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The market channel preference among smallholder cocoyam farmers in South Africa: A food security perspective.

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Abstract

Market channel choice makes important contributions to the incomes and other livelihood attributes among smallholder farmers in developing countries. Often considered from a number of perspectives, the dominant view articulated suggests an advantageous integration into formal market channels. This position is questioned as it has implications for smallholder farmers' food security and rural incomes. Using a mixed methods approach, the study collected primary data from 174 smallholder farmers and applied both a descriptive and multinomial logit regression model to analyze factors contributing to cocoyam production and market channel choices among respondents in the study area. Findings indicate that financial returns and available markets were key factors in cocoyam production, while amount received was a driver of market channel choice among 89% of respondents who sold directly at farm-gate. Farmers' age ($p=0.044$), household size ($p=0.043$), distance to market ($p=0.021$), additional income ($p=0.017$) and amount received ($p=0.014$) were significant variables ($p<.05$) in the determinants of market channel choice. The study recommended improving market information provision and strengthening farmer associations which will enable smallholder farmers in rural communities to make informed choices with respect to produce price, access other markets and consolidate their collective market bargaining position.

Keywords: *cocoyam, farm-gate, market channel, multinomial logit, regression, smallholder farmers*

Introduction:

Cocoyam is a food crop grown in mainly rural communities across Africa by subsistent farmers, and highly valued for its contribution to household food security. Its better storage capacity among other tuber and root crops has been recognized (Boakye-Achampong et al. 2017). The Cocoyam is a staple food for many people in developing countries of Africa, Asia and the Pacific, and a member of the *Araceae* family namely *Colocasia esculentum* and *Xanthosoma sagittifolium*. It is considered to have originated in the Indo-Malaysian region, Asia or Central and South America, with its origins remaining a point of debate. The crop is considered by the FAO (2012) as being among the world's important root and tuber crops, and domesticated in rural communities across Africa and other continents (Ramanatha et al., 2010). *Colocasia esculenta* is a tropical plant grown primarily for its edible corms, commonly known as taro, amadumbe or cocoyam which is widely cultivated in the high rainfall areas under flood conditions usually by smallholder farmers.

The versatile cocoyam crop plays a vital role in the livelihoods of many rural farmers and dwellers as it contributes to their dietary calorie and household incomes, especially during lean or hunger

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periods (Azeez & Madukwe, 2010; Onyeka, 2014). Widely found in East, West and Southern African countries, smallholder farmers grow the crop for increased food security and to supplement their incomes. It is consumed by people of all ages and is particularly fed to weaned children, and usually sold at the farm-gate (Talwana et al., 2009).

In South Africa, the 'amadumbe' as it is known among locals in the isiXhosa and isiZulu language, has been cultivated by villagers in the Eastern Cape and KwaZulu-Natal provinces for so long that it is erroneously regarded as an indigenous food crop. The amadumbe is an important staple crop in the sub-tropical coastal areas of the Eastern Cape and the rest of coastal KwaZulu-Natal province. The crop according to Modi and Mabhaudi (2016) is also cultivated, to a lesser extent, in the sub-tropical and tropical regions of Mpumalanga and Limpopo provinces. Though the crop remains unpopular and not well known outside KwaZulu-Natal and Eastern Cape provinces, where it is cultivated mainly for subsistence (Lewu et al., 2010), its recent introduction on the shelves by well-known retail food chains has suddenly increased the status of this traditional vegetable and staple food among South African consumers.

Despite the importance of cocoyam as a contributor to food security, scientific and economic research on it is scanty in South Africa, as well as in many other parts of the continent (Mare, 2009; Quaye et al., 2010). Furthermore, the production system is regarded as an informal production activity, managed outside conventional markets and economic channels. Yet, in the region, cocoyam contributes substantially to the food and income security of many rural households (Talwana et al., 2009). The same situation has been reported in West Africa, where Quaye et al. (2010) outlined the socioeconomic importance of the crop in Ghana, though the production is also beset with challenges such as lack of improved varieties for commercial production, post-harvest losses and marketing via informal channels.

Research related to the dominant channels used in marketing the cocoyam crop have not been comprehensively explored and remains a grey area in the literature. Though widely consumed among the population, its production is confined to smallholder and subsistent farmers; the crop is mainly sold at the farm gate and found within local, street or village markets. This study hence explored the marketing channel preference among smallholder cocoyam farmers within a rural area.

Study questions

To achieve the aim of this study, the following research questions were formulated.

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1. What are the demographic characteristics of the smallholder farmers' producing cocoyam?
2. How do these smallholder farmers rank the factors influencing their decision to produce cocoyam?
3. Which market channel(s) do smallholder farmers use to sell their cocoyam crop in the area?
4. What factors contribute to the identified market channel preference among these smallholder farmers?
5. What demographic and farm-specific features are influential in their market channel preference(s)?

Review of literature

The market outlet choice is an important farm household-specific decision by farmers to sell their produce through different channels for the purpose of generating higher returns (Shewaye, 2016). Marketing channel choice is often considered to be among the most complex and challenging decisions facing smallholder farmers (Ntimbaa & Akyoob, 2017), as they have to choose relevant market outlets based on proven utility maximization among existing alternatives, clear comparative advantages in bargaining and easy accessibility of the market channels for their farm products. However, the smallholder farmers' decision to select appropriate market outlets can be affected by various factors such as demographic, institutional, socio-economic and access to specific marketing outlets. Access to output markets is also directly linked with the agricultural incomes which play a pivotal role in smallholder farmer's livelihoods (Liu 2018).

The farmers decision to utilize a given market channel is often studied within a number of general frameworks, including a livelihoods approach, value-chain development, transaction costs and utility or profit maximization. Within these frameworks, smallholder farmers are often regarded as economic agents whose market channel choices can be measured by perceiving utility or net benefits from any chosen option. While utility is not observed directly from the actions of economic agents, it can nonetheless be observed through choices made. Markets are also considered very important within the subsistence strategy of rural households (Otekunrin et al. 2019). Due to this, market channel choices among farmers have been studied based on the specific agricultural product, crop or livestock. Thus, the marketing channel preferred by a specific group of farmers may differ based on crop or livestock type, while the determinant factors for channel choice may also be different.

