

## **Determinants of Marketing Channels Choices: Evidence from Vegetable Farmers in the Eastern Cape Province of South Africa**

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### ***ABSTRACT***

*Vegetable farmers are faced with computational and informational restrictions when making marketing decisions. Fresh produce markets in South Africa lack an efficient approach to supply chain management, from the farmers to the consumers. Improving market access can incentivise smallholder farmers to scale up their production. The present paper investigates factors influencing smallholder vegetable farmers' choice of market channels in the Eastern Cape Province of South Africa. A structured questionnaire and a multi-stage sampling technique were used to select 149 vegetable farmers. Multivariate probit regression and descriptive statistics were used for analysis. The results show that most sampled vegetable farmers in the study area sell their vegetable produce to traditional, wholesale, and retail outlets compared to other outlets. The study found that vegetable farmers can substitute one market with the other. Various socio-economic characteristics, transaction costs, asset ownership, membership of farm organisations, and access to extension services influence the selection choice. The study recommends intensive education and training to capacitate smallholder farmers through extension officers and farm organisations to enable farmers to understand and meet the requirements of high-value markets.*

**Keywords:** Eastern Cape, Marketing Channels, Smallholder Farmers, Vegetables.

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## 1. INTRODUCTION

The literature agrees on the pivotal role of commercialising smallholder farmers' production activities for economic growth in agriculture-dependent developing countries (Kihoro et al., 2016). Seyoum et al. (2011) define agricultural commercialisation as a shift from subsistence to market-oriented practices focused on profit maximisation, encompassing product and input decisions aligned with this objective (Goletti, 2005). Commercialisation boosts household income and promotes advanced production methods, fostering increased production through learning, interaction, economies of scale, and exposure to new ideas (Abdulla et al., 2019; Jeleta et al., 2009). The choice of marketing channels becomes a critical decision for smallholder farmers, influencing all aspects of their operations (Soe et al., 2015).

In South Africa, the inadequate commercialisation of smallholder farmers is a cause for concern. This is despite the 28 years of government efforts, policies, and increased spending aimed at integrating them into high-value market chains (Aliber & Hall, 2012; van Schalkwyk et al., 2012). Although agricultural expenditures have risen by 73%, particularly favouring smallholder farmers, the lack of clear success indicators is evident (Aliber & Hall, 2012). The sluggish progress in commercialisation hampers smallholder farmers, impeding their ability to realise the benefits of participating in high-value markets, thereby posing a barrier to the economic growth aspirations of sub-Saharan African countries.

In the Eastern Cape province of South Africa, the role of agricultural product marketing in smallholder farmers' incomes and livelihoods has been underexplored in recent studies. Limited insights are available from existing research, including Musenwa et al. (2007), Kibridge (2016), and Mdoda and Christian (2021). Musenwa et al. (2007) identified factors influencing marketing channel choices, such as farmer age, education, infrastructure, transaction costs, herd size, and cattle-rearing experience. Mdoda and Christian (2021) focused on vegetable commercialisation, using descriptive statistics, the Human Capital Index (HCI), and the Tobit models.

South Africa lacks comprehensive knowledge about the market channel preferences and influencing factors for vegetable smallholder farmers. recognising the ongoing emphasis on increasing smallholder farmers' commercialisation in Africa, including South Africa, understanding these aspects becomes

