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Market channel options for smallholders in dual markets: A case of organic pineapple farmers in Uganda

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Following institutionalisation of certified organic agriculture in Uganda in 2002, more farmers have adopted organic pineapple farming to boost their economic livelihoods. However, farmers have continued to engage in the less profitable conventional market due to organic market's limited capacity to absorb all their produce. This study seeks to examine organic pineapple farmers' market choices, improve the empirical understanding of factors determining these choices and how they relate to the success of organic pineapple marketing in Uganda. Data was obtained from a random sample of 116 organic pineapple farmers from central region and three pineapple export companies, in cross-sectional household and key informant surveys. Descriptive statistics revealed that 68% of the farmers sold organic pineapples via both organic and conventional market channels at the same time. The study employed a conditional logit model to explain the factors influencing organic farmers' market channel choice which established that organic and conventional market price differences in peak and lean seasons, pineapple harvests and losses significantly influenced farmers' market choice. Farmers' organic market share can be increased by policy makers' promotion of local and regional organic market outlets and value addition at farmer and company levels.

Key words: Organic pineapple, market choice, Uganda.

INTRODUCTION

The past few decades have registered an increase in the rate of conversion from conventional to organic agricultural production in developing countries. Literature attributes this increase to the increasing global demand for organic products (Lokendra et al., 2011; Sahota, 2009), especially the high-value crops like fruits and vegetables (Gehlhar and Regmi, 2005). The demand is highest in the developed world, mainly in North America and Europe (Willer et al., 2018; Willer and Schaack, 2015). A fast growth of the global market for high-value crops offers substantial incentives for farmers in developing countries, like Uganda to increase production.

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It might also act as an avenue that fosters potentialincome growth (Gulati et al., 2005). However, as noticed by the authors and Markelova et al. (2009), contrary to the advantage of increasing demand of high-value crops that foster increased productivity and income, which is good for the majority of poor smallholder farmers, it also presents new challenges. The challenges relate to farmers' increased involvement in long and sophisticated supply chains, characterised by stringent food safety standards, required mainly by the international markets. This also augments the market failures experienced by such farmers, as their prospects to increase incomes progressively depend on their ability to compete in constantly evolving markets. Nevertheless, organic products like pineapples are still enjoying a niche export market (Kleemann et al., 2014) which if tapped, can offer opportunities to the smallholder farmers in the developing countries like Uganda.

In Uganda, organic pineapples constitute about 75% of the total exported fruit crops (Namuwoza and Tushemerirwe, 2011). However, this percentage, according to Namuwoza and Tushemerirwe (2011), has been gradually declining due to high freight costs, owing to bulkiness of the fresh pineapples, hence, reducing the crop's competitiveness on the global market. Besides, the shift in consumption trends of the pineapple varieties on the world market, particularly from smooth cayenne, a variety that formally dominated the market with about 90% market shares in the 1980s, to MD2 variety contributed significantly to the decrease of Uganda's total organic pineapple export volumes. MD2 was introduced in Costa Rica in the early 2000s and has since dominated the world market (Kleemann et al., 2014; Fold and Gough, 2008). This variety is by far considered the standard pineapple variety consumed in the EU, which over the years has been the major importer of the smooth cayenne variety mainly grown in Africa and Uganda in particular.

Currently, organic pineapple production in Uganda is encouraged by a premium price in the export market, for which a market chain has developed with certified organic farmers selling to export companies. The challenge for farmers is, however, the consumers' preference shift to MD2 pineapple variety. Stringent export quality standards that organic farmers must adhere to, also present a challenge (Chiputwa et al., 2015).

Farmers are contracted by companies to produce quality organic pineapples and they expect to recover their production costs via the premium price paid for the produce. However, in the contracts, the export companies only specify the required pineapple quality attributes and the prices of pineapples during the peak and lean supply seasons. Quantities to be bought are not specified. Worse still, the companies do not buy all the farmers' produce, particularly during the peak seasons. As a result, farmers face a market choice question as to whether to sell part or all of their organic pineapples to the conventional or the organic market.

Various researchers have compared organic and conventional farming in Uganda, mainly in relation to profitability (Bolwig et al., 2009) and smallholders' food security (Bolwig, 2012; Walaga and Hauser, 2005). There is, however, limited information about the factors that influence organic pineapple farmer's choice to participate in either the organic or conventional market in the country. Yet this information is vital in devising interventions to help the non-homogeneous farmers whose marketing decisions may not be uniformly rewarding. This can be done by mitigating marketing challenges like oversupplying an already constrained organic market, characterized by varying consumer tastes and preferences.

