

Full length Research paper

Market Participation And Financial Viability Analysis of Small Holder Pineapple Producers in Aleta Chucko Woreda Southern Ethiopia: Multinomial Logit and Net Present Value Analysis

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In support of stimulating growth, economic development, food security and alleviating poverty, the analysis of the Factors affecting small holder pineapple producer's market participation plays an important role in an ongoing or future pineapple market development plan. So as to contribute an appropriate policy design to improve pineapple marketing in the study area in particular and in Ethiopia in general, Thus this specific study was aimed to: analyze socio economic characteristics of pineapple producers; investigate financial viability of pineapple for producers; identify factors influencing the choice of pineapple marketing outlet in the study area; and analyze constraints of pineapple production and marketing. Multistage sampling procedure was employed to draw 183 sample respondents. Semi-structured questionnaires were used to collect data from small-scale pineapple farmers. The data were analyzed using the descriptive statistics, net present value and internal rate of return approach and Multinomial Logit model. SPSS version 20 and STATA version 13 computer programs were used to process the data. The survey result showed that the Net Present Values (NPV) were positive indicating that the production of pineapple in Aleta Chucko Woreda was financially viable. This was further confirmed by the estimated Internal Rate of Return (IRR). The estimated IRR indicated that pineapple enterprise was by far higher than the cost of capital and hence financially viable. The sensitivity analysis performed on the Net Present Values for Aleta chucko Woreda revealed revenue to be the most sensitive and cost of chemical is least sensitive variable. The multinomial logit model analysis further showed that age, sex, education, access to contract market, market experience and pineapple yield volume were significantly influenced the choice of pineapple marketing outlets. Since the production of pineapple fruit was financially viable, there is the need for the intensification and expansion of the pineapple sub-sector suitability. The government and other policy makers should increase the marketing information and ability of pineapple farmers through avenues like mass media, extension service, and other means of capacity building.

Key words: Market participation, choice of marketing outlet, financial viability, Net present value, and internal rate of return.

BACKGROUND

Currently, horticultural crops are becoming attractive for many poor farmers around the world there by leading its worldwide grow faster than cereal crops (Lumpkin et al, 2005). Horticultural crops play a significant role in

developing country both in improving income and nutrition status. Farmers involved in horticultural production usually earn much higher farm incomes as compared to cereal producers and per capital farm income has been reported up to five times higher. In addition, horticultural products are considered to be income-boosting alternatives to basic grains for smallholder farmers, and they contribute to increasing employment opportunities (World Bank, 2008). Production

of horticulture in Ethiopia is undertaken dominantly by smallholder farmers, about 6 million and few private sectors. However, according to Tufa et al (2009), its overall contribution to the economy of the country is limited (CSA, 2008/09). The production estimate of fruit and vegetables, including root crops, is 2.16 million tons (9.2% of total national peasant crop production of the season), constituting about 351 thousand tons of fruits (16%), 600 thousand tons of vegetables (28%), and 1.2 million tons of root crops (56%). This volume is produced on 356 thousand hectares (2.4% of total cultivated land in 2008/09) of peasant holdings (CSA, 2008/09).

Horticultural crops can be differentiated as fruits like pineapple, orange, Mangoes, Papayas, banana, avocados and as vegetables like cabbages, onion, tomatoes, garlic, potatoes, carrot and others (CSA, 2007/08). Agro ecology of Ethiopia gives favorable condition to grow different varieties of fruits and vegetables of all temperate, sub-tropical and tropical fruits (EHDA, 2011).

For most Ethiopian smallholders, fruit cultivation is not the main activity rather it is considered supplementary to the production of main crops and the cultivation is on a very small plot of land and is managed by a household.

This low priority for fruit cultivation was mainly due to the traditional food consumption habits that favor grain crops and livestock products in most parts of the country resulting in weak domestic market demand for fruit products (Dawit et al, 2004). On the other hands, fruit production is an important source of income for smallholder farmers and accordingly demand for the products is rising in both domestic and international market. Therefore increasing smallholder farmers' participation in the fruit marketing in general and in pineapple marketing in particular is vital for smallholder farmers' economy Bezabih and Hadera, 2007; Yilma, 2009).

