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ARTICLES

Determinants of Market Outlet Decision of Pineapple Farmers in Assam: An Econometric Approach

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ABSTRACT

Access to the market and farmers' decisions on market outlets for marketing their produce play a pivotal role as they impact the income of households. The present study was carried out to analyze the determinants of market outlet decisions of pineapple producers in Assam and to identify possible areas of intervention. A multistage sampling technique was used to select 100 pineapple farmers from the Dima Hasao and Karbi Anglong districts of Assam. Data was analyzed using both multivariate probit and binary probit models. The study identified five outlets for marketing pineapple, with local traders as the most preferred outlet by producers, accounting for 43 per cent of the quantity marketed. For marketing, the outlet that provides a higher price should be chosen. However, producers prefer to market in the nearest outlets or at the farm gate irrespective of the price received to avoid higher transport costs. The producers also select multiple outlets to sell pineapple to minimise loss. Hence, the study recommended the formation of producer groups or marketing cooperatives to facilitate the pooling of the produce and marketing through shared cost, more investment in infrastructural facilities like cold storage, processing units and proper connectivity linking production cluster areas to market for efficient marketing.

Keywords: Pineapple, market outlets, multivariate probit, binary probit, Assam

JEL codes: M31, Q12, Q13

I

INTRODUCTION

Pineapple is an important commercial crop in Assam. The state is the country's second-largest pineapple producer after West Bengal, accounting for about 15.37 per cent of the total pineapple production. The intervention by the technology mission for integrated development of horticulture through an area expansion scheme has triggered the revolution of pineapple cultivation in the state. During 2017-18, the area under pineapple in Assam was 16.30 thousand hectares, and production was 296.52 thousand MT (GoI, 2018). The productivity of pineapple in the state during the same period was recorded to be 18.19 MT/ha, which was much higher than national productivity (16.57MT/ha). With pineapple cultivation concentrated only in a few regions in the country, the state can become a major export hub.

Having stated the potential of the fruit in the state, the role of marketing cannot be overlooked. As stated by Rafoneke *et al*. (2020), marketing plays a significant role in transforming smallholder farmers into commercial producers, as its availability incentivises farmers to increase their scale of production. With the commercialization of the crop, there is an increased surplus. Proper planning is required to stimulate

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distribution and consumption, particularly perishables like pineapple. In addition, access to the market and selection of appropriate outlets for product marketing are important as they impact the household's income. However, the present marketing scenario in the state is unsatisfactory despite the potential of the fruit. The pineapple production clusters in the state are primarily located in remote and hilly areas. This remoteness of production clusters and a lack of proper road connectivity disadvantage the state. Added to this is the involvement of many intermediaries in marketing, lack of sorting and grading, low price of the fruit, lack of market information, etc.

The producer's decisions in selecting appropriate outlets for marketing their produce also play an important role in determining their profit. However, various factors hinder producers from choosing appropriate market outlets to sell their produce. Identifying these factors hindering the selection of outlets is important so that possible areas of intervention can be identified, which would serve as a guide for policymakers in formulating marketing policies that will benefit the pineapple farmers in the study area. Although production and its constraints have been studied in the past, there is a literature gap regarding farmers' decisions on selecting market outlets. Given the potential of the crop in the state, it thus necessitates studying the factors influencing the outlet decision of the farmers in marketing pineapple to identify possible areas of interventions that may help farmers maximise the benefits from their production and marketing activity.

II

METHODOLOGY

The study was conducted in Dima Hasao and Karbi Anglong district of Assam. The two districts were purposely selected based on dominance in area and pineapple production (GoA, 2016). In the second stage, in consultation with the District Agriculture Office, Harangajao block under Dima Hasao and Nilip block under Karbi Anglong district were selected purposively based on high area and production of pineapple. This was followed by a random selection of two to three villages under each block, wherein a random sample of 50 farmers was drawn from each block. Thus, cross-sectional data was obtained from 100 pineapple farmers using the multistage stratified sampling technique. The study used both primary and secondary data to fulfil its objectives. Primary data was collected from the sample respondents through personal interviews with the help of a pre-tested and well-structured schedule. The reference year for the study was 2019-2020. Secondary data on the state and districts, covering various aspects such as general information about the state, area and production statistics, *etc.*, were collected from concerned state departments and other government publications.