The current study seeks to examine the alternative organic pineapple farmers' market choices in order to improve on the empirical understanding of factors determining these choices and how they relate to the success of organic pineapple marketing in Uganda. Here, success is defined as the amount of pineapples sold via the organic market, as a proportion of total pineapples harvested. The study is mainly based on the hypothesis that price differences (premiums) between the organic and conventional pineapple markets during peak and lean seasons are the major influencing factors for organic farmers' market choice and the share of pineapples sold to either organic or conventional markets.

METHODOLOGY

Study area, data and sampling procedure

The study was conducted in the central region of Uganda, in two districts (Kayunga and Luwero). The districts were purposively selected for being the leaders in pineapple production in the country (Bolwig, 2012), hence a good representative of the country. Farming is the main income activity in the two districts where more than 80% of the population draws its economic livelihoods from pineapple farming (NPHC, 2014) as the dominant agricultural activity. Primary data were generated from a cross-sectional household survey in 2016. Representatives of the organic export companies to which farmers are affiliated were also interviewed in relation to organic pineapple production standards and marketing aspects. A structured questionnaire and a checklist were used to collect the data from farmers and company representatives respectively. For farmers, variables of interest included their age, sex and pineapple marketing experience, years taken by a farmer to be certified organic, pineapple price differences (in US Dollars) during peak and lean pineapple seasons and total annual quantities of pineapples harvested, sold and lost among other variables. At the company level, the study mainly looked at variables to do with how the companies institutionally relate with farmers during production and marketing of the pineapples. Examples of variables that were studied here include the major pineapple production contract specifications and fulfilment by both farmers and companies, the practices set by companies for farmers to produce the required pineapple quality and mode of operation by farmers during production and marketing transactions. That is whether farmers operate in groups or as individuals. Focus group discussions (FGDs) were also conducted at the farmer level with an

objective of investigating the factors that relate to the strategic behaviour of farmers (both organic and conventional) and the provided information about how pineapple farmers cope with the socio-economic conditions in their areas, their other livelihood strategies in addition to the pineapple business and labour availability and access during pineapple production and marketing.

To select representative farmers, sampling was conducted systematically, from purposive selection of districts to probability proportional to size sampling, as specified by Bar-Hillel (1979) and Kothari (2004). Consultations were made with the National Organic Movement for Uganda (NOGAMU) officials to develop the sampling frame for both organic pineapple farmers and the export companies. Three companies (named A, B and C for purposes of confidentiality) were considered for the study. The companies provided lists of pineapple farmers with whom they were affiliated, which were used to randomly select 116 farmer respondents for the study. Based on the common features of farmers attached to the three export companies that were considered, we had three strata that is, three groups of farmers affiliated to three export companies. Sample sizes from the three strata were drawn using proportional to the size sampling method. Three lists of farmers attached to the export companies were provided; 160 farmers with an affiliation to company A (stratum 1), 154 to company B (stratum 2) and 139 to company C (stratum 3). This yielded a total of 453 organic pineapple farmers as the population to sample from. Out of the total sample population, farmers affiliated to company A constituted 35.3%, those affiliated to company B accounted for 34.43% and those affiliated to company C were 30.17%. Therefore, using proportional allocation, the sample sizes for our three strata were 41 company A farmer affiliates, 40 company B farmer affiliates and 35 company C farmer affiliates giving a total of 116 organic pineapple farmers.

Conceptual framework

Literature postulates that market share variability relies on various factors including household socio-economic structures, price fluctuation of agricultural commodities, access to profitable markets and favourable conditions for agricultural potential (Ayenew and Firew, 2014; Gibbon, 2006). In a similar direction, Obi et al. (2011) note that market selection process is subject to market characteristics, efficiency and associated costs, or it can be affected by product related information in terms of product quality, product availability and its associated prices (van Schalkwyk et al., 2012). Market selection has also been explained by Dolan and Humphrey (2000) as an analysis of influencing factors including, product quality together with its compliance with quality standards and procedures.

Selection of a market channel is one of the crucial decisions farmers must make prior to marketing of their produce (Soe et al., 2015; Park and Lohr, 2006). Organic pineapple marketing in Uganda is characterised by a composite nature of farmers who consider a number of financial and non-financial facets before making market channel choice decisions. Moreover, a producer's choice of a marketing outlet according to Park and Lohr (2006) is dependent on his/her utility maximization, outlet characteristics and the producers' marketing experience. In addition to farmer and farm characteristics, transaction costs form another major part of the marketing channel choices among producers (Woldie and Nuppenau, 2011).