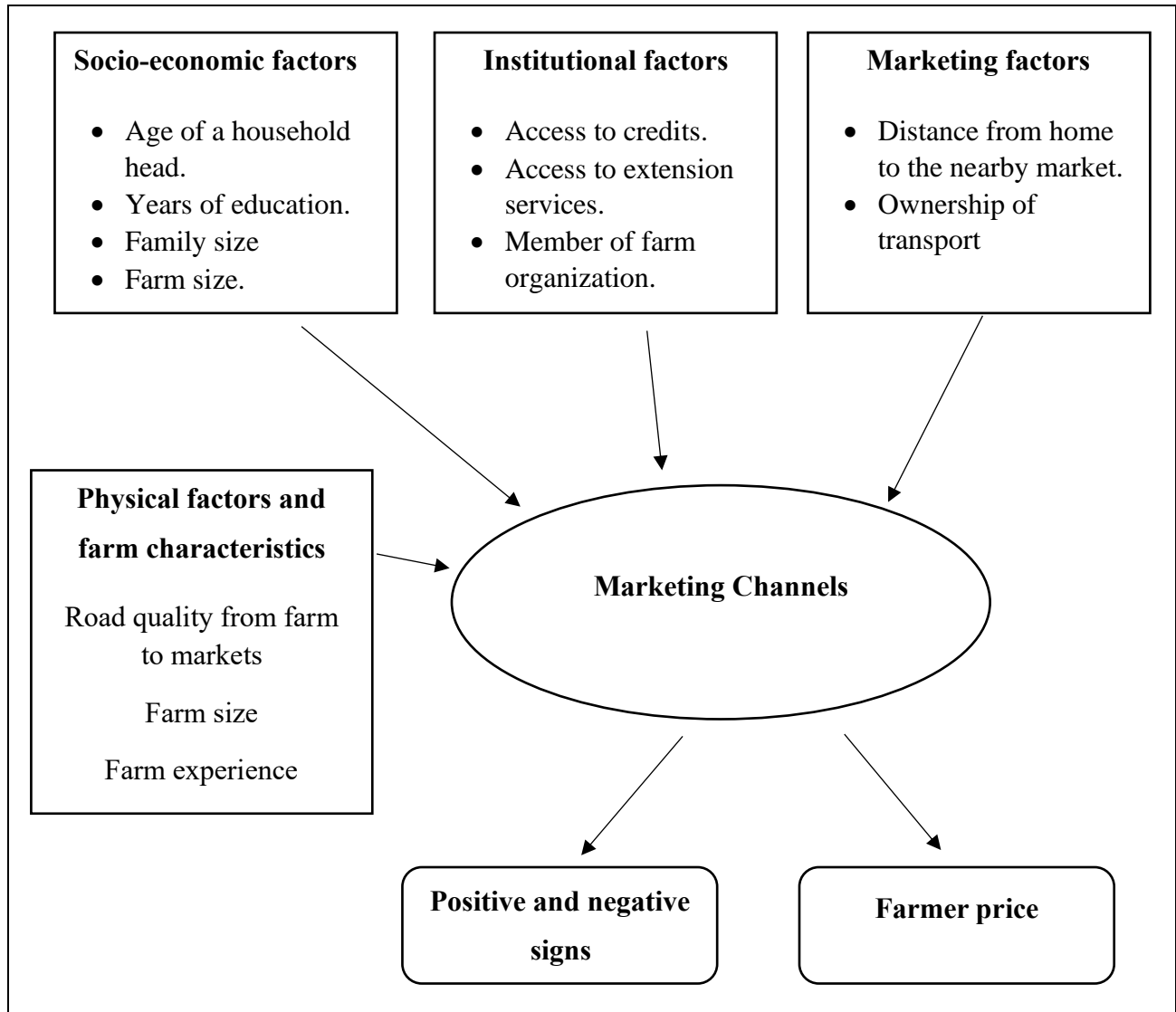
crucial for researchers and policymakers. Addressing this knowledge gap, the study focuses on factors influencing the choice of marketing channels for smallholder vegetable farmers in the Eastern Cape province of South Africa. Specifically, the research explores three key markets—traditional, wholesale, and retail—revealing insights into the dynamics that shape their commercialisation strategies. Through this investigation, the study aims to provide valuable insights to guide future policies and strategies, ultimately fostering the commercialisation of smallholder farmers in the region.