Analytical Framework

Multivariate probit and binary probit were used to estimate the channel choice decision of pineapple farmers. In the study area, there was more than one market outlet

for pineapple marketing at the farmers' disposal. The farmers do not transact pineapple, particularly in a specific channel. Instead, they dispose of their produce in one or more or a combination of available market outlets. The perishable nature of the fruit compelled the producers to sell via multiple outlets to reduce the risk of spoilage and loss. As the decision of outlet choice by the farmer is inherently multivariate and interdependent, the Multivariate Probit model was selected to account for the interdependence and possible correlation in market outlet choices after reviewing the studies conducted on similar situations (Cappellari and Jenkins, 2003; Abera, 2016; Tarekegen *et al*., 2017; Temesgen *et al*., 2017; Melese *et al*., 2018; Wosene *et al*., 2018; Abate *et al*., 2019; Kassaw *et al*., 2019; Degaga and Alamerie, 2020; Rafoneke *et al*., 2020). However, the STATA version 12 program did not support converging more than three outlets. Hence, for the study, the multivariate probit model was estimated for the three jointly and commonly used outlets by the producer, and the binary probit model was used to estimate the channel choice decision of producers separately for each outlet.

The probit analysis is based on the cumulative normal probability distribution. The binary dependent variable (Y_i) takes the value one and zero. The selection of a particular outlet was represented as one, otherwise zero, with the assumption that j^{th} household obtained maximum utility in selecting a particular outlet. The multivariate probit is a generalization of the probit model used to jointly estimate several correlated binary outcomes.

Considering that j^{th} farm household (j=1,2,……, N) facing a decision problem on choosing from among the available i^{th} market outlets, where 'i' denotes the choice of retailer (Y_1), consumer (Y_2), local trader (Y_3), village merchant (Y_4) and commission agent (Y_5) outlet. The selection of market outlet i by farmer j is determined by observed explanatory variables (X_i's) and the error term (ε_i) and is expressed as follows,

$$Y_{ij} = X_i\beta_i + \varepsilon_i \qquad \text{…….(1)}$$

and E (ε/X) =0, Var (ε/X) = 1 and Cov (ε/X) = ρ.

The econometric approach for this study is to translate the indicator function of equation (1) into the observed binary outcome equation that takes the value '1' when farmer j selects i outlet and '0' otherwise for each outlet and is expressed as follows,

$$Y_{ij} = \{1\ if\ Y_{ij}^{A} = X_{ij}^{A}\beta_{ij} + \varepsilon^{A} \geq 0 \leftrightarrow X_{ij}^{A}\alpha_{ij} \geq -\varepsilon^{A} \qquad \text{……..(2)}$$

$$or$$

$$Y_{ij} = 0\ if\ Y_{ij}^{A} = X_{ij}^{A}\beta_{ij} + \varepsilon^{A} < 0 \leftrightarrow X_{ij}^{A}\alpha_{ij} < -\varepsilon^{A} \qquad \text{……..(3)}$$

where, β_{ij} are a vector of simulated maximum likelihood parameters to be estimated and ε^{A} is a vector of error terms under the assumption of normal distribution, Y_{ij}^{A} is the dependent variable for channel choice of retailer, consumer, local traders, village merchant and commission agent and is binary, taking the value 1 when farmer j selects a particular channel and zero otherwise, X_{ij}'s are vectors of independent variables

determining the respective channel choices and ρ's are correlations between the endogenous variables.

The probability that every outcome is a success, for instance, the probabilities that enter the likelihood function of the market channel choices simulation can be explained as

$$\Pr(Retailer = 1, Consumer = 1, Local\ trader = 1, Village\ merchant = 1, Commission\ agent = 1) = \Phi_i(\beta_i X_i, \rho) = \Pr(\varepsilon_i \leq \beta X_i)$$

where, Φ_i is the multivariate normal density function.