In Uganda, pineapple has two distinct harvest seasons; peak and lean. Export companies usually buy only a fraction of organic pineapples at a fixed price from the farmers during the peak season. Peak season is a period during which the conventional market (CM) which serves as an alternative for absorbing the surplus organic pineapples is also saturated. Conventional market price fluctuates between seasons and is presumed relatively higher in the lean season. Given the pineapple seasonality and price changes, there are three market choice options for the organic farmers. First, if we let Q_S be the quantity of pineapple sold either to the organic market; OM (Q_{OM}) or to CM (Q_{CM}), then:

$$Q_S = Q_{OM} + Q_{CM} \quad (1)$$

Secondly, if we let the proportion of pineapple quantity sold to the OM be α, then:

$$Q_S = \alpha Q_{OM} + (1 - \alpha Q_{OM}) \quad (2)$$

And the resultant market choice options are such that;

a. If the farmer sells all the pineapples to (*OM*), then:

$$Q_S = Q_{OM} \quad (3)$$

And this farmer's revenue:

$$R_{OM} = Q_{OM} * P_O \quad (4)$$

b. If the farmer sells all his/her organic pineapples to CM, then:

$$Q_S = Q_{CM} \quad (5)$$

And his/her revenue amounts to:

$$R_{CM} = (1 - \alpha Q_{OM}) * P_{CM} \quad (6)$$

If he/she sells a given pineapple proportion to *OM* and another one to *CM* within the same season, Equation 1 applies and the revenue that accrues to this farmer amounts to:

$$R_{OMCM} = \alpha Q_{OM} * P_O + \left((1 - \alpha Q_{OM}) * P_{CM}\right) \quad (7)$$

The three market channel scenarios as illustrated depict a single season situation, for instance, the peak season. Therefore, similar computations are considered for the lean season.

Analytical framework and model estimation

To evaluate the organic pineapple farmers' constrained market channel choice, a logistic regression was used to assess the factors that influence their choice to sell organic pineapples through CM. The theory behind the logistic regression model has been well explained by literature (Hosmer et al., 2013; Allison, 2012; Menard, 2002; Hosmer and Lemesbow, 1980). Literature acknowledges logistic regression as a powerful, flexible and appropriate tool that has been used extensively to model categorical dependent variables with dichotomous observable realisation, given a set of both categorical and continuous explanatory variables (Hosmer et al., 2013). Applying the choice theory to the present situation of constrained choice, this study relates the probabilities of the two prevalent market options to a set of behavioural rules that reveal the organic farmers' market option decision preferences.

Park and Lohr (2006) asserted that a producer chooses a market channel depending on the utility that he/she derives from it. In our case, OM is of priority, but it is characterized by low quantity

Table 1. Explanatory variables hypothesised to influence organic pineapple farmers' decision to sell pineapples via the conventional market.

Variable	Variable description	Expected sign of the relationship
Y	Dependent variable (binary): (Organic market only = 0, Both organic and conventional=1	
X_1	Age of the farmer (number of years)	-
X_2	Sex of the farmer (1= male, 0 = otherwise)	+
X_3	Marketing experience (Time in years since the farmer started pineapple marketing business)	+
X_4	Conversion period (years taken by the farmer to convert to certified organic farming	-
X_5	Years spent in contractual agreement (0 if no contract existed)	-
X_6	Quantity (tons) of pineapples harvested annually	+
X_7	Distance in kilometres travelled by the farmer from the pineapple garden to the main market	-
X_8	Mode used by the farmer to sell the pineapples (1= individual, 0=group marketing)	+
X_9	Pineapple price differences (USD) in organic and conventional markets during peak season	-
X_{10}	Pineapple price differences (USD) in organic and conventional markets during lean season	-
X_{11}	Total annual pineapple (tons) lost	-
X_{12}	Annual quantity of dried pineapple chips sold (kg)	-
X_{13}	Farmer's actual pineapple selling point (1=on farm gate, 0= off farm)	+/-
X_{14}	Contract initiated by the company (1=yes, 0= no)	-
X_{15}	Contract has ever been amended (1=yes, 0= no)	-
X_{16}	Company pays on delivery (1=yes, 0= no)	-

pineapple purchases. Organic market contracts that only specify pineapple prices but not the periodic quantities to be bought leaves farmers with pineapple surpluses that must be disposed of. The search for the surplus produce buyers compels the farmers to sell organic pineapples via the unintended CM. With an application of the logit model, an organic farmer *i* is assumed to have *k* market options, (*k*=1, 2). This orients our analysis to a binary choice between two market channels, modelled as a function of the level of one or more of the considered explanatory variables as shown in Table 1, such that the dependent variable:

$$Y^{*} = \begin{cases} 1, \text{if the } i\text{th farmer sold to both OM and CM at the same time} \\ 0, \text{otherwise} \end{cases} \quad (8)$$

However, since the logit model probabilities related to the dependent variable are bound to 0 and 1, rendering *X* and *Y* void of linear relationship, a transformation of the categorical dependent variable to an odd ratio was done to enable *Y* assume a linear relationship with the explanatory variables (Allison, 2012).