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Among smallholder farmers, the marketing of agricultural commodities remains a challenge (Umberger et al., 2015), whereas reliable and ready markets serve as an incentive for producers to increase their farm outputs. High transaction costs associated with formal markets have been reported, considering the need for farmers to comply with stringent quality standards and volume requirements (Nxumalo et al., 2019). By developing the capacity to sell to an institutional buyer, smallholder farmers may acquire the knowledge, skills and confidence needed to engage with formal markets. Empowering these farmers through commercial opportunities require an understanding of the drivers of farmers' marketing channel choices, the available marketing options, the characteristics of each channel, and the tradeoffs inherent in the selection of a marketing strategy (Amani, 2014). Past studies have revealed that informal markets are more accessible than formal markets and the produce price was a major determinant of market channel choice. Where smallholder farmers receive better prices from informal markets, Zivenge and Karavina (2012) averred that these markets offer greater prospects for the development of communal farmers, as it contributes positively to rural welfare, household incomes and livelihoods. Smallholder farmers may also engage in transactions offering lower prices, resulting from their lack of storage facilities and to avoid transaction costs associated with searching for higher prices (Adeoti et al. 2014; Osmani et al. 2015).

The majority of trade that links small-scale producers and low-income consumers in developing and emerging economies is informal. In addition, any market links, whether to street markets or at the farm-gate, has long term importance for the development of smallholder farmers, and for strategies aimed at reducing poverty and hunger. An identification of the market channels which are beneficial to local smallholder farmers is therefore considered very important among development practitioners (Seville et al., 2011). While there are competing narratives about market context for smallholder farmers, their role in local food security has been widely recognized.

Smallholder farmers use several strategies to secure their livelihoods, with a view to ensuring that their food requirements are met, while they generate enough income for their immediate consumption needs, other social purposes and farm investments. Hence, interaction with agricultural markets is an essential part of these strategies. Markets are where, as producers, smallholders buy their agricultural inputs and sell their products; they are where, as consumers, smallholders use income from the sale of crops or from their non-agricultural activities to buy food and other consumption goods. Improved market access, therefore, is not only important for

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better-off producers or for the production of cash crops rather than food crops; it is also very important for smallholder farmers (IFAD, 2003).

In the development literature, resource-constrained people adopt informality as a choice to secure their livelihoods and food security, despite the evolution of markets towards formality. The debate around participation of smallholder farmers in the mainstream economy and rising world food prices has been a subject among scholars and policy makers, but it now has a topicality and urgency for two reasons. Firstly, in development policy there is presently much higher expectations of the formal private sector to act as an engine of development. At a time of renewed concerns about food security due to rising food prices, resource constraints, climate change, urbanization and growing population, there has been much policy focus on linking smallholder farmers with modern value chains and other formal markets. Secondly, there is a policy and intellectual bias against informality that has taken shape in recent times. Informality is now often viewed as a deadweight that reproduces poverty and impedes the development of the private sector (OECD 2009). The dominant globally accepted models for development of small-scale producers are focused on market-inclusion approaches within the value chain development.

Vorley (2013) asserts that for some farmers, especially smallholders in rural areas, when formality is neither affordable nor viable, embracing the informal sector may not be a choice at all; and furthermore, not participating in high-value formal chains is not always a question of exclusion. Some producers make a conscious decision not to become involved because, in comparison to informal channels, the entry costs and barriers are too high while the rewards are considered too low. Baipheti and Jacobs (2009) hence, noted that subsistence or smallholder production can increase food supplies and thus cushion households from food price shocks, thereby improving their household food security. The dominant narrative regarding formal market-inclusion for smallholders have also been questioned (Nxumalo et al. 2019), as smallholder farmers may exhibit subjective attitudes where their personal preferences drive reluctance to engage with certain market sources. When price received is not the only factor explaining smallholder farmers' choice of market channels, and the personal relationships involved, including issues of perception and trust are prominent; then their marketing channel preferences matter for the question of whether they participate, or do not, in formal supply chains.

There are typically three most common marketing destinations for the produce of smallholder farmers, namely fresh produce markets, informal markets and supermarket chains**.** We extract from the literature, core reasons why informal markets may present the most viable and attractive option for smallholder or subsistence farmers, especially in rural communities. Firstly,

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supermarkets are supposedly making foods available at lower prices than informal vendors in local markets because of their economies of-scale advantages in procurement. Secondly, competitors for the local demand, especially wholesale traders who operate fresh produce markets have often been forced out of business, because they are unable to compete against the pricing of these large supermarket retailers. While the implications for consumers may appear to be positive, the consequences for smallholder farmers are, on the whole, more negative than positive. And finally, farmers with secured market outlets have been noted to be less likely to produce for self-consumption (Yemeogo et al., 2018), which is a potent risk to their household food security.

A market channel describes the movement of agricultural produce from the farm to consumers (Mbaga 2012), and there is no universally accepted set of marketing channels. Various studies related to the market channel choice among smallholder farmers have classified the available market channels under different categories. Some consider it as a choice between informal and formal market channels (Kawala et al., 2018; Mafukata 2015), a direct or indirect sale to various intermediaries and users (Donkor et al. 2018), while others have studied these channels through exploring the various value-chain actors and structures (Benmehaia 2019), or compared the institutional and technical factors involved (Panda & Sreekumar, 2012). Irrespective of the classification used, the choice of a market channel depends on a multitude of composite and inter-dependent factors, ranging from the economic, personal and social, to the technical, political and institutional.

An understanding of market channel choices among smallholder farmers is important due to the prevailing economic and social policy direction, where many interventions seek to encourage the participation of smallholder farmers in formal markets or supply to modern value chains (Olofsson, 2020). While there is an implicit assumption of enthusiasm among smallholder farmers in this regard, empirical evidence from related studies, such as this, could provide useful insights into the market channel preference among specific groups of smallholder farmers.