In a multivariate model, where several market outlet choices are possible, the error term will jointly follow a multivariate normal distribution with zero conditional mean and variance normalized to unity where (μ_{x1} ……, μ_{xi}) MVN~(0, Ω) and the symmetric covariance matrix is Ω. For the present study, as the model supports converging only up to three markets, the Ω is represented as,

$$\begin{bmatrix} 1 & \rho_{x1x2} & \rho_{x1x3} \\ \rho_{x2x1} & 1 & \rho_{x2x3} \\ \rho_{x3x1} & \rho_{x3x2} & 1 \end{bmatrix} \qquad \text{……(4)}$$

Equation (4) generates the multivariate model that jointly represents the market outlet choice decision. The off-diagonal elements in the covariance matrix represent the unobserved correlation between the stochastic components of the different types of outlets. It represents the unobserved characteristics that affect the choice of alternative outlets.

Hypothesized Variables

For the study, ten variables were considered, which were supposed to influence producers' decisions on market outlets. The explanatory variables expected to influence the dependent variable are summarized in Table 1.

III

RESULTS AND DISCUSSION

General Characteristics of the Households

Of the 100 sample households surveyed, 82 per cent were male-headed households, while 18 per cent were female-headed households (Table 2). The mean age of the household head was 50 years, and the mean educational level indicated that the sample household head had at least a middle school-level education. About family size, the mean family size of the household surveyed was five members, with a minimum household of 2 persons and a maximum household of 10 persons. The average annual income of the household from both off-farm and on-farm, excluding the earnings from pineapple, was Rs. 41695 per year. The average experience of farmers in pineapple farming was 14 years in the study area.

TABLE 1. SUMMARY OF VARIABLES USED FOR DETERMINING PINEAPPLE PRODUCERS' MARKET OUTLET CHOICES

Name of the variable		Type of the variables	
Dependent variables			
Market outlet choice decision of pineapple growers		1	If the producer chooses a retailer
		2	If the producer chooses a consumer
		3	If the producer chooses a local trader
		4	If the producer chooses a village merchant
		5	If the producer chooses a commission agent
Independent variable			
AGEHH	Age of household head in years	Continuous	
GENHH	Gender of household head	Dummy:1=Male, 0=Female	
FMSZ	Household size in number of families	Continuous	
EDHH	Education level of household head	Continuous	
DISMKT	Distance to nearest market in kilometres	Continuous	
ACCMKTINF	Access to market information	Dummy: 1=Yes, 0=No	
PINFRMEXP	Pineapple farming experience in years	Continuous	
AIN	Annual income (in ₹)	Continuous	
TRUSTBUY	Trust in buyers	Dummy: 1=Yes, 0=No	
QNTYPRO	Quantity of pineapple produced in numbers	Continuous	

TABLE 2. SUMMARY STATISTICS OF HOUSEHOLD CHARACTERISTICS

Continuous variables	Observations	Mean
Age of household head	100	49.88
Education level of household head	100	1.56
Family size	100	5.04
Pineapple farming experience	100	13.91
Quantity produced (in qtl)	100	212.30
Distance to market(in km)	100	8.16
Annual household income	100	41694.5
Dummy and categorical variables	**Responses**	**Frequency**
Gender of household head	Male	82
	Female	18
Access to market information	Yes	64
	No	36
Trust in buyers	Yes	89
	No	11

On average, the area under pineapple was 1.01 hectares, and the average production was 212.30 quintals. Regarding information access, about 64 per cent of the respondents received information about the prevailing price. Still, the information received was from fellow farmers and buyers, and its legitimacy cannot be guaranteed. The study also found that most farmers (88%) trusted the buyers, indicating the reliability and commitment built over the years. The average distance from the production area to the nearest local market was about 8.16 km in the study area.