The logistic regression model as used by this study took the following form:

$$\text{Logit}\,(Y_i^{*}) = \ln\left(\frac{Y_i}{1-Y_i}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \ldots + \beta_n X_n \quad (9)$$

Where; $\ln\left(\frac{Y_i}{1-Y_i}\right)$ is the conditional logit for pineapple market channel choice, equalling to 1, if an organic farmer sold to both markets, or 0 otherwise, β_0, the constant term, β_1 to β_n, the estimated parameters and X_1 to X_n, the independent variables.

We used the Z-test to test the hypotheses on price differences during peak and lean seasons as:

1. H_0 : β (market channel) premium price peak = 0, and,
2. H_0 : β (market channel) premium price lean = 0

RESULTS AND DISCUSSION

Characteristics organic pineapple farmers in Uganda

Different organic and conventional pineapple market chains in Uganda were identified by this study. It was however established that organic pineapple famers predominantly participate in two main markets, namely; OM and the open market, usually referred to as CM. The option of organic farmers selling via CM results from the inability of organic export companies to purchase all the organic pineapples produced, mainly during peak harvest seasons. Figure 1 summarises the general overview of the pineapple market chains in Uganda, as identified in this study. The chains segmented in three groups including those at the village or local level, and the national and the international levels.

An assessment was done on the two distinct groups of the organic pineapple farmers as identified by this study (those that sold via the OM (export companies) only and those that sold through both OM and CM) to identify the similarities and the differences between the them with regard to demographic, socioeconomic, farm and market related characteristics. Table 2 presents results about farmer and farm specific characteristics, while Tables 3 and 4 present market related variables, thought to have potential influence on the organic pineapple farmer market choice. Of the total 116 studied farmers, 68% sold pineapples via both OM and CM channels in the same season. This percentage is evidently larger than that of the farmers who sold via only the originally intended OM channel.