## **2. CONCEPTUAL FRAMEWORK**

The present study defined information needs as a situation that arises when an individual or community member encounters a problem that can be resolved through some information. This means that when someone identifies the information needed, the next step is seeking information to meet those needs. In this case, smallholder vegetable farmers need more information. This study adopted the Traditional consumer theory, which indicates that a typical consumer derives utility from a good or service by maximising utility subject to budget restrictions (Greene, 2003). This theory assumes that individuals have complete information and are rational decision-makers, with well-defined preferences (Thaler, 1990).

Consequently, farmers prefer options where they derive the highest utility. The process of choice-making can be set using the random utility theory or model (RUM). According to Greene (2003), RUM hypothesises that an individual will choose the alternative from a choice set that will provide the highest utility. Smallholder vegetable farmers will select the best market channel choice that will yield the best satisfaction to them regarding high farm returns.

Markets and improved market access play an important role in improving the incomes of smallholder farmers. Marketing access and channel choice are the most important household decisions for farming and greatly impact household income. Participating in markets is associated with many factors in developing countries, especially in South Africa, including demographic, farm characteristics, marketing, institutional, and external factors. The conceptual framework was used to simplify the interrelationship of explanatory variables used in this study and how they are linked and interdependent. It was used to reveal the interrelationships between key relevant variables used in this study.



**FIGURE 1: Conceptual Framework on Market Channels**

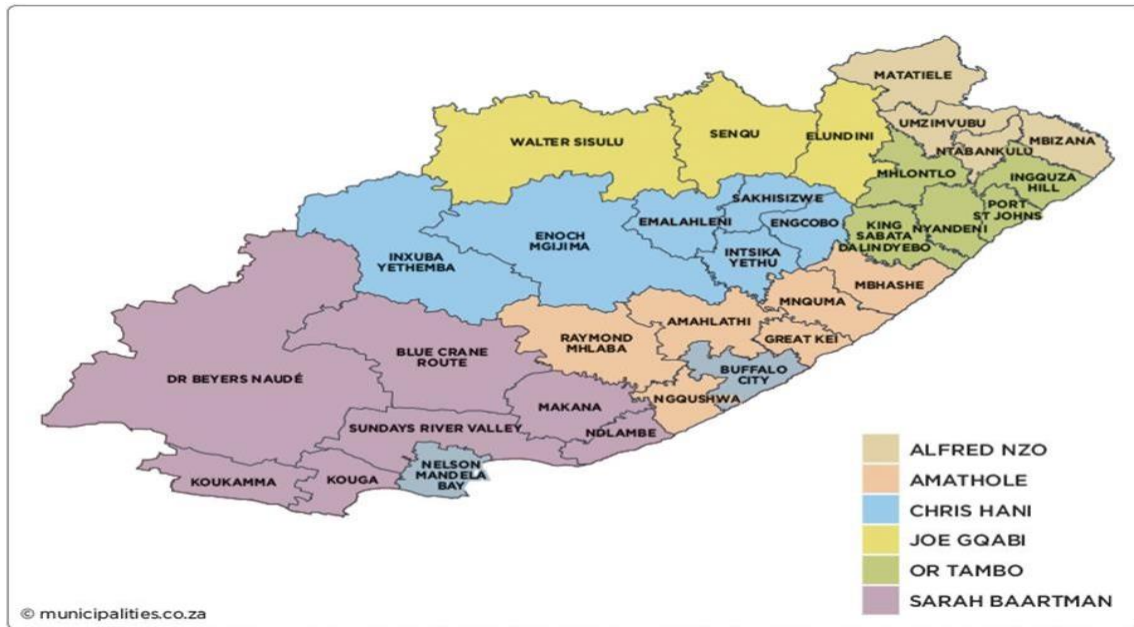
### 3. MATERIALS AND METHODS

#### 3.1. Description of the Study Area and Research Design

The study was conducted in the Eastern Cape Province which is the third most populated province in South Africa with 6 562 053 (12.7%) people after Gauteng and KwaZulu-Natal Province, which are estimated to have populations of 12 272 263 million (23.7% of national) and 10 267 300 million (10.8% of national), respectively (Mdoda & Obi 2019; Hlomendlini 2015; Department of Economic Development, Environmental Affairs and Tourism [DEDEAT], 2013). The province is