Pineapple Market Outlets in Assam

The sampled farmers market their pineapple through five outlets: retailers, commission agents, consumers, local traders, and village merchant outlets, which were chosen in combination. Table 3 presents the different market outlets used by producers when marketing their pineapple, and the quantity marketed in each outlet is presented in Figure 1. The most chosen market outlet for marketing pineapple was a local trader, which was reported by 62 per cent of farmers, and about 79.95 quintals of pineapple were marketed through this outlet. This was followed by retailer outlets (56%), and the quantity marketed through this outlet was 33.94 quintals. At the same time, 40 per cent of farmers chose a village merchant outlet, and the quantity marketed through this outlet was 59.63 quintals. Pineapple marketed through consumer and commission agents was less, at 7.41 quintals and 5.24 quintals, respectively.

TABLE 3. DESCRIPTION OF PINEAPPLE MARKET OUTLETS IN ASSAM

Decision	Frequency				
	Retailer	Commission Agent	Consumer	Local Trader	Village Merchant
Yes	56	9	22	62	40
No	44	91	78	38	60
	Quantity marketed in each outlet				
Mean	33.94	5.24	7.41	79.95	59.63
Percent to total	18.23	2.82	3.98	42.94	32.03

The Role of Intermediaries in the Pineapple Supply Chain in Assam

To understand the producers' choice of an outlet for pineapple marketing, it is necessary first to understand the role played by intermediaries to better understand the connection between them. The role of each intermediary involved in pineapple marketing in Assam is further discussed below.

Village Merchant: The village merchant acts as the assembling agent in Assam. They move from field to field to collect the fresh fruit and transport it to local markets for bulk sale to traders at the wholesale rate. Some village merchants also transport the produce to distant markets to distribute it to distant traders. Compared to other intermediaries, the village merchant procures the fruit from farmers at the lowest rate.

Commission Agent: The commission agent only acts as a facilitator between the farmer and trader without claiming to produce ownership. He facilitates the sale of farmers' produce by contacting the traders, making the available quantity known to them, and negotiating the price with the trader on the farmers' behalf. He charges a commission of Rs.3 per piece of pineapple sold by the farmers. No commission is charged from traders as these traders collect the produce from the farm gate.

Local Trader: The local traders in the state also play a key role in collecting the produce directly from the farmers or village merchants, assembling markets, and transporting it to the local markets, where it becomes accessible to other intermediaries. They are directly involved in buying fresh pineapples from farmers in scattered and remote growing areas, transporting the produce from place to place and selling it to retailers at the wholesale rate. They are essential in making the fruit available in all markets to cater to many consumers in dispersed locations.

Distant Trader: Those traders from outside the cluster area under study are categorized as distant traders for the study. They procure fresh pineapple from village merchants in the local assembly markets, or the fruit is delivered to them by the merchant. Traders from neighbouring states like Arunachal Pradesh (Tawang), Delhi, and Bangalore are considered distant traders in the study area. They play a key role in ensuring that the fresh fruit reaches those markets where the fruit is not available or in lesser supply, and in turn, create place utility.

Retailer: The retailers are the end connectors in the supply chain, linked directly to the consumers. The retailers in the study area include small retailers who retail fruits and vegetables all year round, roadside vendors and seasonal fruit retailers. They purchased fresh pineapple from traders in major markets or directly bought it from farmers at the farm gate for further sale to consumers.

Consumer: Consumers represent the end user of the product in the supply chain. Consumers in the area purchase fresh fruit from retailers or farmers for consumption purposes.

Determinants of Pineapple Producer Market Outlet Decision

The multivariate probit model was first estimated jointly for five binary dependent variables: retailer, consumer, village merchant, local trader and commission agent market outlets. However, there was a problem with converging all five binary dependent variables in Stata 12, which was used for multivariate probit analysis. As the model supports converging only three binary dependent variables simultaneously, the multivariate probit analysis was carried out only for the three channels jointly and commonly chosen by most households for pineapple marketing in the study area. The farmer's decision to select a particular outlet was analysed separately following a binary probit model for each market outlet.