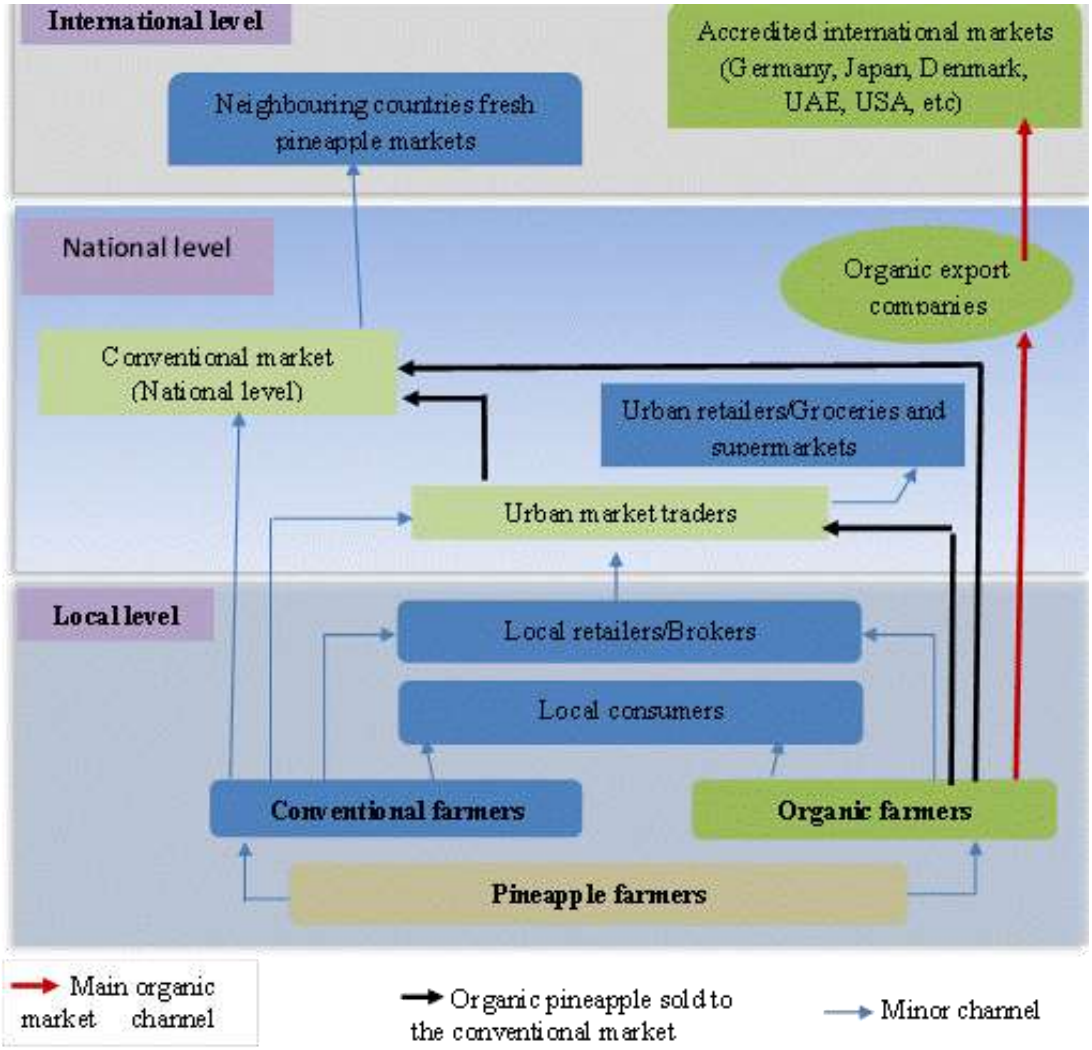

Figure 1. Pineapple market chains in Uganda.
Source: Own illustration

Farmers who transacted in both markets were significantly younger (P≤0.10) than those who sold through only OM as shown in Table 2. As revealed by information obtained from the FGDs and individual farmers during the interview, selling pineapple to CM usually requires organic farmers to travel relatively longer distances in search for the market for pineapples that are originally intended the organic market (export companies). These transactions require effective coordination, a process that requires relatively young and energetic farmers, as also established by Ayoola et al. (2011).

The majority of farmers that engaged in both markets were males as described in Table 2. Generally in the study area, male farmers have better access to agricultural production and marketing resources as compared to the female farmers especially for commercial crops like pineapples. Similar results have been reported by various scholars including Oseni et al. (2015) and Croppenstedt et al. (2013).

With reference to Table 2 regarding farm specific characteristics, farmers that sold pineapples to OM only got much of their total annual income from pineapple sales (P≤0.10). Probably, this result comes from the fact that pineapple growing, as reported by farmers during FGDs, is the main income generating activity that most farmers in the area are involved in.

Results further show that farmers who sold via both markets harvested significantly more pineapples (P≤0.01) than their counterparts as shown in Table 3, and sold significantly more (P≤0. 01) to CM as depicted in Table 4, than the quantities sold to OM by farmers that used only the OM channel, especially during the peak season. During the lean season, farmers that used OM only, sold significantly more pineapples (P≤0.01) than the organic proportion sold to CM, by farmers who used both markets. This is further reflected by the significantly more

Table 2. Organic pineapple farmer and farm specific characteristics.

Farmer specific characteristic	Market channel [mean (SD)]		P-value/x^2
	Organic only (n=37)	Both organic and conventional (n=79)	
Age of farmer (years)	47.11 (11.98)	43.33 (11.14)	0.099
Farmer's formal education (years in school)	7.70 (3.38)	8.28 (3.12)	0.369
Number of working age household members (15-65 years)	3.30 (1.51)	3.32 (1.54)	0.950
Sex of the farmer (% male)	56.76	72.15	0.100
Farming experience (years)	22.41 (11.96)	18.46 (10.08)	0.067
Pineapple farming/marketing experience (years)	13.27 (9.41)	11.13 (6.39)	0.153
Distance(km) from pineapple farm to the main market	9.00 (11.07)	9.40 (7.31)	0.862
Percentage of income from pineapple sales	96.11	90.36	0.072
Household's main pineapple marketing mode (individual) (%)	78.38	73.42	0.692
Farmer sells pineapples only at farm-gate (%)	13.51	24.05	0.192

Figures in brackets are the standard deviations; 1USD=3,400 Uganda shillings at the time of the study.
Source: Survey data (2016).

Table 3. Organic pineapple output and sales descriptive results as a basis for market choice model.

