

Determinants of Market Information Accessibility among Smallholder Spice Farmers in Tanzania

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ABSTRACT

This study aimed at analyzing socio-economic factors influencing accessibility to market information among smallholder spice farmers in Tanzania, a case of Morogoro district. The study adopted a cross-sectional research design. Structured questioners were used for collecting quantitative data from 170 smallholder spice farmers at Morogoro District. STATA 16 was used to generate descriptive and inferential statistics. Data were analyzed using descriptive statistics and binary logic regression. Study findings show that variables like means of accessing news, electricity, education and ownership of mobile phones were positively and statistically significant ($p < 0.05$) associated with accessibility to market information. Again, age was positive and statistically significant ($p < 0.1$) associated with accessibility to market information. Other variables like sex of respondents, marital status, farm size, annual spice income, gender, transport ownership were not statistically significant influencing accessibility to market information. It is concluded that means of accessing news, education, electricity and ownership of mobile phones were the only factors that influence access to market information among smallholder spice farmers. It is recommended that the ministry for agriculture in Tanzania and other agriculture stakeholders should strengthen market information systems to smallholder farmers, improve electricity services in rural areas and introduce tax waivers on mobile phones.

Keywords: Government; Smallholder farmer; Accessibility; Market information

INTRODUCTION

Globally, accessibility to agriculture market information plays a significant role in supporting the agriculture market. Farmers with access to market information are in a better chance of creating profit than those with no access. Accessibility to market information in agriculture has been supported by the advancement in science and technology for example mobile phones, radio and television. There has been an increase in the use of means of accessing news by farmers in improving their agriculture activities and marketing globally.

Accessibility to market information is one of the important aspects that in one way or another support farmers to be informed on what to plant. It also helps farmers to know when to harvest and where to sell as well as decrease risks in market transactions. Literatures show when smallholder farmers are accessed with market information increases the chance of improving and increasing productivity. Accessibility to market information to smallholder farmers is crucial as it helps to improve farmers' economies [1-5]. Once farmers have access to information on transport costs as well the ongoing crop price, it helps them increase their bargaining power. According to Zanello, et al. once the market information is received in a

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Received: 12-Sep-2022, Manuscript No. JRD-22-19171; **Editor assigned:** 14-Sep-2022, PreQC No. JRD-22-19171 (PQ); **Reviewed:** 28-Sep-2022, QC No. JRD-22-19171; **Revised:** 02-Jan-2023, Manuscript No. JRD-22-19171 (R); **Published:** 09-Jan-2023, DOI: 10.35248/2311-3278.23.11.205

Citation: Kwingwa J, Msinde J, Bakari SJ (2023) Determinants of Market Information Accessibility among Smallholder Spice Farmers in Tanzania. J Res Dev. 11:205

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reliable time it helps to increase farmers' bargaining power. Also, it creates an opportunity to engage in a reliable broad market. It is argued that for farmers to access market information, cooperation among market actors in terms of supporting smallholders in technology and market services are necessary. To help smallholder farmer's access market information there is a need of strengthening market institutions.

In the 90's there was a rapid increase of means of communication such as mobile phones in almost many developing countries. In Sub-Saharan Africa, there has been increasing use of means of accessing news by farmers in accessing agriculture information. For instance, for a country like Nigeria, the use of mobile phones by farmers has increased on acquiring information on price, transport and thus reduced transactional cost. Again Anglo, et al., conducted a study that examined the role of radio in awareness creation on agriculture programs in Nigeria, the result showed that 97.8 percent of respondents indicated adopting new agriculture practices. However, it is argued that means of accessing news has some challenges for instance, through mobile phone illiterate people can face difficulty in accessing text messages but also phone has some cost implications on their use. On the side of the radio program, it depends on the coverage of an area; also most of the radio is used for recreational purposes and less in educational programs. A study conducted in Nigeria showed that rural farmers face several challenges in accessing agriculture information due to lack of electricity, poor TV, and radio signals [6-10].

