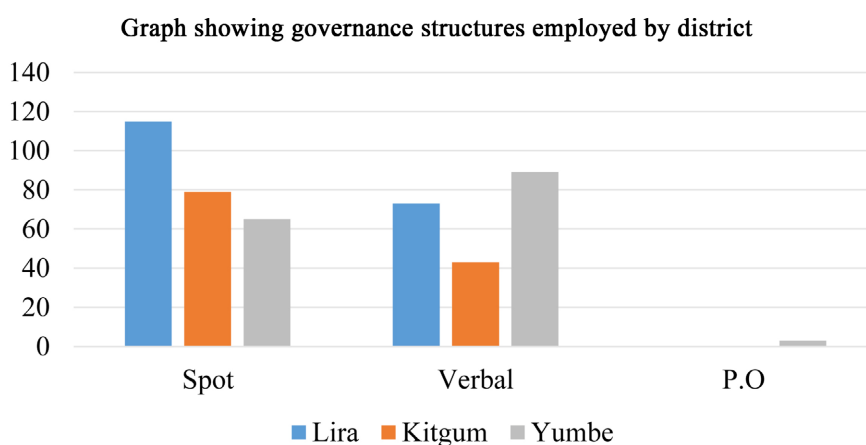


Figure 4. Governance structures employed by apiculture farmers.

4.4. Comparison of the Governance Structures Employed by the Beekeepers in the Sampled Area

In the comparison of farmer characteristics among the governance structures employed, annual income was significant at 1% for spot markets and 5% for verbal agreements and producer organizations. The land allocated for beekeeping by the beekeepers that use spot markets, verbal contracts, and producer or-

ganizations was significantly different at 1%, 5%, and 10%, respectively with no significant difference for age, social capital index, and education (**Table 1**).

4.5. Multivariate Probit Results of Factors that Affect the Choice of Governance Structure by Apiculture Farmers

The maximum likelihood estimation results of the multivariate Probit model on the factors that influence the decision of governance structure used by apiculture farmers are presented in **Table 2**. The likelihood ratio test ($X^2(3) = 79.0753$, $Prob < 0.0000$) of the independence of the residual terms is vehemently rejected at a 1% level of significance, implying that multiple uses of governance structures were not mutually exclusive, hence justifying the use of the MVP model.

Table 2. Factors that affect the choice of governance structure used by apiculture farmers.

Explanatory Variable	Market arrangements		
	Spot market	Verbal	Producer organization
Training	−0.547 (0.189)***	2.316 (0.191)*	−0.013 (0.137)
Distance to market	0.012 (0.008)	−0.005 (0.007)	0.003 (0.008)***
SCIB	−0.010 (0.007)	0.015 (0.012)*	−0.016 (0.006)
Education	−0.045 (0.024)*	−0.016 (0.007)**	8.27e−05 (6.24e−05)
Age	0.003 (0.006)	−0.035 (0.026)	0.005 (0.005)
Beekeeping experience	0.001 (0.012)	0.017 (0.014)	0.020 (0.019)
Annual income	−7.17e−08 (6.28e−08)	1.06e−07 (4.32e−08)***	−0.006 (0.010)
Land for beekeeping	−0.275 (0.070)***	0.147 (0.040)***	5.36e−08 (5.12e−08)
Predefined market arrangement	−2.224 (0.398)***	−1.834 (0.296)***	−0.057 (0.044)
Transaction uncertainty	−1.920 (0.208)***	2.720 (0.221)***	−0.138 (0.200)
Connectedness	−1.554 (0.243)***	0.664 (0.199)***	−0.031 (0.118)
Asset specificity	−1.59e−08 (1.18e−07)	−9.84e−08 (1.06e−07)	0.076 (0.156)**
Human specific assets	0.000024 (0.00001)**	5.99e−08 (1.33e−06)	3.40e−07 (1.74e−07)*
constant	0.111 (0.417)	−1.696 (0.537)***	−4.85e−06 (2.67e−06)
rho21	−1.976 (0.319)***		
rho31	−.0828 (0.101)		
rho32	0.096 (0.101)		
N	408		
Number of simulation (draws)	30		
Log pseudo-likelihood	−453.24		
Wald chi2(40)	314.96***		
Likelihood ratio test of rho21 = rho31 = rho32 = 0: chi2(3)	79.0753		
Prob > chi2 = 0.0000			

*, **, and *** indicate statistical significance at 10, 5, and 1 percent level of significance.

The training was found to have a significant effect on a beekeeper selecting a spot and verbal contract. For the spot market, training was found to have a significant (1%) and a negative impact when a farmer chooses a spot market. It indicates that for every additional training offered, the beekeepers' likelihood to participate in the spot market reduces by 54.7%, keeping other factors constant. This may be attributed to the fact that training empowered beekeepers to take up higher risks and improved their production capacity, which resulted in more being produced, and this pushes beekeepers to turn to markets where they can sell their products once. This finding on training corresponds to that of [24], who reported that institutional support has a negative effect of participation on spot markets though this effect was not significant. Further still, training was found to have a positive and significant (10%) effect on the involvement in verbal contracts. It showed that for every additional training, the beekeepers' likelihood of using the verbal agreement increased by 2.316 times.