Generally, both domestic and export markets for Ethiopia fruits are showing a growing pace. The major fruit crops with a high significance for the local and export market include pineapples, bananas, mandarin, avocados, guava, citrus fruits, mangoes, passion fruits, grapes, asparagus, papayas (EIA, 2012). The export markets for these fruits include Djibouti, Arab Emirates, Sudan and Somali. However, the main products exported to these countries are non-graded fresh fruits. On the other hands, higher valued fresh produce that includes graded and pre-packed are exported to the United Arab Emirates, United Kingdom and the Netherlands (EHDA, 2011).

Pineapple fruit (*Ananas comosus*) belongs to the family Bromeliaceae. It is known as the queen of fruits because of its excellent flavor and taste. According to Ubi et al (2005), the pineapple plants are drought tolerant and well adapted to the tropical sandy soils with PH ranging from 4.5 to 6.5. The plants are propagated from suckers or from the crowns, which grow on top of

the fruit. It is one of the most important commercial fruit crops in the world available throughout the year.

In Ethiopia, pineapple plant is grown in Jimma, Gojeb and Sidama zone (Aleta chucko and, Dara woredas) and Gedeo zone (Wonago Woreda) of southern Ethiopia (CSA, 2012). The national production area and yield per hectare is respectively 163.7 hectares and 32.52 quintals. The total number of smallholder farmers engaged in pineapple production is only about 34,633 smallholders, who are the only sources supplying to local, regional and international markets. According to Yeshitla (2004), pineapple accounts for 44% of the total traded volume, followed by mangoes (27%), avocados (12%) and papayas (7%). The main reason to increase in demand for tropical fruits including pineapple is that the growing familiarity of consumers with tropical fruits; their taste, nutritional value and cooking qualities.

Studies on analysis of financial viability of pineapple production in study area have been scanty or nonexistent. For instances, studies conducted on factors influencing the farmers participation in pineapple value chain was not focused on financial viability analysis of pineapple production, pineapple market participation and the choice of marketing outlet in study area.

Therefore this study sought to contribute to filling the gap in the exiting literature by analyzing financial viability of pineapple production by using net present value and internal rate of returns as well as sensitivity analysis approach, and also analysis of choice of pineapple marketing outlet by using multinomial logit model in study area.

Thus, understanding the knowledge gap and identifying factors hindering small scale pineapple producers from remunerative market participation is vital so as to inform policy makers and the marketing actors (Geoffrey .K, 2014).

This study, therefore is aimed at analyzing the socio-economic characteristics of the pineapple market actors and determinants of small scale pineapple producers' market participation in Aleta chucko Woreda of Sidama Zone. By using net present value and internal rate of return approach and multinomial logit model which will narrow the information gap on the subject and will contribute to better understand on improved strategies for reorienting marketing system for the benefit of small farmers in study area

MATERIALS AND METHODS

Description of the study area

This study was conducted in southern nations, nationalities and peoples region of Ethiopia, Sidama zone, Aleta chucko Woreda at four pineapple producing kebele. Its geographical location extends from 6°46'N and 38°04'E to 7°01'N and 38°24'E.