made up of five Districts and two Metropolitan Municipalities. The average poverty level of the province was estimated at 74.9% (Mdoda & Mdiya 2022; Stats SA 2019; Eastern Cape Development Corporation [ECDC] 2013) and the province's level of food insecurity (78%) is above the national average of 64%, making households in the province to be amongst the most food insecure people in the country (Sigigaba et al., 2022; DEDEAT, 2013). Most residents rely on agriculture as an important source of livelihood. According to Mdoda et al. (2022) and Hlomendlini (2015), about 80% of households in this province are farming to supplement other income sources and for household subsistence purposes.

The Eastern Cape province is rich in natural resources ranging from arable land for crop production to luscious grazing lands and pastures to forests and marine life-rich farming soils and water to the wilderness. The province has all seven of South Africa's ecological zones, and the province's climate is favourable for agricultural production. Vegetables are largely grown in home gardens and small plots of less than 5 ha depending on rainfall and hand watering. In addition, there are few irrigation projects in which vegetables are grown all year round. Vegetables produced include cabbages, spinach, carrots, onions, green pepper, tomatoes, pumpkins, broccoli, cauliflower, sweet potato, potatoes, beans, peas, and sugar beet. The province has abundant water from the numerous rivers that run from the mountains to the sea, which makes it easy for crop production to be practised. The map of the study sites is presented in Figure 2.



**FIGURE 2: Map Showing Study Sites (Source: ECDC, 2013)**

The study adopted a cross-sectional survey design where data was collected at one point in time using structured questionnaires. The target population for this study was all smallholder farmers engaged in vegetable farming, i.e., those selling their produce to formal and informal markets in three districts of the Eastern Cape Province. A multi-stage sampling of smallholder vegetable growers was used in the survey to collect the data. Eastern Cape Province is composed of seven district municipalities and two metro municipalities. The study focused on three district municipalities that dominated vegetable production and are involved in agribusiness and subsistence farming. In the first stage, three districts were purposively selected from the seven: O.R Tambo, Joe Gqabi, and Chris Hani. These districts have vegetable farmers with better market access to sell their produce compared to the other districts that were excluded. In the second stage, two local municipalities and four wards in each municipality where vegetable farming dominates and is strictly practised for agribusiness were randomly selected.

In the final stage, vegetable farmers were sampled from the list of registered vegetable farmers in the Eastern Cape Province from the Department of Agriculture and Farm organisations. Accordingly, out of 10 752 vegetable producers in Eastern Cape Province, a total of 149 sample

producers are determined based on the formula given by Yamane (1967) at a 95% confidence level with a degree of variability of 5% and a level of precision equal to 8%:

$$n = \frac{N}{1 + N(e^2)} = \frac{10752}{1 + 10752(0.082^2)} = 8\%$$

where n is the sample size, N is the total size of the vegetable producers (10 752), and e is the level of precision (8%).

### 3.2. Data Analysis

The data collected in this study was analysed using STATA 15, a statistical package for Social Sciences. Descriptive statistics and econometrics were used as the research techniques. The descriptive statistics include means, standard deviation, and frequencies and were employed to characterise smallholder vegetable farmers. A multivariate probit regression model was used to analyse factors influencing vegetable farmers choice of market channel.

#### 3.2.1. Analytical Framework

The study focuses on the market channel choices made by vegetable farmers and explores the possibility of farmers concurrently choosing multiple channels. The researchers argue that traditional models like multinomial logit regression may not adequately capture the interdependence among these choices. Instead, they advocate for using the multivariate probit (MVP) model, citing its ability to handle correlated binary outcomes jointly. The MVP model is more suitable because it accommodates the likelihood of farmers selecting more than one market channel simultaneously, a phenomenon observed in previous studies (Pham & Theuvsen, 2019; Chiv et al., 2020; Mmbando et al., 2016). While multinomial logit models have been used in similar studies, the researchers argue that the multivariate probit model is better equipped to estimate factors influencing market channel choices while considering potential correlations and interdependence among these choices (Gumataw et al., 2016).