Methodology

Study area:

Mbizana is a rural area located in the north eastern part of the Eastern Cape Province, within the Pondoland in the former Transkei homeland, and a recent municipal boundary adjustment locates the Mbizana local municipality within the Alfred Nzo district. Bizana lies on latitude 31.567 and longitude 29.400 with an estimated area of 2806 km2, along the coastal belt of the Eastern

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Pondoland. It has a temperate climate, characterized by fertile soils and frost-free conditions, with an annual rainfall of 700mm per annum and considered as one of the highly populated local municipal areas within the district. It is wedged between rivers umTentu to the south and umTamvuna to the north, forming the northern boundaries of the Eastern Cape Province with the Kwazulu Natal province (Nwafor & Westhuizen, 2020). Dominated by grasslands, settlements are loosely scattered throughout the area and are surrounded by arable grazing land.

Data collection, sampling and delimitation:

A questionnaire was used for the target population of the study and sections of the questionnaire captured demographic characteristics, production and produce marketing information. The questionnaires were pre-tested and adjustments made to produce a study instrument deemed appropriate for the objective of this study.

Farmer interviews and data collection was carried out using a purposive sampling technique, based on a list of farmers provided by the Department of Agriculture in the Bizana District Office. Using a snowball approach, a total of 174 farmers were interviewed; this number was based on the calculated sample size required. The choice of respondents or study population is hereby delimited, as the sample consists of smallholder farmers selected purposively using convenience sampling. The geographical area of the study is also limited to the Mbizana local municipality of the Eastern Cape Province.

Data analysis:

Descriptive statistics and quantitative methods were used to analyze the collected data. Descriptive analysis consists of frequency distribution values of the parameters of interest, with the results presented in tables. Though simple descriptive methods provide vital information regarding observed trends in behavior, it does not provide much needed insights into complex relationships which influenced the observed trend. This study therefore, also used a quantitative econometric analysis to explore the smallholder farmers' choice of marketing channels.

For the quantitative analysis, the study used a multinomial regression to test for variables significant in market channel preference among the study population. A number of studies related to market channel choice among farmers have considered it as a choice between two sources, either formal or informal markets, and hence modeled it as the function of either outcome. These studies such as that by Sikawa and Mugisha (2010), as well as Kwakwa et al. (2013), hence used binomial logit or probit models, combining several market outlets in order to make the dependent variable a binary outcome. For problems involving the choice among three

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or more categories, the multinomial logit technique is most often employed; and other studies that have utilized this technique include Ayuya et al. (2012), Murage (2010), as well as Jari and Fraser (2009). The study also collected data of market selection decision using methods based on the revealed preference among respondents.

Empirical model

The multinomial logit is an econometric model applicable when the dependent choices are more than two, as in this study, and this approach analyzes the choice of market on the premise of individual decision maker rather than the choice itself, it determines the determinants of choice. Multinomial logit model is considered the best approach for choices that are based on the attributes of the decision maker and used in studies exploring the market channel choices among smallholder farmers.

The study assumes that the individual has preferences defined over a set of alternatives, and choice of a given marketing outlet is discrete since it is chosen among other alternatives (Greene 2012). The choice variable (dependent) has more than two unordered options, while the independent variables have both features of the alternatives as well as the characteristics of the individual farmer. In the model (which assumes a decision to sell), the utility of a household ί choosing market channel j is given by Uij, and is a linear stochastic function of exogenous household characteristics and endogenous household choices.

Where; $$U_{ij} = \beta^{i} X_{ij} + \varepsilon_{ij} \quad (1)$$

Noting the limitations in the multinomial logit model, we utilize the probability function to show that farmers choice of a particular market channel U_{ij} is the largest utility among other j utilities, and the probability that this specific market channel will be chosen by most farmers is given by;

$$\text{Prob}\,(U_{ij} > U_{ik}) \text{ for all other } k \neq j \quad (2)$$

P_{ij} represents the probability of choosing a given market outlet by the farmer as shown in the equation.

$$P_{ij} = \beta_o + \beta_1 X_1 + \beta_2 X_2 \ldots\ldots\ldots\ldots\ldots \beta_n X_n + \varepsilon \quad (3)$$

Where ί could take a value from 1, 2 and 3 (representing the market channel of choice i.e. farm-gate sales, informal retailers and formal dealers), $X_1 \ldots X_n$ are the independent variables affecting

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choice of a given market channel; β_0 is the constant term or intercept, $\beta_1....\beta_n$ are estimated factors, while ε represents the random error. Assuming ί alternatives, the probability of choosing any market outlet by the farmer j, having computed the log odd ratios and marginal effects determined by differential probabilities, is given by the following equation;

$$P_{ij} = \beta_o + \beta_1 age + \beta_2 gender + \beta_3 education + \beta_4 exp + \beta_5 farmsize + \beta_6 hhsize + \beta_7 distance + \beta_8 labour + \beta_9 addincome + \beta_{10} coopmember + \beta_{11} price + \varepsilon \quad (4)$$

The identified variables expected to influence market channel choice among the rural farmers included in the model are age, gender, education, farming experience, size of farm, number of persons in farmers' household, distance to market, use of casual labor, additional income source, membership of a cooperative and amount received. These variables and their measurement including the expected sign are shown in Table 1.

Table 1. Variables in the determinants of smallholders market channel choice.

Variable (type)	Code	Description	Measurement	Expected sign
Market channel (dependent)	MrkChan	Choice of marketing channel used by farmer	1=own sales 2= informal retailer 3=formal dealers	None
Age (independent)	Age	Age of farmer	Years	+/-
Gender	Gndr	Gender of farmer	0= male 1= female	+
Education	Edu	Level of education attended	Years	+
Experience	Exp	Farming experience	Years	+
Farm size	Frmsz	Size of farm	Hectares	+
Household size	Hhsz	Number of persons in household	Units	-
Distance	Dist	Distance to local market	Km	-
Additional income	Addinc	Other income source	0=No 1=Yes	-
Labour	Labr	Use paid casual labour	0=No 1= Yes	+
Cooperative member	Coopmem	Membership of a farmer cooperative	0=No 1=Yes	+
Price	Amt	Amount received from sales	Rands	+

Source: Researcher's own tabulation 2018

The choice of a market channel is independent of other market alternatives, as the farmer may sell produce using more than one channel in the same period. Simultaneous estimation normally

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resolves this problem, and by using a multinomial regression model, different combinations of the independent variables were used in determining the factors associated with market channel of choice among respondents. Since correlation of predictors in the regression was likely, the variance inflation factor was checked (greater than 1 but less than 4) to ensure absence of, or minimal multi-collinearity.