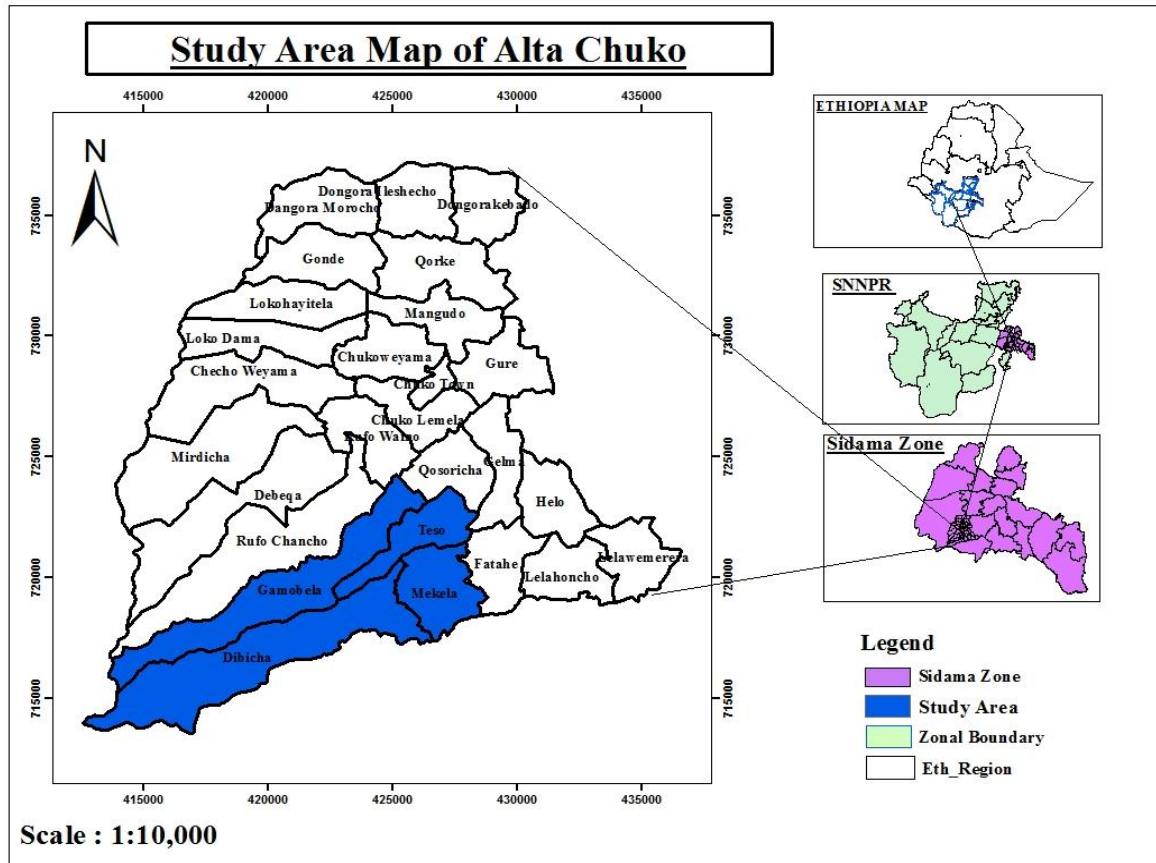


Figure 1: Map of Aleta Chuko Woreda showing study area

Administratively, the Woreda is divided into 26 rural and 5 urban Kebele. According to CSA (2014/2015) annual sample study report, the total population of Aleta chuko Woreda was 209,886, of whom 102,215(48.7%) was male and 107,671(51.3%) was female. The Woreda has an estimated land area of 32.2 square kilo meters. Altitude varies between 1400 and 2000m above sea level and the area is characterized by low land agro-ecological zones. Annual average rain fall and temperature ranges between 1, 232-1, 400 mm and 18-28c⁰, respectively. Rainfall is bimodal, rains in Belg (from March to May) and in Kirment (from June to August).

In general, mixed agriculture including crop production and livestock keeping is practiced in the study area.

The prominent pineapple producing villages in Chuko Woreda were Dibbicha, Tesso, Gambella and Makala. Pineapple fruits mainly produced in these four rural kebele was due to its more favorable agro ecological condition for the crop than the rest.

Sampling techniques and Sample size determination

A multi-stage sampling technique was employed to draw a total of 183 sample pineapple producers.

In the first stage, purposive sampling technique was adopted to select four pineapple producing kebeles (Dibbicha, Gambella, Tesso, and Makala) in the Woreda based on pineapple production potential. In the second stage, the stratified sampling technique was used to identify producers from non-producers before simple random sampling technique was employed to draw the 183 sample pineapple producers. Before simple random sampling technique was employed, a probability proportion to sample size was used to distribute the sample size. The sample size was determined by the following simplified formula, suggested by Yamane (1967), which is represented by a formula;-

$$n = \frac{N}{1+N(e^2)}$$

-----1

n = sample size, N=population proportion, e=error term

$$n = \frac{1761}{1+1761(0.07)^2} = 183$$

-----2

Data types, sources, and methods of data collection

Both primary and secondary data were used for this study. Primary data were collected from the sampled pineapple producers. Semi-structured questionnaire was prepared, pre-tested and administered to the sample producers to collect relevant data.

The questionnaire was pre-tested to evaluate the appropriateness of the design, clarity, and relevance of the questions. The appropriate modification was made on the pre-tested questionnaire in order to capture the relevant information related to the study objectives. Four enumerators were recruited and trained on the content of the questionnaire and interviewing process. Primary data were collected through the administration of semi-structured questionnaire by a team of four trained enumerators. Secondary data were collected from different published and unpublished sources, government institutions, and websites. Data from the field were edited, coded, and cleaned to ensure consistency, uniformity, and accuracy. Data were entered into SPSS and STATA computer software for analysis. Three types of analysis, namely: Descriptive statistics, Net present value and Econometric model analysis approach were used to analyze the collected data.