The model is specified as follows:

The selection of vegetable market channel i by farmer j is  $Y_{A_{ij}}$  defined as the choice of farmer j to transact in vegetable market channel i ( $Y_{A_{ij}} = 1$ ) or not ( $Y_{A_{ij}} = 0$ ) is expressed as follows:

$$Y_{ij}^A = \left\{ \begin{array}{l} 1 \text{ if } Y_{ij}^A = x_{ij}^A \alpha_{ij} + \varepsilon^A \geq 0 \\ 0 \text{ if } Y_{ij}^A = x_{ij}^A \alpha_{ij} + \varepsilon^A < 0 \end{array} \right. \dots\dots\dots 1$$

Where

$\alpha_{ij}^A$  is a vector of estimators, and  $\varepsilon^A$  is a vector of error terms under the assumption of normal distribution,  $Y_{ij}^A$  is the dependent variable for vegetable market channel choice of traditional, wholesalers and retailers and  $X_{ij}^A$  is the combined effect of the explanatory variables.

To analyse factors that influence the market channel choice decision of smallholder farmers on vegetable commodities, a multivariate probit model (MVP) was used. The econometrics model is expressed as follows:

$$\begin{aligned} \text{Traditional}_j &= X1' \beta_1 + \varepsilon^T \\ \{\text{Wholesalers}_j &= X2' \beta_2 + \varepsilon^W\} \dots\dots\dots 2 \\ \text{Retailers}_j &= X3' \beta_3 + \varepsilon^R \end{aligned}$$

Where  $\text{Traditional}_j$ ,  $\text{Wholesalers}_j$ , and  $\text{Retailers}_j$  are binary variables taking values 1 when farmer  $j$  selects traditional, wholesalers and retailers, respectively, and 0 otherwise;  $X_1$  to  $X_4$  are vector of variables;  $\beta_1$  to  $\beta_4$  a vector of parameters to be estimated and  $\varepsilon$  disturbance term. In a multivariate model, the choice of several market channels is possible, the error terms jointly follow a multivariate normal distribution (MVN) with zero conditional mean and variance snormalised to unity, and the symmetric covariance matrix  $\Omega$  is given:

$$\Omega = \begin{Bmatrix} 1 & p_{12} & p_{13} & p_{14} \\ p_{21} & 1 & p_{23} & p_{24} \\ p_{31} & p_{32} & 1 & p_{34} \\ p_{41} & p_{42} & p_{43} & 1 \end{Bmatrix} \dots\dots\dots 3$$

where  $\rho_{ij}$  represents the correlation between different types of market outlets.

#### 4. RESULTS AND DISCUSSIONS

##### 4.1. Socio-Economic Characteristics of Smallholder Vegetable Growers

Table 1 presents the characteristics of smallholder vegetable farmers. The results revealed that the majority (72%) of farming households are male-headed. This implies that vegetable farming is



male-dominated in the Eastern Cape and that most male smallholder farmers have better market access than females. The average age of vegetable growers was 48 years, implying that partially young farmers dominate agriculture in the study areas. The study's results revealed that on average, smallholder vegetable farmers spent 10 years in school, which ultimately means they were literate. Vegetable farmers had an average household size of 5 persons and 11 years of vegetable farming experience. The average farm size was 4 ha. The study revealed that 74% of farmers are members of farm organisations and have access to extension services, with 68%.

Farmers were radio and cell phone owners, with 62% and 68%, respectively. The distance travelled to markets by farmers was 12 km, and many farmers were based in remote areas far from the marketplace. The average income of farmers was R 6 650.00, which was a combination of social grants, securities, produce sales, and wages. About 76% of farmers in the study area do not have access to credit.