The distance to the market was found to positive and significant (1%) for participation in producer organization. Every 1 km increase in distance, increases the likelihood of the farmer choosing the producer organization. This could be attributed to the fact that beekeepers who are located farther away from the market face higher transaction costs and so may opt for producer organizations that are located closer to them to cut down the costs. This finding is congruent with that of [57] [58] and [59]. However, distance to the market had no significant effect on the probability of choosing either a spot market or a verbal contract.

For the social capital index, which takes into account both structural and cognitive social capital was found to be positive and significantly (10%) associated with the probability of the beekeeper making use of the verbal contract. A beekeeper with a high social capital index has better access to information that helps to make production and marketing decisions. A higher social capital index can also contribute towards reduced transaction costs and strengthen a beekeepers' bargaining power through networking and provision of up to date information to members. Therefore, the result reveals that having a high social capital index increases likelihood of choosing verbal contracts. The findings are in agreement with those of [58] and [59]. However, this is not significant for spot markets and producer organizations.

The education of the beekeeper was also found to be negative and significant for spot and verbal contracts at 10% and 5%, respectively. For every year of education, the beekeeper's likelihood to make use of spot markets and verbal agreements reduces by 4.5% and 1.6%.

For annual income, there is a positive and significant (1%) effect for the beekeepers who make use of the verbal contract. The positive value of annual income indicates that beekeepers who have a higher income are more likely to participate in verbal contracts than spot markets and producer organizations. Annual income was, however, not significant for spot markets and producer organ-

izations.

The total land allocated for beekeeping was found to significantly influence the use of spot markets and verbal contracts by the beekeepers. For spot markets, for every 1-acre increase in the amount of land for beekeeping reduced the probability of the farmer using the spot market by 0.275. In contrast, this additional unit increased the likelihood of a beekeeper using a verbal contract by 0.145. The results indicate that beekeepers with more land allocated to beekeeping are more likely to use verbal agreements than spot markets.

Beekeeping experience and age of the farmer were found not to be significant in influencing the choice of governance structure chosen by the beekeeper.

The results further reveal that there is a negative and statistically significant (1%) correlation between the transaction connectedness and the spot market governance structure, on the one hand, and a positive and significant (1%) correlation with verbal contract however not significant for producer organization on the other. The finding is consistent with the fact that, when the transactions have a secure connection, strong co-ordination governance is favourable. This finding is in line with the results of [24]. The transaction connectedness also considers the relationship between a farmer's production system, beekeeping practices, other buyer's demand attributes, and quality requirements. We can infer from that result that the more beekeepers are engaged in a highly coordinated type of GS, the more likely they are aware of the end consumer's quality requirements, and the more they adjust production practices to fulfill the demand.

The results further reveal that predefined market arrangements are negatively and significantly (1%) correlated with spot markets and verbal contracts. The negative correlation is an expected sign of the spot market. It indicates that a unit increase in predefined agreements reduces the beekeeper's likelihood of participation in the spot market and verbal contract by 2.2 and 1.8 times, respectively. Literature reveals that when more pre-agreements exist in market arrangements, farmers are more likely to go for an integrated type of governance structure to safeguard their investments [60]. This finding, however, does not correspond with the conclusions of [24].

Transaction uncertainty is significantly (1%) correlated with spot markets and verbal contracts. However, this was negatively correlated with a spot market and positively correlated with verbal contracts. When transactions are under uncertainty, it can become very costly or impossible to anticipate all contingencies [61].

Investment in specific assets was found to correlate with the use of producer organizations positively. The results show that for every 1 Ugx invested into specific assets, the likelihood of choosing a producer organization increases by 0.076. Human-specific investments were found correlated positively with spot markets and producer organization at 5% and 10%. This result is contrary to theory since it is expected that the more investment one makes for training, the

less likely they are to use the spot market arrangement. This result is also contrary to [24]. It was previously demonstrated that the spot market GS is characterized by less human-specific investment compared to other forms of governance structures.

5. Conclusion and Recommendation

Keeping all other factors constant, a rational beekeeper will choose a governance structure that minimizes the costs of production and transaction costs. The transaction cost theory provides greater comprehension into the choice of governance structure employed by the beekeeper. This study therefore provides empirical evidence to the transaction cost theory and one step further in Williamson's attributes of a transaction by emphasizing social capital as an attribute of a transaction that is worth considering in analyzing the choice of the governance structure.

The factors that determine governance structure choice made by apiculture farmers are investigated in order to increase the understanding of how and why they select among these governance structures and what guides their decision. The governance structure choice has been observed as a strategy to safeguard their investments.

Beekeepers involved in the verbal contracts are less likely to be involved in another type of governance as well, showing the specificity and exclusivity of this type of transaction arrangement. Concerning the choice of each type of GS, results can be used as a powerful tool in defining intervention strategies in promoting contract enforcement, whether oral or written, in the various partnerships in agri-food chains.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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