Net present value as a measure of financial viability

This was estimated by first assessing the various cost items and associated benefits. The costs include; Suckers, planting, weeding, fertilizer, labor, harvesting, and transportation cost.

The benefit includes the revenue generated which was the product of price per unit and yield sold. These benefits and costs were discounted because of time difference in cost and benefit streams. This assessment is done for pineapple farmers over a five (5) year period.

The NPV gives a more accurate definition of the cash flows that accrue to the farmer. The NPV is a useful tool for assessing financial viability which estimates the worthiness of an investment in monetary terms. The NPV was estimated according to the following formula:

$$NPV = \sum_{t=0}^n (B_t - C_t) / (1+r)^t$$

-----Eq3

Where; NPV denotes Net Present Value, C_tdenotes cost streams in each year starting from year 1 to year 5

B_tdenotes the benefit streams in each year starting from year 1 to year five; *r* is the discount rate and *n*the number of years. In analysis of financial viability of the pineapple business, the following assumptions were taken into consideration: (a) Initial investment occurs in year zero (b) All cash flows occur at either the start or end of a year. Cash flows occur in one year's time after the previous cash flows (c) Inflation is constant throughout the production period.

Investment cost is the initial capital required within year zero and the one to commence the business. It usually involves investing in non-current assets that are expected to last more than one financial year.

Operating costs are however the cost rent, interest, sales, distribution and administration cost) incurred on daily basis. These are normally incurred throughout the project life and may be partly financed from proceeds realized during production John K.M (2013).

Internal Rate of Return: The Internal Rate of Return is a discounted cash flow approach which estimates the opportunity cost of investment capital. It is a rate of return that yields zero Net Present Value (NPV). It involves estimating two NPVs with the same cash flow streams using two separate discount rates (low and high). It is sometimes assumed to be a trial and error method with the expectation that the lower discount rate gives a positive NPV while the higher discount rate gives a negative NPV. The discount rates and the NPV so determined are then modeled to obtain a discount rate which yields zero NPV as in equation below.

$$IRR = L + (H - L) [(NPVL/NPL - NPVH)]$$

-----Eq4

Where IRR denotes Internal Rate of Return, H and L denote the higher and lower discount rates respectively, while NPVH and NPVL denote the NPV of higher and lower discount rates respectively. The investment is accepted if IRR is greater than the discount rate. The IRR is most effective for assessing the discount rate that will give a break even situation. The implication of the decision is that the farmer should not take loan from the bank whose interest rate is more than the IRR.

Sensitivity Analysis (Switching Values Approach)

Sensitivity analysis is done to ascertain the responsiveness of the costs and benefits associated with estimating the NPV. Sensitivity by switching value estimates how much each of the estimated costs and benefits used in the NPV computation can change before the decision alters. This implies if the NPV is positive, the sensitivity shows how much the estimated cost or benefit will change to alter the NPV to be negative. The lower the rate of sensitivity the more sensitive the estimate

The sensitivity margin is specified in equation below

$$\text{Sensitivity margin} = NPV/PV * 100$$

-----Eq5

Where, PV is present value

Multinomial Logit Model (MLM)

Multinomial logistic regression is useful in analyzing data where the researcher is interested in finding the likelihood of a certain event occurring. In other words, using data from relevant independent variables, multinomial logistic regression is used to predict the probability (p) of occurrence, not necessarily getting a numerical value for a dependent variable (Gujarati, 1992).

Dougherty (1992) explained that the procedure for formulating a multinomial logistic regression is the same as for a binary logistic regression. Where as in binary

Table 1: Summary of hypothesized variable that determines small holder producers'pineapple market outlet choices

Variable Code	Variables	Measurement of the variables	Expected sign
Dependent Variable=MktOutlet	Household choice of pineapple marketing outlets	(Farm gate =1, Local market =2,Urban market=3,)	
Independent Variables			
Age	Age in years	In years (continuous)	□
Sex	Sex	Dummy (1 =Male 0= Female)	□
EDC	Education	1 = No education, 2 = Primary, 3 =Secondary, 4= Tertiary	±
VehOwn	Vehicle ownership	Dummy (1 = yes, 0 = No)	□
PineOutcm	Pineapple outcome.	In kilograms or Birr.(continuous)	±
PricInfr	Price information	Dummy(1 = Yes, 0 = No)	□□□□□□□
Contr	Contract Arrangement	Dummy (1= present,0 = Absent.	□□□□□□□□□□□□□□□□
MktExpr	Marketing experience	In years (Continuous)	±

logistic regression, the dependent variable has two categories, in multinomial logistic regression, it has more than two categories. Thus, multinomial logistic regression is an extension of binary logistic regression. To determine the factors influencing the choice of pineapple marketing outlet in study area, the multinomial Logit model was used.