Variable	Market channel used by the farmer [mean (SD)]		P-value
	Organic only (n=37)	Both organic and Conventional (n=79)	
Tons of fresh pineapple harvested in peak season	5.479 (5.558)	9.658 (8.025)	0.009
Tons of fresh pineapple harvested in lean season	3.568 (3.334)	3.473 (3.672)	0.907
Tons of fresh pineapple lost in peak season	0.781 (0.787)	1.023 (1.094)	0.275
Tons of fresh pineapple lost in lean season	0.308 (0.295)	0.282 (0.292)	0.724

Figures in brackets are the standard deviations.
Source: Survey data (2016).

income (P≤0.01) earned by farmers that used OM only during the lean season as described in Table 4. In addition, during the peak season, farmers that sold all their pineapples to the OM received a significantly higher price (P≤0.01) per kilogram of pineapples sold than their counterparts as shown in Table 4. This is possibly an incentive for farmers that sell to OM only. These results are further confirmed by the significantly higher price margins (premiums) offered to farmers that sold all the pineapples to OM only in the peak (P≤0.01) and lean (P≤0.01) seasons.

Econometrics model result

Before running the conditional logit model which was employed to identify influencing factors of organic pineapple farmers' market choice decision to participate in the conventional market, a multicollinearity test; variance inflation factor (VIF) for variables specified for the model was done and its results are presented in Table 5.

Based on the VIF results, we found no correlation between the independent variables that were considered for the model. The model results presented in Table 6 showed that organic farmers' decision to participate in the conventional market was significantly influenced by seven of the sixteen independent variables that were used to estimate the model. These include, total annual pineapple quantities harvested, total annual pineapple quantities lost, organic market premium prices in peak and lean seasons, farmers' pineapple marketing experience, distance in kilometres travelled by the farmer from his/her pineapple farm to the main market and the number of years spent by the farmer in the organic pineapple production contract.

Every additional ton of harvested organic pineapples increased the odds of selling to both OM and CM by a factor of 1.08, holding other variables constant. This could partly be attributed to the nature of contracts between the farmers and export companies that only specified the price but not the quantities to be bought. Farmers with surpluses unbought by organic buyers were therefore left with only the option of selling through CM. Park and Lohr (2006) reported similar results and singled out seasonal effects as a major factor that distorts

Table 4. Additional descriptive results from selected market choice model variables between farmers who sold to the organic market only and those who sold to both markets.

Variable	Market channel used by the organic farmer				
	All to organic market (n=37)	Portion sold to organic market by farmers who sold to both markets (n=79)	P-value	Portion sold to conventional market by farmers who sold to both markets (n=79)	P-value
Tons of fresh pineapple sold in peak season	3.887 (3.605)	4.972 (5.462)	0.331	6.034 (5.503)	0.010
Tons of fresh pineapple sold in lean season	2.935 (2.839)	2.021 (2.791)	0.164	1.412 (1.927)	0.000
Average market price during peak season (USD/kg)	0.141 (0.064)	1.164 (0.08)	0.174	0.086 (0.051)	0.000
Average market price during lean season (USD/kg)	0.186 (0.098)	0.201 (0.106)	0.280	0.176 (0.080)	0.184
Average market price differential/margin during peak season (USD/kg) (Op-Cp)	0.125 (0.078)	0.045 (0.099)	0.000	0.045 (0.011)	0.978
Average market price differential/margin during lean season (USD/kg) (Op-Cp)	0.176 (0.104)	0.036 (0.174)	0.000	0.036 (0.020)	0.980
Average income from pineapple sales in peak season (USD)	538.368 (499.661)	821.887 (965.554)	0.130	605.148 (568.195)	0.401
Average income from pineapple sales in lean season (USD)	551.373 (514.891)	377.615 (454.669)	0.112	353.857 (352.947)	0.000

Figures in brackets are the standard deviations; 1USD=3,400 Uganda shillings at the time of the study; Op and Cp refer to organic market price and conventional market price, respectively.
Source: Survey data 2016.

equilibrium output in a given market, a situation that pushes farmers to seek alternative market channels for their organic produce.

The study also found that every additional ton of organic pineapples lost or wasted during the post-harvest process, decreased the odds of an organic farmer selling to both OM and CM by a factor of 0.42. These findings indicate that the more pineapples are registered as losses during and after harvesting, the less pineapple surpluses. Pineapple losses are increased by delayed or absence of the company representatives during pineapple collection periods. Evidence shows that farm losses in horticultural crops can go as high as 16% (Murthy et al., 2009). This accounts for economic losses to the farmer in form of lost income.