**TABLE 1: Characteristics of Vegetable Farmers**

<b>Continuous variables</b>	<b>Mean</b>	<b>SD</b>
Age of the farmer	48.10	11.33
Years spent in school	9.87	5.89
Household size	4.98	1.34
Farm size	4.24	0.79
Farm experience	11.20	6.10
Household income	6 650.00	48.29
Distance to the market	12.13	5.95
<b>Categorical variables</b>	<b>Frequency</b>	<b>Percentage</b>
Gender		
Male	107	72
Female	42	28
Access to extension services		
Yes	101	68
No	48	42

Member of farm sorganisation		
Yes	110	74
No	39	26
Radio owners		
Yes	92	62
No	57	38
Phone owners		
Yes	101	68
No	48	42
Access to credit		
Yes	36	24
No	113	76

#### 4.2. Market Channel Choice Selection

Table 2 shows the market channel choices used by smallholder vegetable farmers in the Eastern Cape province. The alternative market channels available to vegetable producers in the study area include traditional markets, wholesalers, and retailers. These channels are primarily chosen in combination with one another. The most used marketing channel by producers is the traditional market, with 73% of respondents supplying a mean of 16 kg; wholesale market, which was chosen by about 16% of respondents with a mean supply of 31 kg. And lastly, 11% of respondents sold to retailers with the mean supply of 18 kg.

**TABLE 2: Market Channel Choice Selection by Farmers**

Variable	Frequency	Percentage	Supply to each market in Kgs (Mean)
Traditional markets	80	73	24 (13)
Wholesalers	18	16	31 (12)
Retailers	12	11	18 (10)

### 4.3. Factors Influencing the Choice of Marketing Channel Decisions

Table 3 presents the empirical results of the MVP model. The chi-square (Wald test) of 164.15;  $p = 0.000$  in Table 3 implies that the model is jointly significant and that the explanatory power of the factors included in the model is satisfactory; thus, the MVP model fits the data reasonably well. The correlation coefficient indicated differences in farmers' preferences for marketing channels. They were all estimated negative; however, only  $\rho_{21}$  (correlation for traditional and wholesalers) and  $\rho_{31}$  (correlation for wholesalers and retailers) were statistically significant. This suggests that unobservable factors that increase the probability of choosing the traditional marketing channel reduce the probability of selecting the wholesale market, as well as the wholesale and retail markets. The negative correlation suggests that these three markets are substitutes. This suggests that if the conditions for supplying one market outlet are not met by a smallholder farmer, another market will be chosen.

A reasonable probability of supplying markets (i.e., 4%) implies that the targeted smallholder farmers are facing challenges that constrain their production and marketing, and they do not have the capacity or the economies of size to spread the fixed costs of accessing three different marketing channels. There were differences in the marketing channel choices behaviour among vegetable producers, which was reflected in the likelihood ratio statistics. Separately considered, the  $\rho$  values ( $\rho_{ij}$ ) indicate the degree of correlation between each pair of outlet choices. The MVP model estimates for the variables are presented in Table 3.

**TABLE 3: Multivariate Probit Simulation Results of Market Channel Choice**

	<b>Traditional markets</b>	<b>Wholesalers</b>	<b>Retailers</b>
<b>Variable</b>	<b>Coef. (Std Err)</b>	<b>Coef. (Std Err)</b>	<b>Coef. (Std Err)</b>
Household size	0.756***(0.178)	0.087 (0.132)	-0.214 (0.432)
Years spent in school	0.917 (0.234)	0.502** (0.023)	0.642** (0.372)
Distance to nearest urban market	0.145**(0.057)	-0.326 (0.450)	-0.430** (0.257)
Age	0.023** (0.016)	0.610 (0.331)	0.015 (0.022)