The choice of a given marketing outlet is discrete because it is chosen among other alternative outlet. Let P_{ij} represent the probability of choice of any given market outlet by pineapple farmers, then equation representing this was: $P_{ij} = \frac{e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}}}{e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}} + e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}} + e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}}}$ -----6

Where i takes values (1, 2, 3), each representing the choice of marketing outlet (farm gate =1, local market =2, urban market =3). X_{i} are factors affecting choice of a market outlet, β are parameters to be estimated and ϵ is randomized error.

With j alternative choices, the probability of choosing outlet j

The multinomial Logit model is given below;

$$P_{ij} = \frac{e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}}}{e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}} + e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}} + e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni}}}$$
-----7

Choice of market outlet (P_{ij})
 $= \beta_0 + \beta_1 \text{age} + \beta_2 \text{sex} + \beta_3 \text{Educ} + \beta_4 \text{PineOutcm} + \beta_5 \text{VehOwn} + \beta_6 \text{Prinfr} + \beta_7 \text{Contr} + \beta_8 \text{MktExpr} + \epsilon_i$

Hypothesized variables

The potential variables, which were supposed to influence producers’ market outlet choice, need to be explained. Hence, the explanatory variables expected to have -dependent variables are summarized as follows (Table 1).

RESULTS AND DISCUSSIONS

Financially Viability analysis of pineapple production

Net present value (NPV) approach

The analyses of the viability of the production of pineapple in the Chucko Woreda are presented as Table 2. Discounting the five year cash flows of the farmer in the Aleta chucko Woreda at 18% recorded an NPV of 7049.3 ETB indicating that pineapple production in the Aleta chucko Woreda was financially viable using the NPV approach (Table 3). Furthermore, discounting the same cash flow at 85% and 92% gave NPVs of 148.8 and -124.8 respectively, yielding an IRR of 88% which was higher than the discount rate (18%) and hence the production of pineapple in the Aleta Chucko district was financially viable using IRR estimation approach (Table 4).

The sensitive analysis indicates that average total revenue is the most sensitive (ranking of 1) and costs of chemical is least sensitive (ranking 13). Thus, average total revenue is the most sensitive parameter with 27.6% followed by average total cost with 38.15%, planting material with 236.33%, other costs with 240.1%, transportation costs with 271%, planting cost with 983%, land preparation costs with 285.6%, weeding costs with 307.4%, harvesting cost with 321.4%, planting cost with 374.4%, sucker cost with 2405.9%, land rent cost with 2411.7% farm tools cost with 3067.8% and costs of chemicals with 3478.4% being the least sensitive for production in the Aleta chucko Woreda (Table5).

Table 2: Average cost and Revenue per hectare of pineapple in Aleta Chucko Woreda

Cost/Revenue	Year 1	Year 2	Year 3	Year 4	Year 5
Land rent	100	100	110	110	120
Sucker	70	75	80	90	92
Farm tools	45	60	65	75	81
Chemical	50	45	55	65	69
Land preparation	420	630	625	940	960
Planting material	576	875	870	910	947
Planting	487	495	490	515	606
Weeding	456	617	612	756	812
Harvesting	345	550	550	870	890
Transporting	480	670	665	930	990
Other costs	543	855	880	875	980
Total cost of production	3572	4972	5002	6136	6547
Revenue	0	7630	8665	10715	12287
Net cash flow	-3572	2658	3663	4579	5740

Average fruit weight = 1.95k/g, Average number of fruits per hectare =1800

Table 3: NPV Estimation for Pineapple production in the Aleta Chucko Woreda

Cash flow	Year 1	Year 2	Year 3	Year 4	Year 5
Average cost of production	3572	4972	5002	6136	6547
Average revenue	0	7630	8665	10715	12287
Net cash flow	-3572	2658	3663	4579	5740
Discount factor @18%	1	0.847	0.718	0.608	0.515
Discounted cash flow	-3572	2251.3	2630	2784	2956
NPV @18%=7049.3					

Source survey data (2016)