Results and Discussion

Demographic characteristics of respondents

The study focused on specific characteristics of the respondents including their gender, age, level of education, farming experience, household size, farm size and distance to market. The focus was chosen due to its prominence in the reviewed literature related to market channel choice among smallholder farmers. The personal features of the respondents are shown in Table 2.

Table 2. Respondents demographic characteristics

Variable		Frequency (n=174)	Percent (%)
Gender	Male	54	39
	Female	120	61
Age	35 or less	15	9
	36 – 45	42	24
	46 – 55	78	45
	56 or more	39	22
Education	0	12	7
	5 or less	24	14
	6 – 12	126	72
	More than 12	12	7
Farming experience	5 or less	39	23
	6 - 10	51	29
	11 - 20	63	36
	More than 20	21	12
Farm size	Less than 1	69	53
	1-2	84	35
	More than 2	21	12
Household size	1- 4	39	23
	5-8	84	48
	9 and above	51	29
Distance to market	Less than 10 km	54	31

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	10km and more	120	69

Source: Researcher's questionnaire survey 2018

From the survey, 61% of respondents were female and 39% male, age bracket of respondents varied with 9% of respondents between 35 years or less, 24% of respondents were aged 36-45 years, about 45% were between 46-55 years, and 22% were 56 years and above. Only 7% of the respondents had completed high school, 7% did not attend any school, while 72% had between 6-12 years of schooling. On average, the respondents had about 14 years of farming experience, with 23% farming for about five years, and another 23% of the respondents farming for more than twenty years. The minimum and maximum farming experience was 3 years and 40 years respectively. More than half (53%) of respondents had farm size less than 1 hectare, while 35% of respondents had between 1 and 2 hectares, and 12% had more than 2 hectares of farmland. Furthermore, 23% of respondents had four persons or less, 48% had between five and eight persons, and 29% had more than nine persons in their household respectively. The distance to local markets was less than ten kilometers for 31% of respondents, and more than ten kilometers for 69% of the survey respondents.

Factors influencing farmers' cocoyam production decision and ranking of factors

The respondents were asked to identify and rank various factors which influence their decision to produce cocoyam within the area, and the number of responses for each factor summed to produce a ranking as shown in Table 3.

Table 3. Ranking of factors influencing respondents to produce cocoyam.

Factors	Respondents (%)	Ranking
Returns from sale of the produce	40	1
Available local market for the produce	32	3
Home consumption of the produce	20	2
Low cost of inputs (no seeds or fertilizer)	5	4
Easy to cultivate (no mechanization involved)	3	5

Source: Respondents survey 2018

From Table 3, the financial return made from the sale of cocoyam was identified by 40% of respondents as the key factor which influenced their production decision. Also, 32% of respondents were of the view that an available market for the sale of the produce was the key factor that influenced their decision. Approximately 20% of respondents placed greater emphasis on home consumption of the produce, while 5% considered the low cost of inputs and 3% noted

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ease of cultivation, as the key influence for their cocoyam production decision. From the five identified factors, returns from sale, the availability of a market for the produce, home consumption, low cost of required inputs and ease of cultivation of the crop were ranked in the order shown.

Farmers in the study placed greater importance on the financial returns from their crop production activities. This is shown by their ranking of the returns from sale and the availability of a market for their produce as more important, than home consumption of the produce. The cost of the required inputs and ease of cultivation ranked fourth and fifth respectively.

Market channel preference and ranking

Smallholder farmers generally market their produce through different channels, and the survey asked respondents if they had sold the produce using any of the channels identified in Table 4. These channels were then ranked based on the number of respondents involved.

Table 4. Ranking of market channel used by farmers

Respondents preferred marketing channel (n=174)	Yes (%)	No (%)	Ranking
Farm-gate (own sales to consumers)	89	11	1
Informal retailers	28	72	2
Fresh produce wholesalers	12	88	3
Supermarket chain	8	92	4
Others (aggregators, processors)	3	97	5

Source: Respondents survey 2018

As shown in Table 4, about 89% of respondents sold directly to consumers while 11% did not use this channel. Also, 28% of respondent sold to informal retailers while 72% have not used this channel, 12% sold to local grocers and 88% did not. Only 8% preferred selling to chain stores as 92% did not prefer this channel, and 3% sold to processors or aggregators with 97% not making sales through this channel. Direct sales by farmers was ranked number one preference, sales through informal retailers was ranked second, local grocer shops ranked third, with supermarket chain ranking fourth followed by aggregators / processors ranked fifth.

Perception of factors in market channel preference among respondents

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Factors considered as affecting the market channel preference of smallholder farmers were listed, and respondents requested to indicate if they agreed, disagreed or were undecided about each of the factors. The total number of respondents and their percentage under each factor heading was tabulated and presented in Table 5.

Table 5. Perception of respondents about factors related to market channel preference

Factors considered by farmers (n=174)	Agree		Disagree		Undecided	
	n	%	n	%	n	%
Price received for produce	156	90	18	10	0	0
Farmers experience of market	111	65	42	25	18	10
Competition among marketers	78	45	90	50	9	5
Cost of transporting produce	132	75	24	15	18	10
Distance to available market	138	80	36	20	0	0
Immediate payment for produce	165	95	9	5	0	0
Volume produced by farmer	87	50	60	35	27	15
Personal relationships with buyers	69	40	87	50	18	10

Source: Respondents survey 2018

The Table 5 indicates that 90% of respondents agree that price received for produce was a factor in market channel choice, while 10% of respondents disagree. The first and most obvious potential economic incentive for participating in a particular marketing channel is the expected or actual output price received by the farmer. Some have however, suggested that price differences may not be the main factor explaining farmers' marketing choices. Also 65% of respondents agree that prior experience of the market contributes to market channel choice among farmers, 42% of respondents did not agree while 18% of respondents were undecided.