With regard to organic premium prices (our major hypothesis variable), results show a decrease in the odds of an organic farmer selling to both OM and CM by factors of 0.001 and 0.007 in the peak and lean seasons, respectively, with a unit increase in prices as shown in Table 6. In other words, the price differences act as incentives for farmers to respect their organic contracts. Based on these results, we reject the null hypothesis that price differences between OM and CM during peak and lean seasons are the major influencing factors for organic farmers' market choice and the share of pineapples sold to either OM or CM. With reference to Table 4, results indicate a higher OM price than the CM price in both seasons, but still, farmers continue selling to CM. Therefore, other factors, also greatly contribute to the failure of the OM.

Organic farmers' pineapple marketing experience (years) was associated with a reduction in the odds of their decision to transact in CM by a factor of 0.92. As stated by Park (2009), certified organic farmers are willing to allocate time and other resources to get acquainted with the available organic practices. This experience may translate into more knowledge about different marketing opportunities where by farmers are more likely to develop

Table 5. Variance inflation factor test results.

Variable	VIF	1/VIF
Total annual pineapple quantities harvested (t)	1.66	0.601
Total annual pineapple quantities lost (t)	1.44	0.695
Organic market premium price in peak season	1.33	0.751
Organic market premium price in lean season	1.56	0.641
Contract initiated by organic company (dummy)	1.37	0.729
Contract has ever been amended (dummy)	1.55	0.643
Mode of payment (1 = cash on delivery, 0 = paid later)	1.29	0.773
Number of years taken to convert to organic farming	1.28	0.784
Pineapple marketing experience (years)	1.42	0.702
Mode used by farmers to market pineapple (1 = individually, 0 = group)	1.43	0.697
Distance (km) from pineapple farm to the main market	1.26	0.796
Specified organic contract period (years)	1.33	0.751
Annual dried pineapples chips sold (kg)	1.2	0.831
Sex of the household head (male =1, female = 0)	1.18	0.848
Age of the household head (years)	1.43	0.699
Farmer's pineapple selling point (1 = farm gate, 0 = off farm)	1.43	0.702
Mean VIF	1.39	-

Source: Authors' own computation based on survey data (2016).

diversified sets of market outlets within their niche. For instance, they may venture into value addition; say pineapple drying in our case. This way, the organic pineapple farmers have limited chances to appear as actors in CM.

On the contrary, however, every added year on the contract period between farmers and the company, increased the organic farmers' odds to sell via CM by a factor of 1.45. Probably, the more time the farmers spend in this kind of marketing arrangement, the more they are likely to predict the trend of pineapple seasonal variations and the quantities procured by the companies. Perhaps this also helps them establish working relationships with the conventional buyers early enough, in case they anticipate availability of pineapple surpluses. Literature on social systems shows that building social connections, reciprocity and trust takes time (Hinrichs, 2000), with social ties being crucial in altering and enhancing human economic interactions (Portes, 2014).

Lastly, every additional kilometre between the organic farm and the main conventional pineapple market reduces the odds of selling organic pineapples to CM by a factor of 0.97. This is an indication that organic farmers away from such markets are most likely to lose their pineapples, if the company fails to buy all of them. This result is in line with our a priori expectation as presented in Table 1. Usually, the companies pick the pineapples from the farmers' fields. The farmers, given their production and marketing strategies, may therefore not find it economically viable to travel in search of the CM. Moreover, such transactions are associated with extra costs including produce transportation and market information search costs. As a result, farmers may prefer selling within the smallest radius possible from their fields. Xaba and Masuku (2012) and Makhura (2001) similarly established a negative relationship between distance to the market and informal farmer market channel choices.

CONCLUSION AND POLICY IMPLICATIONS

This article analysed and discussed the factors that influence organic pineapple farmers' choice decision to participate in CM using a conditional logit model. The study identified the two main market channels used by the organic pineapple farmers in Uganda as; (1) one where the farmers sell pineapples to OM only (organic export companies), and (2), where farmers sell part of the organic pineapples to CM. One specific finding from this study is that the price margins between OM and CM during the peak and lean season, as earlier hypothesized, negatively and significantly influence organic pineapple farmers' probability to participate in CM. Total annual pineapples registered as losses, farmers' pineapple marketing experience, and distance from pineapple farms to the farmers' main market also negatively influenced this decision.

On the contrary, the study showed the tonnage of annual pineapples harvested and the period (years) spent in contract by farmers, as variables that positively and significantly influence organic pineapple farmers' participation in CM. These factors together, provide a general overview of the functionality of OM in the country which makes the study relevant for scholars interested in the OM studies related to institutional arrangements, a

Table 6. Determinants of organic pineapple farmers' decisions to sell to the conventional market (Logit model).