Table 4: IRR Estimation per a hectare of pineapple in Aleta Chucko Woreda

Cash flow	Year 2013	Year 2014	Year 2015	Year 2016	2017
Net cash flow	-3572	2658	3663	4579	5740
Discounted factor @85%	1	0.54	0.29	0.157	0.0853
Discounted cash flow	-3572	1436.8	1070.3	723.7	490
NPV@ 85%=148.8					
Discounted factor@92%	1	0.5208	0.27	0.141	0.073
Discounted cash flow	-3572	1384.3	993.6	646.94	422.3
NPV@92%=-124.8					
IRR=88%					

Table 5: Sensitivity analysis for pineapple production in Aleta chucko Woreda

Activity	Discounted cash flow	Sensitivity/switching value	Rank
Land rent	292.36	2411.17	11
Sucker	293	2405.9	10
Farm tool	229.8	3067.58	12
Chemicals	202.66	3478.4	13
Land preparation	2468.28	285.6	6
Planting material	2982.765	236.33	3
Planting	1883.295	374.3	9
Weeding	2292.83	307.4	7
Harvesting	2193.06	321.4	8
Transporting	2600.3	271	5
Other costs	2935.7	240.1	4
Total cost of production	18477.127	38.15	2
Revenue	25526.6	27.6	1
NPV =7049.3			

Source survey data (2016)

Econometrics Model.

Factors affecting the choice of pineapple marketing outlets.

The multinomial Logit model was used to determine the factors influencing the choice of pineapple marketing outlets in Aleta Chucko Woreda. The variables included in the estimation were: age, sex, education, vehicle ownership, pineapple yields, marketing experience, price information, and contract marketing. Table 6 presents the results of the Multinomial Logit model. The Chi-square value of -128.49479 showed that likelihood ratio statistics are highly significant ($P < 0.000$) suggesting that the model had strong explanatory

power. The pseudo-R square was 0.4852 indicating the explanatory variable explained about 48% of the variable in the choice of market outlets. Before the marginal effects were run, the coefficient estimates were run and presented to provide only the direction of the effect of the independent variable on the dependent variables but not the actual magnitude of the change of probabilities. Thus, the marginal effects from the MNL model, which measure the expected change in the probability of a particular choice being made with respect to a unit change in an independent variable, are reported and discussed. The significant value (also known as p-values) show whether a change in the independent variable significantly influences the Logit at a given level (Gujarati, 2007).

Table 6: Marginal effect from Multinomial Logit on the choice of marketing outlets

Explanatory variables	Farm gate		Local market		Urban market	
	dy/dx	P value	dy/dx	P value	dy/dx	P value
Age	.0188969***	0.000	-.0111741*	0.009	-.0009307	0.780
Sex	-.0911559*	0.060	.0200629***	0.01	-.0516406	0.264
Education	-.1039693**	0.005	.0894846**	0.022	.0982414***	0.001
Contract market	.2710055***	0.000	-.1916729***	0.001	.0304218	0.464
Market experience	-.0763788***	0.000	.0296569*	0.060	.0353941***	0.001
Pineapple yield	.0000268	0.326	-2.66e-06	0.120	.0000596**	0.005
Price information	.0266655	0.657	.0463461	0.486	-.0012707	0.977
Vehicle ownership	.0048129	0.924	.0205918	0.733	.0635931	0.148
Number of observation	=152		Pseudo R2		=0.4852	
LR chi2 (24)	=	242.23	Log likelihood=		-128.49479	

***: Significant at 1% level, **: Significant at 5% level, *: Significant at 10% level
Source survey data (2016)

Age had positive significant influence on the choice of the farm gate market and negative significant influence on the choice of local market. An increase in Age of household by one percent the probability of selling the pineapple yield in the farm gate market increased by 1.8% and an increase in age of household by one percent decreases the probability of selling their products at local market by 1.1%. The result is consistent with argument by Arega *et al.* (2007) who stated that market participation declines with age because the older people are perceived to be risk averse and reluctant to adopt technology. Barret *et al.* (2007) also concluded that young people participated more in the market because they are more receptive to new ideas and are less risk averse than the older people.

Sex of the household head had a significant influence on the choice of farm-gate and local market. Male-headed household had a higher probability of selling at local markets by 2%; however, they had a lower probability of selling at farm-gate by 9.1%. A possible explanation for this is that male-headed households tend to risk takers thus they are capable of searching markets in the distance and competitive places like local market.