Competition among marketers was not considered as contributing to market channel choice among 50% of respondents, though 45% agreed and 5% were undecided. The cost of transporting produce was agreed by 75% of respondents to contribute to their market channel choice, while 24% disagree and 18% were undecided. Linked to this, 80% of respondents agree and 20% of respondents disagree, that distance to available markets contribute to market channel choice. Cost of transporting produce to market is invariably linked to distance involved, and it is generally perceived as a constraint which increases transaction costs for farmers.

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Most farmers expect to receive immediate payment for their produce at the market, and this is agreed by 95% of respondents while only 5% of respondents disagree. The issue of immediate payments has been noted as a reason why many smallholder farmers do not enter into supply agreements, or other forms of market contracts where they have to defer receipt of payments for produce. The volume of crops produced was also listed as a factor contributing to market channel choice among farmers, and 50% of the respondents agree while 35% disagree with the statement, though 15% of respondent were undecided. From the survey, 55% of respondents agree that personal relationships with buyers contributed to market channel choice, though 35% of respondents disagree and 10% were undecided.

The findings from the survey indicate among others, that smallholder farmers prefer market channels where they get a better price and do not have to incur high transport costs or travel long distances to market their produce. It also suggests that farmers prefer to receive immediate payments for produce, and the choice of market channel could be linked to volume produced while many respondents consider personal relationships with buyers as an important factor.

Farmer and farm specific factors influencing market channel choice

The result from the multinomial logit regression provides the estimated coefficients and the marginal effects of the independent variables in the model as shown in Table 6. The values measure the expected change from a unit change in each of the independent variables, and the sign of the coefficient indicates the direction of influence of the variable on the market channel choice. The p-values were tested at the 5% significance level, thus p-values less than, or equal to, 0.05 indicate sufficient evidence supporting the claims presented by the coefficient.

Table 6. Empirical results of the determinants of market channel choice

Market Channel Choice	**Own sales farm-gate**		**Informal retailers**		**Formal wholesalers**	
Independent Variables	**Coef.**	**P-value**	**Coeff**	**P-value**	**Coef.**	**P-value**
Age	0.140	0.044*	1.268	0.084	0.209	0.161
Gender	0.016	0.985	0.036	0.145	0.006	0.130
Education	-0.388	0.073	-1.323	0.091	-0.218	0.032*
Farm Experience	0.134	0.367	1.182	0.059	0.195	0.022*
Farm size	-2.847	0.294	-1.075	0.046*	-0.177	0.007*
Household size	0.034	0.043*	-0.891	0.082	-0.147	0.068
Distance to market	-2.236	0.021*	0.287	0.618	0.047	0.620
Additional income	-1.756	0.017*	0.320	0.441	0.053	0.438
Use casual labour	0.176	0.677	0.732	0.086	0.121	0.043*
Cooperative membership	1.203	0.092	3.983	0.023*	0.656	0.018*
Price received	0.045	0.014*	0.087	0.006*	0.014	0.756

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Constant	-4.191	1.837	0.023
Prob > chi^2			0.000
Pseudo R^2	0.5716		
LR $chi^2(33)$	101.25		
Log likelihood	-73.93		

* indicates significance at 5% ($p<0.05$)

Age, size of household, distance to market, additional income and price received were significant variables among respondents who sold directly at the farm-gate. In the category of farmers who used the informal retailer channel, the farm size, cooperative membership and price received, significantly influenced this choice. Among respondents who utilized formal wholesale channels, education, farm experience, farm size, use of casual labour and membership of cooperative significantly influenced their market channel choice.

Age was significant within farmers making own sales at farm gate and may involve older farmers who are reluctant to engage with outside markets. Younger farmers are reported to be enthusiastic and eager to seek market opportunities wherever they are located. The adventurous nature of younger farmers is noted, whereby younger farmers sought urban markets which were far away from their rural farm locations, in contrast to older farmers' preference for closer rural markets within the proximity of their own farms. These market explorations also require both effective coordination and risk-taking, which are considered unfavorable traits among older farmers (Kyomugisha et al., 2019).

Across the market channels used by respondents in the study, gender was not found to be a significant influence on the chosen channel. Many studies that analyzed how gender affects agriculture and market participation have found unequal access to socio-economic opportunities among male and female farmers (Palacious Lopez and Lopez, 2015; Farnworth and Calverson, 2015; Me-Nsope and Larkin, 2016). The findings from these studies suggest that gender constraints may affect the market channel choice among women, who preferably utilize informal markets due to lower transaction costs (Olumeh et al. 2018). Gender represents differences in market orientation between male and female farmers and Reyes et al. (2012) posited that male farmers were better resourced, more likely to sell produce, owned productive assets and had more access to extension services.

Education was found to be significant among farmers who used the formal wholesale market channel. Education improves the sourcing and interpretation of market information, hence influencing the level of market participation (Jari and Fraser, 2009). It is assumed to enhance the farmer's ability to access and process information, thereby facilitating understanding of

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contractual requirements and supply agreements inherent in formal market channels. The wording of contracts sometime requires literacy and may discourage non-literate smallholder participation. Kassaw et al. (2019) averred that education increases the farmer's level of productivity, which in turn improved and strengthened linkages with formal wholesalers. When farmers are educated, they become aware of the value of their produce, and hence their likelihood to participate in informal markets is reduced.

Farm experience was determined by the number of years spent in farming and considered as a direct indicator of production knowledge including expertise in producing the crop. The variable for farm experience was significant for formal market channel. The experienced farmers would have built up contacts in different market channels, and is able to meet the often stringent requirements in the formal market channel. This may also imply that inexperienced farmers have not created market networks with other buyers in the formal channel. However some studies (Muthini et al., 2017) have reported that the farming experience did not significantly affect choice of market channel.

Farm size is closely related to the quantity produced implying that farmers with larger farm sizes produced more crop output, and require market channels that can absorb the output. The farm size was significant for informal retailer and formal wholesaler channels. This could imply that farmers with greater crop output are unable to sell all their produce directly to consumers at farm-gate, necessitating use of other market channels.