The results of the multivariate probit model are presented in Table 4. The Wald test ($\chi^2(33)$ =62.76, p=0.0013) is significant at a 1 per cent level, indicating that the subset of coefficients of the model is jointly significant and that the explanatory variables included in the model are satisfactory. Thus, the multivariate probit model fits the data reasonably well. Also, the results of the likelihood ratio test of independence in the model (LR($\chi^2(3)$ =19.76, p=0.0002) was significant at a 1 per cent significance level, indicating that the null hypothesis of independence between three market outlet choice decisions ($\rho_{21}= \rho_{31}= \rho_{32}=0$) was rejected. This signified the joint correlations for two estimated coefficients across the equations in the model. Thus, the decisions to choose the three market outlets are interdependent. The likelihood ratio statistics of the estimated correlation matrix also reflect the behaviour of the pineapple producers in market outlet selection.

TABLE 4. MULTIVARIATE PROBIT ESTIMATIONS FOR JOINTLY USED MARKET OUTLET IN ASSAM

Variables	Market outlet coefficient		
	Retailers	Consumers	Local trader
AGEHH	-0.014(0.020)	0.008(0.025)	0.004(0.017)
GENHH	0.461(0.492)	-0.054(0.431)	0.099(0.426)
EDHH	-0.089(0.134)	-0.173(0.172)	0.041(0.124)
FMSZ	0.002(0.098)	0.157(0.113)	0.115(0.086
PINFRMEXP	-0.022(0.029)	-0.066(0.041)	-0.002(0.026
QNTYPRO	1.25E-05(0.000)	-9.29E-06(0.000)	1.57E-05(0.000)
DISMKT	0.053***(0.026)	0.034(0.027)	0.005(0.023)
ACCMKTINF	-1.948***(0.435)	-1.410***(0.448)	-1.3632***(0.374
TRUSTBUY	-1.536**(0.788)	-1.911***(0.584)	0.013(0.491)
AIN	3.4E-06(0.000)	-9.33E-06*(0.000)	-1.59E-06(0.000)
Constant	2.863(1.335)	1.750(1.180)	0.096(0.947)
	Estimated correlation matrix		
ρ_{21}	0.6759***(0.151)		
ρ_{31}	0.5350***(0.135)		
ρ_{32}	0.6939***(0.183)		
Likelihood ratio test of independence: $\rho_{21}= \rho_{31}= \rho_{32}=0$ $\chi^2(3)$=19.7659 Prob> χ^2=0.0002***			
No of observations	100		
Log-likelihood	-125.49		
Wald χ^2 (33)	62.76		
Prob > χ^2	0.0013***		

Note: ***, **, * indicates significance at 1%, 5% and 10% level respectively
Figures in the parentheses are standard errors

The correlation between the choice for consumer and retailer (ρ_{21}), the correlation between the choice for local trader and retailer(ρ_{31}), and the correlation between the choice for local trader and consumer (ρ_{32}) are positively interdependent and significant at 1 per cent probability levels, thus, indicating that producers who choose consumer outlet are more likely to choose retailer outlet. Likewise, the producers delivering to local traders are more likely to choose consumer and retailer outlets. The producers jointly sell through all available outlets, when they transport to the common assembling market as they prioritize selling their entire produce to avoid spoilage and loss.

The pineapple producer's market outlet choice decision was studied using ten explanatory variables. According to the multivariate probit model results, variables like distance to market, access to market information, and trust in buyers significantly influenced retailer outlets. In contrast, consumer market outlet was influenced significantly by access to market information, trust in buyers and annual income. Access to market information significantly influenced the choice of local trade outlets.

Table 5 presents the binary probit estimates of all the five outlet decisions of pineapple producers in Assam.