Conversely, female household's head tends to be confined at home by household chores hence hindering them from attending the market places. The finding concurs with that of Morrison *et al.* (2007), who found that female farmers are faced with gender specific constraints like a time burden that limit them from accessing the best market for their output.

Education had a significant influence on the choice of farm gate, local market and urban market. As education level of pineapple producers increased, the probability of choosing farm gate market was decreased by 1%, whereas education level of house hold increases the probability of selling pineapple yield at local and urban market increased by 8.9% and 9.8% respectively. Formal education has been found to

enhance managerial competence and successful implementation of improved production, processing and marketing practices (Marenya and Barret, 2006). The finding is consistent with the argument of Makhura *et al.* (2001) who stated that human capital represented by the household head's formal education is posited to increase a household understanding of market dynamics and therefore improve decision about the amount of output sold. This is in line with Astewel (2010) who illustrate if paddy producer gets educated, the amount of paddy supplied to Local and urban market increases, which suggests that education improves level of sales that affects the marketable surplus.

Market experience had significant negative influence on the choice of farm gate. As market experience of sampled household increased by one percent the probability of selling pineapple yield at farm gate market decreased by 7.6%. But as market experience of household increased by one percent the probability of selling pineapple yield at local and urban market increased by 2.9% and 3.5% respectively. In essence, marketing experience captures the aspects relating to social networks and linking with marketing players, which accrue over time. The existence of such links reduces transaction cost in searching for the trading partners, contracting, negotiating and enforcing contracts which in turn increases market participation (Geoffrey K, 2014).

Pineapple yield had apposite significant influence on choice of urban market. An increase in the weight of pineapple yields by one kilogram increases the probability of selling at urban markets by 0.00596%; this means that the farmers who have more yields have more opportunities of selling their produce at the market places than those with the little produce. The finding is in line with that of Chalwe (2011), who found more of the beans produced are sold to the private traders in the market places than to other households at the farm gate. Contract marketing had a positive significant influ-

ence on the choice of farm-gate. The farmers who were under contract in marketing had a higher probability of selling at farm-gate by 27.1%. While the contract market increased by one percent the probability of selling pineapple yield at local market decreased by 19.16%. Contract marketing guarantees the farmers with a ready market. In essence, a ready market reduces the farmers' costs that are associated with searching the potential buyers and transport. For this reason, the farmers opt to sell at farm-gate in order to incur zero transaction cost. The finding is consistent with that of Escobal and Cavero (2007), who found that marketing of potato at the farm-gate in Peru involves no tax obligation (taxes are not levied) or trade commitments, since the farm is an open market and there is no restriction or barrier.

CONCLUSIONS

This study has analyzed market participation and financial viability among small holder pineapple producers. By using Net present value and internal rate of returns approach it was assured that pineapple production was financial viable for small holder producers. The literature in market outlets' choice stresses that pineapple producers prefer a particular market outlet either because of its closeness or outlet that offers the best price.

However the result depicts that pineapple producers use different alternative market outlet choices such as farm gate, local and urban centers depending on the factors that influence the decision of producers to sell their produces at each available market outlet choices. Six factors were found to be significant in determining factors influencing the choice of pineapple marketing outlet. Age, Sex, education, pineapple yield, contract marketing and market experience significantly influence the choice of pineapple marketing outlet. Age had positive significant influence on the choice of the farm gate market and negative significant influence on the choice of local market. This indicates that old people were enforced to sell their products at farm gate markets than that of young people as they participated more in the market because they are more receptive to new ideas and are less risk averse than the older people. Sex of the household head had a significant influence on the choice of farm-gate and local market, male-headed households tend to risk takers thus they are capable of searching markets in the distance and competitive places like local market and Conversely, female household's head tends to be confined at home by household chores hence hindering them from attending the market places. Formal education has been found to enhance managerial competence and successful implementation of improved production, processing and marketing practices, therefore as education level of household increases the probability of participating at local and

urban market increases. In essence, marketing experience captures the aspects relating to social networks and linking with marketing players, which accrue over time. The volume of pineapple also had the significant effect on the choice of market outlet since the volume of pineapple increases the producers prefer choice of urban market than the farm gate and local markets.

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Authors' contributions

The data collection, analyzing of the data, and drafting of the manuscript was done by authors primary role in the paper is the revision of the drafted manuscript and guidance on additional interpretations of the results. All authors have read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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