Access to extension services	0.266*** (0.013)	0.412** (0.187)	0.483*** (0.129)
Duration of payment	-0.551*** (0.008)	0.0330*** (0.010)	0.061*** (0.012)
Own transportation	-0.743 (0.876)	0.412** (0.021)	0.687** (0.395)
Farm size	-0.552** (0.342)	0.605*** (0.013)	0.072 (0.606)
_cons	3.537**(1.428)	-4.059*** (1.251)	2.954 (1.071)
Wald $\chi^2$ (52): 164.15                      Log likelihood: -252.1878                      Prob > $\chi^2$ = 0.000 Joint probability (success): 0.043                      Joint probability (failure):0.046 Likelihood ratio test of $\rho_{21} = \rho_{31} = \rho_{32} = 0$ $\rho_{21}$ - 0.922*** $\rho_{31}$ -0.367** $\rho_{32}$ -0.073 Number of simulations (draws) 5			

\*\*\* and \*\* indicate statistical significance at 1% and 5%, respectively.

The choice of marketing channels in the traditional market was significantly and positively affected by the age of the household head. This suggests that an additional year to the farmers' age, the more likely it is that a farmer will select traditional markets. Younger vegetable growers are more likely to sell to wholesalers and retailers' market channels because they are well educated they understand the requirements of the formal markets, and they are more likely to make investments that will improve their produce access to these markets. Household size had a significant positive influence on vegetable farmers' choice of a traditional market channel; however, it did not influence the choice of retail and wholesale markets. The household size, although it can influence smallholder farmer's market participation through the provision of cheap labour, smallholder vegetable farmers are more likely to sell their produce in the traditional market because a larger family size will imply more vegetables are consumed within the household for subsistence. The remaining produce is not enough for the wholesale/retail market, but can be sold to the traditional markets (Dlamini-Mazibuko et al., 2019).

The educational status of the vegetable farmer is an important variable affecting the vegetable farmers' choice of marketing channels. The better-educated farmers were more likely to choose wholesalers and retailers at a 5% significant level. This suggests that as the literacy status

increases, a farmer will likely select wholesalers and retailers as market channels increase by 50.2% and 64.2%, respectively. These results agree with Erkie et al. (2021) and Dessie et al. (2018) that educational status affects vegetable smallholder farmers' marketing channel choices and that more educated farmers are likelier to sell vegetables through wholesalers and retailers. Literacy levels affect market channels positively because as farmers become literate, they obtain marketing skills, a better understanding of formal, eagerness to generate more profits and management capabilities, which positively influence them to sell their produce on formal market outlets, namely, the wholesale and retail market than a traditional market. Owning transport was estimated to be positive and significant at a 1% level of statistical confidence. This suggests that having transport will increase the chances of selecting wholesalers and retailers as market channels by 41% and 68%, respectively. This aligned with prior expectations because owning transport enables farmers to transport their produce to retail and wholesale markets. These results corroborate Camara's (2017) and Melese et al. (2018) findings.

The payment duration was found to be significant at a 1% level in all three marketing channels. The coefficient was negative for the traditional market but positive for the wholesale and retail markets. The payment duration is one of the key factors influencing smallholder farmers' choice of marketing channels because farmers prefer receiving their money as quickly as possible after selling their produce. The variable coefficient for the duration of payments was expected to be negative for the wholesale and retail markets because formal markets have a longer duration of payments, unlike traditional markets when payments are received immediately. Thukur et al. (2023) also found that markets with longer payment durations are less likely to be chosen by agricultural producers. This might be because in South Africa, the wholesale and retail markets are more lucrative than the traditional market; hence, when smallholder farmers have access to formal markets, they will choose formal markets even when the duration of payments is longer.

The coefficient of distance to market was estimated as negative and positive, respectively, for retailers and traditional markets and significant at a 5% level of statistical significance. These findings are consistent with the prior expectation that distance will affect the choice of marketing channels. This means that farmers who reside away from the marketplace face difficulties in selling their products due to the high transaction costs involved in moving the products to the market;

hence they opt to sell their produce locally in traditional markets. On the other hand, the increase in distance negatively affects the selection of retailers as market channels. This suggests that an additional kilometre distance to the market reduces the likelihood of farmers selecting retailers by 43%. These results were in line with Ermias (2021), Yaregal (2018), and Tarekegn et al. (2017), who found that distance to market plays a crucial role in farmers' decisions about market channel selection and further discourages smallholder farmers from participating in the formal markets outlets (wholesale, and retailers). As a result, the location of farmers far away from the markets forced farmers to prefer traditional markets due to high transaction costs.