Household size was significant in own sales (direct farm-gate) market channel in this study. The size of households significantly influences farmer's choice of market channel, as it affects their production and consumption patterns. While some suggest that large household size positively assisted the farmer in selling produce either at farm-gate or the local market, others argue that large households encourage consumption with less marketable surplus, or facilitates search for more profitable market options rather than selling at farm-gate (Mango et al., 2018; Sunga, 2011).

Distance to market was significant but negatively influenced own sales at farm-gate, and was not significant for the other market channels. Past studies show that the farther away the farmer was located, the less produce they brought to the market, and made more sales at the farm-gate (Tura & Hamo, 2018). Also, the greater the distance to the market, higher transportation costs and lower net benefits accrue to the household (Adugna et al. 2019), which reduces the effective price farmers receive for their outputs or produce (Buckmaster, 2012). Transaction costs are

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associated with distance to market and are important covariates in the marketing decision; therefore a direct relationship exists between distance to market and selling at farm-gate.

Additional income source was found significant among farmers using own sale at farm-gate market channel. Related studies have shown that farmers with an additional source of income were less likely to sell at farm-gate. This was because these farmers were not cash-constrained and could delay sales and seek for better prices. Contrarily, cash-constrained farmers sold at farm-gate even at the risk of lower prices in order to meet their urgent financial needs.

Use of casual labor was significant among formal wholesale market channel in the study, though it was not significant for other channels. This might be connected to the volume of produce and farm size of the farmers involved. The casual labour used may also be necessary to meet the requirements of formal markets, either during the harvest, cleaning, packing and transportation of produce for the market.

Cooperative membership was also found to be significant for informal retailer and formal wholesale market channels in this study. Cooperatives are considered as a marketing channel used by members (Liu et al., 2018), and this study agrees with Hao et al. (2018) who reported a positive influence of cooperative membership in farmers decision to participate in wholesale market channels. Membership of a cooperative is universally understood to provide market access, improve bargaining power and reduce transaction costs for members (Alho, 2015), which are essential to obtain benefits from formal wholesale market channels.

Price received for produce was significant in the own sale (farm-gate) and informal retailer market channels in this study. Price received from produce has been noted to be a driving factor among smallholder farmers, as rational producers seeking to maximize their net returns, who choose marketing channels with relatively higher price. Though price received was not found to be a significant variable in the formal wholesaler market channel, it could be assumed that crop volumes and stable supply agreements in the formal channels compensate for any price differentials across marketing channels. Price received translates to income for the farmer, and may be determined by the choice of marketing channel (Khapayi & Celliers, 2016).

Conclusion

This study shows that there are more female smallholder farmers in the area than males, and most of the smallholder farmers were advanced in age, mostly above 46 years, with few having attained more than a high school education. Many were cultivating less than one hectare of land, had an average of fourteen years of farming experience and located less than ten kilometers to

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the local market centre. The expected financial returns from the crop, the availability of a market for the produce and contribution to home consumption were the main factors influencing the farmer's decision to grow the cocoyam crop. Other factors considered were the low cost of inputs and also the ease of cultivating the crop.

Most of the smallholder farmers sold their produce directly to local consumers at their farm-gate, while few sold to local retailers, fresh market wholesalers, chain stores and other aggregators or processors. The amount received was the major factor contributing to their market channel preference, as well as immediate payment for the produce. Other factors considered for choosing this market channel was the distance to other markets, cost of transportation and their experience using the market channel.

The study shows that smallholder cocoyam farmers in the study area mainly used the own sales (farm-gate) market channel , followed by informal retailers market channel and compares with a number of other findings regarding smallholder farmers in South Africa. Farmers choose their preferred market channel from several possible options, which is based on envisaged financial returns, their comparative advantage in bargaining and closeness of market channels. Different socio-economic characteristics of the farmers determined their choice of various market channels and among the majority that sold directly at their farm-gate, the variables influencing their choice was age, size of household, distance to market, additional income and price received. Gender was not found to be significant in influencing the market channel choice among the smallholder cocoyam farmers within the study area.

Based on the findings from this study, it is recommended that adequate market information be provided to the smallholder farmer, through existing sources such as extension officers, community boards and farmer associations. The market information should include current price offered by other market channels or agents, as the amount received was found to significantly influence the smallholder's market channel choice. The study also recommends strengthening farmer cooperatives in the area which will improve the collective bargaining power of the farmers, as well as their access to formal value-chains.

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Reference

Adeoti, A.I., Oluwatayo, I.B. and Raheem O.S. 2014. Determinants of Market Participation among Maize Producers in Oyo State, Nigeria. *British Journal of Economics, Management and Trade*, Vol. 4(7): 1115-1127.

Adugna, M. Ketema, M. Goshu, D., Debebe, S. 2019. Market Outlet Choice Decision and its Effect on Income and Productivity of Smallholder Vegetable Producers in Lake Tana Basin, Ethiopia. *Review of Agricultural and Applied Economics*, 1: 83-90. DOI: 10.15414/raae.2019.22.01.83-90.

Alho, E. 2015. Farmers' self-reported value of cooperative membership: evidence from heterogeneous business and organization structures. *Agricultural and Food Economics* (2015) 3:23 DOI 10.1186/s40100-015-0041-6

Amani, S. 2014. Smallholder Farmers' Marketing Choices. P4P Global Learning Series. Prepared for the World Food Programme (WFP), by Management Systems International (MSI).

Ayuya, O., Waluse, S. and Gido, O. 2012. Multinomial logit analysis of small-scale farmers' choice of organic soil management practices in Bungoma County, Kenya. *Current Research Journal of Social Sciences,* Vol. 4(4): 314-322.

Azeez, A.A. and Madukwe, O.M. 2010. Cocoyam production and economic status of farming households in Abia state, South-East, Nigeria. *Journal of Agriculture and Social Science*, Vol. 6(1): 83–96.