Variable	Coef.	Std. Err.	b	z	dy/dx	P>z	e^b	e^bStdX	SD of X
Total annual pineapple quantities harvested (t)	0.079	0.036	0.079	2.181	0.006	0.029	1.082	95.441	57.774
Total annual pineapple quantities lost (t)	-0.862	0.304	-0.862	-2.832	-0.063	0.005	0.422	0.111	2.552
Organic market premium price in peak season	-6.567	3.766	-6.567	-1.744	-0.478	0.081	0.001	0.518	0.100
Organic market premium price in lean season	-4.943	2.539	-4.943	-1.947	-0.360	0.052	0.007	0.437	0.168
Contract initiated by organic company (Dummy)	0.535	0.700	0.535	0.765	0.044	0.444	1.708	1.251	0.419
Contract has ever been amended (Dummy)	-0.216	0.952	-1.216	-1.278	-0.115	0.201	0.296	0.583	0.444
Mode of payment (1= cash on delivery, 0= paid later)	1.009	0.682	1.009	1.479	0.080	0.139	2.743	1.652	0.497
Number of years taken to convert to organic farming	0.146	0.411	0.146	0.354	0.011	0.723	1.157	1.117	0.762
Pineapple marketing experience (years)	-0.083	0.043	-0.083	-1.929	-0.006	0.054	0.920	0.535	7.512
Mode used by farmers to market pineapple (1= individually, 0= group)	1.003	0.895	1.003	1.121	0.060	0.262	2.726	1.547	0.435
Distance (km) from pineapple farm to the main market	-0.028	0.013	-0.028	-2.115	-0.002	0.034	0.972	0.240	51.010
Specified organic contract period (years)	0.371	0.153	0.371	2.420	0.027	0.016	1.450	4.106	3.805
Annual dried pineapples chips sold (kg)	-0.003	0.002	-0.003	-1.607	-0.000	0.108	0.997	0.469	268.555
Sex of the household head (male=1, female=0)	1.098	0.731	1.098	1.502	0.096	0.133	2.999	1.678	0.471
Age of the household head (years)	-0.022	0.030	-0.022	-0.723	-0.002	0.469	0.979	0.781	11.500
Farmer's pineapple selling point (1=farm gate, 0= off farm)	1.486	1.056	1.487	1.407	0.159	0.159	4.421	1.831	0.407
Constant	-0.361	2.087	-0.361	-0.173	-	0.863	-	-	-
Model summary			Number of observations					= 116	
	Logistic regression		LR chi2(16)					= 67.48	
			Prob > chi2					= 0.000	
	Log likelihood		= -38.888161						
	Pseudo R2		= 0.465						
H_0: β (Market channel)premium price peak = 0; $chi^2(1) = 3.04$ and Prob > $chi^2 = 0.081$									
H_0: β (Market channel)premium price lean = 0; $chi^2(1) = 3.97$ and Prob > $chi^2 = 0.052$									

e^b = exp(b) = factor change in odds for unit increase in X; e^bStdX = exp(b*SD of X) = change in odds for SD increase in X; SDofX = standard deviation of X.

case in point, market failures due to contracts between producers and the buyers of organic products.

The negative sign attached to the amount of annual pineapple losses should be a pointer for both the company agents and the farmers work together to improve their access to pineapple value addition strategies. For instance, export companies can venture into pineapple drying and through credit schemes and also empower farmers to follow suit so as to enable pineapple product differentiation, a practice that can significantly reduce pineapple losses and help the organic farmers to benefit from their extra efforts to produce organically. Improving the shelf life of the produce, through value addition can also encourage organic product diversification by the companies, beyond handling only fresh fruits. As a result, more farmers' pineapple produce will be bought by the companies, especially during peak seasons (Choudhury, 2006). That way, the proportion of pineapples wasted and those sold to CM due to smallholder farmers' lack of resources and suitable postharvest handling equipment,

are reduced.

Based on this study's results, the stakeholders in the organic sector in Uganda need to establish, strengthen and expand local and regional organic niche markets which can absorb part or all the organic pineapples registered as losses and those sold to CM, rather than entirely depending on international markets. It is therefore pertinent for the organic farmers and buying companies to lobby agricultural policy makers to support the organic marketing systems through effective policies and strategies that promote local and regional OM outlets. We recognise the fact that pineapples are highly perishable and therefore recommend that companies should respect the contracts as regards the aspect of timely collection.

CONFLICT OF INTEREST

The authors have not declared any conflict of interests.

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