TABLE 5. BINARY PROBIT MODEL ESTIMATES FOR MARKET OUTLET CHOICE DECISION OF PINEAPPLE PRODUCERS IN ASSAM

Variables/coefficients	Retailers	Consumers	Village Merchant	Local trader	Commission Agent
AGEHH	-0.012(0.019)	0.011(0.027)	0.008(0.018)	0.005(0.017)	0.036(0.033)
GENHH	0.441(0.489)	-0.126(0.463)	-0.988**(0.446)	0.220(0.448)	-0.082(0.607)
EDHH	-0.066(0.134)	-0.148(0.191)	-0.006(0.126)	-0.034(0.126)	0.074(0.226)
FMSZ	0.021(0.099)	0.141(0.125)	-0.141(0.094)	0.143(0.093)	-0.323(0.215)
PINFRMEXP	-0.019(0.028)	-0.065(0.045)	0.002(0.028)	-0.010(0.028)	0.001(0.047)
QNTYPRO	9.01E-06(0.00)	-1.39E-05(0.000)	-8.54E-06(0.000)	1.51E-05(0.000)	1.61E-05(0.000)
DISMKT	0.067***(0.027)	0.020(0.030)	-0.016(0.025)	0.014(0.025)	0.136***(0.047)
ACCMKTINF	-1.849***(0.411)	-1.322***(0.449)	1.303***0.384)	-1.378***(0.385)	-1.440**(0.719)
TRUSTBUY	-1.486**(0.737)	-1.922***0.607)	1.576**(0.645)	-0.027(0.525)	0.528(1.033)
AIN	2.93E-06(0.000)	-7.06E-06*0.000)	1.03E-06(0.000)	-9.07E-07(0.000)	6.89E-06*(0.000)
Constant	2.431(1.229)	1.738(1.354)	-1.231(1.062)	-0.053(0.974)	-3.565(1.874)
No of observations	100	100	100	100	100
Pseudo R2	0.32	0.36	0.17	0.17	0.41
Log-likelihood	-46.74	-33.62	-56.08	-55.01	-17.74
LR chi2	43.70	38.15	22.44	22.79	25.02
Prob >chi2	0.0000***	0.0001***	0.0212**	0.0189**	0.0090***

Note: ***, **, * indicates significance at 1%, 5% and 10% level respectively
Figures in the parentheses are standard errors

The likelihood ratio test results in the model for retailer outlet, consumer outlet and commission agent outlet were found significant at a 1 per cent level. For village merchants and local traders, it was found significant at a 5 per cent level, thus indicating that the explanatory variables included in the model were satisfactory. Out of the ten explanatory variables under consideration for the study, the retailer outlet was influenced significantly by three variables: three significantly influenced consumer outlet, three significantly influenced village merchant outlet, one significantly influenced local trader outlet and three significantly influenced commission agent outlet. The significant influence of explanatory variables in the study on farmers' decision to choose market outlets is further discussed below.

The distance to market has a positive relationship with the likelihood of choosing a retailer outlet and commission agent at a 1 per cent significance level. It reflects the producer's preference to sell at the nearest outlet or farm gate to avoid additional transport costs to distant markets. According to Mgale and Yunxian (2020), market distances can also hinder farmers from accessing better markets. This situation is observed particularly for orchards that are inaccessible due to their location. Here, producers' priority is to dispose of the fruit as soon as possible, irrespective of the price received, to avoid the high cost of transporting it to market, reduce risk, and avoid loss due to spoilage. The findings also concur with the study conducted by Gachoka *et al*. (2023) on market outlet choices among mango and passion fruit farmers in Kenya, as he stated that long distances implied higher transportation costs and, at the same time, fruits are subjected to high loss due to longer hours on road which may, in turn, render the enterprises to be unprofitable. As such, when production clusters are located far from the market centre, producers in the study area prefer to sell their produce to commission agents and retailers who collect at the farm gate or the nearest local markets, although the price received is less than the market price. Similar findings were reported by Abera (2016), Wosene *et al*. (2018), Degaga and Alamerie (2020) and Ermias (2021), where households located far from the market centre prefer to sell their produce at the nearest market or farm gate to avoid additional marketing costs.

Access to market information was positively associated with the likelihood of choosing the retailer and village merchant outlet at a 1 per cent level of significance. Still, it was negatively associated with the likelihood of choosing the consumer, local trader outlet at a 1 per cent level of significance and commission agent at a 5 per cent level of significance. With access to price information, the risk-taking farmers usually sell to retailers offering higher prices for their produce rather than selling to commission agents and local traders at the farm gate who procure in bulk and offer them lower prices. The findings of Bezabih *et al.* (2015) confirmed the positive influence of market information access on choosing retailer outlets. According to Chekol and Mazengia (2022), access to market information increases farmers' bargaining power and helps them get reasonable prices for their produce. The result of the negative relation of market information access and consumer outlet in the study