Baiphethi, M. and Jacobs, P. 2009. The Contribution of Subsistence Farming to Food Security in South Africa. *Agrekon*, 48(4): 459-482.

Boakye-Acheampong, S., Ohene-Yankyera, K., Aidoo, R. and Sorensen, O.J. 2017. Is there any economics in smallholder cocoyam production? Evidence from the forest agro-ecological region of Ghana. Agriculture and Food Security (2017), 6:44. DOI 10.1186/s40066-017-0121-9.

Buckmaster, A. D. 2012. Going the distance: The impact of distance to market on smallholders' crop and technology choices. Doctoral dissertation, Virginia Tech. University. USA.

Benmehaia, M.A. 2019. Farmers' Income Risks and Marketing Channel Choices: Case of Date Palm Processing in Biskra, Algeria. *New Medit*, Vol. 18(3): 47-58.

Donkor, E., Onakuse, S., Bogue, J. and Rios-Carmenado, I. 2018. Determinants of farmer participation in direct marketing channels: A case study for cassava in the Oyo State of Nigeria. *Spanish Journal of Agricultural Research,* Vol. 16(2): 1-17.

Farnworth, C. and Colverson, K. 2015. Building a Gender-Transformative Extension and Advisory Facilitation System in Sub-Saharan Africa. *Journal of Gender, Agriculture and Food Security*, Vol. 1(1): 20-39.

Food and Agriculture Organization, 2012. FAO statistical yearbook. World food and agriculture. Rome, Italy: Food and Agriculture Organization of the United Nations.

Greene, W. 2012. Econometric Analysis, 7th Edition. Prentice Hall, Upper Saddle River, New Jersey.

Hao, J., Bijman, J. Gardebroek, C. Heerink, N. Heijman, W. and Huo, X. 2018. Cooperative membership and farmers' choice of marketing channels – evidence from apple farmers in Shaanxi and Shandong Provinces, China. *Food Policy* 74: 53-64.

International Fund for Agricultural Development, 2003. Promoting Market Access for the Rural Poor in Order to Achieve the Millennium Development Goals'. IFAD Discussion Paper. Rome, IFAD.

Jari, B. and Fraser, G. 2009. An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat-River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research,* 4(11): 1129-1137.

Kassaw, H.M., Birhane, Z. and Alemayehu, G. 2019. Determinants of market outlet choice decision of tomato producers in Fogera woreda, South Gonder zone, Ethiopia. *Cogent Food and Agriculture*, 5(1). Available at https://doi.org/10.1080/23311932.2019.1709394 (Accessed on 12/01/2020).

Kawala, M., Hyuha, T.S., William, E., Walekwa, P., Elepu, G. and Kalumba, S.C. 2018. Determinants for Choice of Fish Market Channels: The Case of Busia (Uganda/Kenya) Border. *Journal of Agricultural Science*, Vol. 10 (8): 118-124.

Khapayi, M. and Celliers, P.R. 2016. Factors limiting and preventing emerging farmers to progress to commercial agricultural farming in the King William's Town area of the Eastern Cape Province, South Africa. *South African Journal of Agricultural Extension*, Vol. 44(1): 25-41.

Kwakwa, P., Wiafe, D. and Hamdiyah, A. 2013. Households Energy Choice in Ghana. *Journal of Empirical Economics,* 3(1): 96-103.

Kyomugisha, H., Nuppenau, E. and Mugisha, J. 2019. Market channel options for smallholders in dual markets: A case of organic pineapple farmers in Uganda. *Journal of Development and Agricultural Economics*, Vol. 11(8): 186-196.

Lewu, M.N., Adebola, P., and Afolayan, J.A. 2010. Comparative assessment of nutritional value of commercially available cocoyam and potato tuber in South Africa. *Journal of Food Quality* 33(4): 461 – 476.

Liu, Y. 2018. Determinants and impacts of marketing channel choice among cooperatives members: Evidence from agricultural cooperative in China. 30th International Conference of Agricultural Economists. July 28-August 2, Vancouver, Canada.

Liu, Y., Ma, W., Renwick, A. and Fu, X. 2018. The role of agricultural cooperatives in serving as a marketing channel: evidence from low-income regions of Sichuan province in China. *International Food and Agribusiness Management Review,* (in press) DOI: 10.22434/IFAMR2018.0058.

Mafukata, M. 2015. Factors Having The Most Significance on the Choice and Selection of Marketing Channels Amongst Communal Cattle Farmers in Vhembe District, Limpopo Province. *Journal of Human Ecology*, Vol. 19(1): 77-87.

Mare, Rorisang 'Maphoka. 2009. TARO (COLOCASIA ESCULENTA L. SCHOTT) Yield and Quality Response to Planting Date and Organic Fertilisation. Unpublished PhD thesis. University of Kwa-zulu Natal, South Africa.

Mango, N., Makate, C., Francesconi, N., Jager, M. and Lundy, M. 2018. Determinants of market participation and marketing channels in smallholdergroundnut farming: A case of Mudzi district, Zimbabwe. *African Journal of Science, Technology, Innovation and Development,* Vol. 10(3): 311-321.

Mbaga, M.D. 2012. Date Marketing. In: Manickavasagan A., Mohamed Essa M., Sukumar E. (eds), *Dates: Production, Processing, Food, and Medicinal Values*. Boca Raton (FL): CRC Press.

Me-Nsope, N. and Larkins, M. 2016. Beyond crop production: Gender relations along the pigeon pea value chain and implications for income and food security in Malawi. *Journal of Gender, Agriculture and Food Security,* Vol. 1(3): 1-22.

Modi, A.T. and Mabhaudhi, T. 2016. Developing a research agenda for promoting under-utilised, indigenous and traditional crops. Water Research Commission Report No. KV 362/16. Available at www.wrc.org.za/wp-content/uploads/mdocs/KV362_172.pdf (Accessed on 05/12/2019).

Muthini, D.N., Nyikal, R.A. and Otieno, D.J. 2017. Determinants of small-scale mango farmers' market channel choices in Kenya: An application of the two step Cragg's estimation procedure. *Journal of Development and Agricultural Economics*, Vol. 9(5): 111-120.