Access to extension services is another important variable, as it provides farmers with market information and innovative techniques. This variable was positive and significant at a 5% level of statistical confidence for traditional markets and retailers while negative and significant at 5% for wholesalers. The payment duration is one of the key factors influencing smallholder farmers' choice of marketing channels because farmers prefer receiving their money as quickly as possible after selling their produce. The variable coefficient for the duration of payments was expected to be negative for the wholesale and retail markets because formal markets have a longer duration of payments, unlike traditional markets when payments are received immediately (Dlamini-Mazibuko et al., 2019). Moreover, the results also showed that the farm size is positively related to wholesalers at 1% and negative to the traditional market at a 5% significance level. This implies that a one-hectare increase in farm size increases the likelihood of farmers choosing wholesalers as a market channel by 60% while reducing the likelihood of them choosing the traditional market by 55%. This is because larger farm size enables smallholder farmers to have enough surplus (remaining output after households' consumption) to sell at either the retail or the wholesale market (Dlamini-Mazibuko et al., 2013). Furthermore, with large farm sizes, smallholder farmers can adopt technologies that enable them to produce high-quality outputs; most of these technologies operate on larger farm sizes.

## **5. CONCLUSION AND POLICY IMPLICATIONS**

This paper investigated factors influencing the choice of the marketing channel by smallholder vegetable farmers in the Eastern Cape Province using a multivariate probit model. The results reveal that vegetable farmers use different alternative market outlets, and the frequently used marketing

channels are substitutes. This implies that farmers shift from one marketing channel to another if one marketing channel becomes more favourable to them. The study found that vegetable farmers in the study area have three market channel choices: traditional, wholesalers, and retailers. The traditional market was found to be the most used marketing channel.

This doesn't necessarily mean that smallholder farmers prefer traditional markets over wholesale and retail markets; in general, smallholder farmers are more likely to choose retailers and wholesalers because they are more lucrative than traditional markets due to higher demands than at the traditional markets, implying higher volume sales. The choice of traditional markets can be attributed to high transactional costs associated with a long distance to formal markets and poor produce quantity and quality, among other challenges. Therefore, the study recommends interventions designed to address challenges that limit smallholder farmers from accessing formal markets so that they can channel most of their produce to formal markets and generate more profits. The results of this study showed that the determinants of different marketing channels are not mutually exclusive. The farmers' choice of the traditional market was significantly affected by household size, access to extension services, access to market, farmer age, duration of payment, and farm size. Years of education, access to extension services, payment duration, own transport and farm size were key determinants of a wholesale marketing channel choice. Lastly, the retail market choice was affected by years of education, access to the market, access to extension services, payment duration, and own transport. The extension services positively affected access to all markets, implying that extension services can play a vital role in the commercialisation of smallholder vegetable farmers in the study area. The study, therefore, recommends an improvement of extension services support to ensure that smallholder vegetable farmers are offered relevant information necessary for them to produce outputs that meet the requirements of the formal markets (wholesale and retail market) in terms of quality and safety requirements. Education also positively affected the choice of wholesale and retail marketing channels. As farmers become highly educated, they can gather market-related information which helps them have better access to formal markets. The study, therefore, recommends smallholder farmers undertake training and invest more in educating their young household members, support from the government and experienced commercial farmers may be deemed necessary for this to be significantly realised.

## ACKNOWLEDGMENT

The authors are very grateful to smallholder vegetable farmers who volunteered to be part of this study and provided the necessary information.

## DISCLOSURE STATEMENT

The authors have not declared any conflict of interest.

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