area was in contrast with other studies (Honja *et al*., 2017 and Tarekegn *et al*., 2017) where producers who have information access to prevailing prices prefer to market in outlets like consumer who give a relatively higher price to them. Also, Abera (2016) revealed that access to price information of different market outlets will create an opportunity to opt for the best rewarding outlets. From interaction with farmers in the study area, it was observed that information received about the prevailing prices and buyers was usually from fellow farmers and buyers. Hence, farmers are not willing to risk taking to market based on the information obtained as its legitimacy cannot be guaranteed. In addition, the difficulties in making transport arrangements and the associated costs were other reasons for producers' preference for selling to village merchants and retailers at the farm gate. Although the price received was comparatively lesser at the farm gate, additional expenses in transporting the produce to market and the risk associated with marketing could be minimized when sold at the farm gate.

Trust in buyers has a positive and significant association with the likelihood of producers selling to village merchants at a 5 per cent significance level and is negatively associated with the likelihood of choosing retailers and consumer outlets at a 5 and 10 per cent significance level, respectively. The positive and significant result of producers selling to village merchants indicated a good relationship and trust built between producers and village merchants over the years that increased the grower's commitment and cooperation with village merchants.

The annual income of the producers from sources other than pineapple had a negative association with the likelihood of choosing a consumer outlet but had a positive association with the commission agent outlet. This result concurs with the findings of Kabeta and Alemu (2019), where households with an increased non-farm income had a negative association with consumer outlets. It was observed that households with additional income from sources other than pineapple usually own larger farms than those with lesser income, as they can manage larger farms from their additional income and, hence, have more production. Thus, they prefer to sell through an outlet like a commission agent, where an arrangement is made for bulk procurement rather than a consumer outlet, although the price received is less. This bulk disposal also avoids losses without facilities like cold storage and processing units.

Male-headed households were negatively associated with the likelihood of choosing village merchant outlets, indicating that male-headed households are more likely to choose competitive market outlets than village merchant outlets. It reflects that male-headed households tend to be risk takers, and they are more capable of searching competitive outlets for their produce rather than selling at the farm gate, unlike female-headed households who are confined at home, occupied with household chores and taking care of family, hence, hindering their marketing activity. This finding concurs with Sigei *et al.* (2015), who found male-headed households to be risk-takers capable of searching competitive markets.

IV

CONCLUSIONS AND SUGGESTIONS

The study finds that farmers select multiple outlets to sell pineapple to minimise loss and maximise their income. Five outlets were identified for selling pineapple: retailer, commission agent, consumer, local trader, and village merchant. The results of the econometric analysis revealed that variables like distance to market, access to market information and trust in buyers significantly influenced farmers' decision in selecting an outlet for marketing pineapple. For disposal of the fruit, the outlet that provides a higher price should be preferred. However, for farmers in the study area, their emphasis was on reducing marketing costs and their associated risk rather than targeting outlets with higher prices. As production clusters in the state are scattered and located in remote areas, and there is an absence of proper connectivity linking these clusters to markets, the producer incurs higher transportation costs. Hence, they prefer to sell at the farm gate irrespective of the price received. Additionally, more risk is involved when dealing with perishables like pineapple, particularly in the absence of storage and cold chain facilities in production clusters. Hence, disposing of the fruit as soon as possible in multiple outlets to minimise loss due to spoilage becomes a priority for the producers rather than the price received.

From these findings, the study suggested the formation of producers into groups such as Farmer Producer Organizations (FPOs) or co-operative marketing societies to facilitate the pooling of their produce to constitute sufficient volume for efficient marketing through shared cost, which, in turn, would benefit them. In addition, direct marketing through groups can empower producers, improve their bargaining power, and increase their profit by obtaining a higher share of the consumer's rupee. Additionally, disseminating up-to-date price information in the markets through proper media can help farmers be aware of the existing prices and negotiate, not just be price takers. The study also suggested more investment in infrastructure development like proper connectivity linking production clusters to the market, setting up of facilities like cold storage and processing units in the production clusters to ensure a quality supply of fruit and, at the same time, enable producer access to different outlets where they can obtain better prices.

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