Ntimbaa, G.J. and Akyoob, A.M. 2017. Factors Influencing Choice Decision for Marketing Channels by Coffee Farmers in Karagwe District, Tanzania. *Global Journal of Biology, Agriculture and Health Sciences,* Vol. 6(2): 1-10.

Nwafor, C.U. and van der Westhuizen, C. 2020. Prospects for Commercialization among Smallholder Farmers in South Africa: A Case Study. *Journal of Rural Social Sciences*, 35(1): Article 2. Available At: https://egrove.olemiss.edu/jrss/vol35/iss1/2. (Accessed on 10/01/2020).

Nxumalo, K.K., Oduniyi, O.S., Antwi, M.A. & Tekana, S.S. 2019. Determinants of market channel choice utilised by maize and sunflower farmers in the North West province, South Africa. *Cogent Social Sciences,* Vol. 5, DOI: 10.1080/23311886.2019.1678451

Organization for Economic Cooperation and Development (OECD). 2009. Promoting Pro-Poor Growth: Employment. Available at https://www.oecd.org/greengrowth/green-development/43514554.pdf. (Accessed on 10/12/2019).

Olofsson, M. 2020. Socio-economic differentiation from a class-analytic perspective: The case of smallholder tree-crop farmers in Limpopo, South Africa. *Journal of Agrarian Change*, Vol. 20(1): 37-59.

Olumeh, D.E., Adam, R., Otieno, D.J. and Oluoch-Kosura, W. 2018. Characterizing Smallholder Maize Farmers' Marketing in Kenya: An Insight into the Intra-Household Gender, Wealth-Status, Educational and Credit Access Dimensions. *Journal of Marketing and Consumer Research*, Vol. 48 (2018).

Onyeka, J. 2014. Status of Cocoyam (Colocasia esculenta and Xanthosoma spp) in West and Central Africa: Production, Household Importance and the Threat from Leaf Blight. Lima (Peru). CGIAR Research Program on Roots, Tubers and Bananas (RTB). Available online at: www.rtb.cgiar.org

Osmani, A.G. and Hossain, E. 2015. Market Participation Decision of Smallholder Farmers and Its Determinants in Bangladesh. *Economics of Agriculture*, Vol. 62(1): 163-179.

Otekunrin, O.A., Siaka, M. and Ayande, I.A. 2019. Smallholder Farmers' Market Participation: Concepts and Methodological Approach from Sub-Saharan Africa. *Current Agriculture Research*, Vol. 7(2): 139-157.

Panda, R.K. and Sreekumar, S. 2012. Marketing Channel Choice and Marketing Efficiency Assessment in Agribusiness. *Journal of International Food and Agribusiness Marketing*, 24: 213–230. DOI: 10.1080/08974438.2012.691812.

Palacios-Lopez, A. and Lopez, R. 2015.Market imperfections exacerbate the gender gap: The case of Malawi. World Bank Policy Research Working Paper, Number 7300.

Ramanatha, R. V., Matthews, P. J., Eyzaguirre, P. B. and Hunter, D. 2010. The global diversity of taro: Ethnobotany and Conservation. Rome, Italy: Biodiversity International.

Quaye, W., Adofo, K., Agyeman, K.O. and Nimoh, F. 2010. Socio-economic survey of traditional commercial production of cocoyam and cocoyam leaf. *African Journal of Food Agriculture, Nutrition and Development,* Vol. 10(9): 4060-4078.

Reyes, B., Donovan, C., Bernsten, R. and Maredia M. 2012. Market participation and sale of potatoes by smallholder farmers in the central highlands of Angola: A Double Hurdle approach. Paper presented at the International Association of Agricultural Economists (IAAE) Triennial Conference, 18-24 August, 2012. Foz do Iguaçu, Brazil.

Shewaye A. 2016. Econometric analysis of factors affecting haricot bean market outlet choices in Misrak Badawacho District, Ethiopia. *International Journal of Research Studies in Agricultural Science,* Vol. 2(9): 6–12.

Seville, D., Buxton, A. and Vorley, B. 2011. Under what conditions are value chains effective tools for pro-poor development? Report for the Ford Foundation. Sustainable Food Laboratory & IIED.

Sikawa, G.Y. and Mugisha, J. 2010. Factors influencing south-western Uganda dairy farmers' choice of the milk marketing channel: a case study of Kirihura district south western Uganda. Research report series, No. 0856-9681

Sunga, C. 2011.Factors Influencing Bean Producers' Choice of Marketing Channels in Zambia. MSc thesis, University of Zambia.

Talwana, H.L., Serem, A.K., Ndabikunze, B.K., Nandi, J.O., Tumuhimbise, R., Kaweesi, T., Chumo, E.C. and Palapala, V. 2009. Production Status and Prospects of Cocoyam (Colocasia esculenta (L.) Schott.) in East Africa. *Journal of Root Crops*, 2009, Vol. 35(1): 98-107

Tura, E.G. and Hamo, T.K. 2018. Determinants of Tomato Smallholder Farmers Market Outlet Choices in West Shewa, Ethiopia. *Journal of Agricultural Economics and Rural Development*, Vol. 4(2): 454-460.

Umberger WJ, Reardon T, Stringer R, Loose SM, 2015. Market channel choices of Indonesian potato farmers: A best-worst scaling experiment. *Bulletin of Indonesian Economic Studies*, 51(3): 461-477.

Vorley, B. 2013. Meeting small-scale farmers in their markets: understanding and improving the institutions and governance of informal agrifood trade. IIED. London. Available at https://pubs.iied.org/pdfs/16548IIED.pdf Accessed on 12/11/2019.

Yameogo, Bossa, Torou, Fusillier et al., (2018) Socio-Economic Factors Influencing Small-Scale Farmers' Market Participation: Case of Rice Producers in Dano. *Sustainability* 2018, 10, 4354; doi: 10.3390/su10124354

Zivenge, E. and Karavina, C. 2012. Analysis of factors influencing market channel access by communal horticulture farmers in Chinamora District, Zimbabwe. *Journal of Development and Agricultural Economics*, Vol. 4(6), pp. 147-150