In Tanzania, several studies show that farmers have benefited from various means of accessing news. They found that farmers have benefited from the use of radio as one of the popular means of accessing news compared to television which was reported to be used by few farmers. A study by Magesa, et al. in Tanzania revealed that 83 percent of rural farmers in remote rural areas depend on radio and mobile phones in information access, agriculture information being inclusive. In a similar study, it was revealed 75.9 percent use mobile phones in receiving agricultural information including the market. However similar study shows few farmers use television and newspaper in getting agriculture information. Lack of electricity was reported to be one of the barriers in accessing agriculture information in remote areas.

On the other hand, socio-economic factors have a great role in supporting individual farmers in accessing market information. Socio-economic factors are such as age of an individual, farm size, farm income, education, sex, gender and transport facilities ownership. For instance, a study conducted in India as cited by Adewale showed that age between 20-40 was in high use means of communication such as mobile phones for agricultural use. Ozor and Cynthia argue that education as one of the socio-economic factors helps an individual farmer in the acquisition of technology and in making good development decisions.

In Tanzania spice-sub sector is still faced by several challenges, one is the accessibility of market information to farmers. Many smallholder farmers face the challenge of incomplete market information and always depend on traders. There have been various supports given by the government and other interested

parties to strengthen spice sub-sector such as the development of spice-sub sector strategy, however, relative less have been achieved, spice market is still a challenge. Furthermore, various studies have been conducted on spices, for example, Mohamed conducted a study on the inclusion of small-scale farmers in the spice value chain in Zanzibar whereby the study found poor coordination among actors within the spice value chain. Also, a study conducted by Negera, et al. analyzed factors determining the supply of cardamon spice in Ethiopia. Again, a study conducted by Boyal, et al. in India analyzed the growth rate of major seeds spice and export performance. In addition, Fundikira conducted a study on contamination of aflatoxin on marketed spices in Tanzania. Another study was conducted by who explored the safety and quality of black pepper and clove grown organically in Tanzania [11-16].

However, none of the above-mentioned studies analyzed socio-economic factors influencing the accessibility of market information to smallholder spice farmers which is a focus of this study. Therefore, this study aimed at bridging this knowledge gap. This study provides a picture of socio-economic factors how they influence access to market information among smallholder spice farmers. The study findings, therefore, provide useful information to policymakers and other stakeholders in addressing farmers' challenges and therefore strengthening smallholder farmers' market information systems. Also, supports the attainment of Sustainable Development Goals (SDGs) number one and two.

Theoretical framework

This study was guided by networking theory. Networking can be defined as an ability of an individual or a firm to create interrelationship in a particular context. Networking plays a significant role in the organization or individual products sell. The relation is important in accessing market information. According to Thomas, et al., through networking, society can exchange different information which can create and increase their power as well their decision making. This theory has been chosen in this study since access to market information in most cases is contributed by different factors, some of which are related to networks resulting from relations between individuals and groups. Other socio-economic factors are also of paramount importance.

MATERIALS AND METHODS

Study area description

The study was conducted in Morogoro district which is one among six districts of Morogoro region, Tanzania. The region covers 19,056 square kilometers with a population of 286,248. Morogoro district has the following political division, it has 6 divisions, 29 wards, and 214 village. This study was conducted in Mtombozi ward in the following selected villages, Mtombozi, Lugeni, Tandali, and Kibwege (Figure 1). The study area has a great number of smallholder farmers who engage in spice farming in mainland Tanzania having for instance 641 ha cultivated with clove. Also, it is an area where stakeholders such as SAT provide production and marketing support to

smallholder spice farmers [17-20]. This is the main criterion for choosing this area. The study area is experiencing an average temperature between 18°C on the mountain areas to 30°C in valleys. The major economic activities are crop farming both food and cash crops, however, in some lowland areas, indigenous people practice animal husbandry (Figure 1).

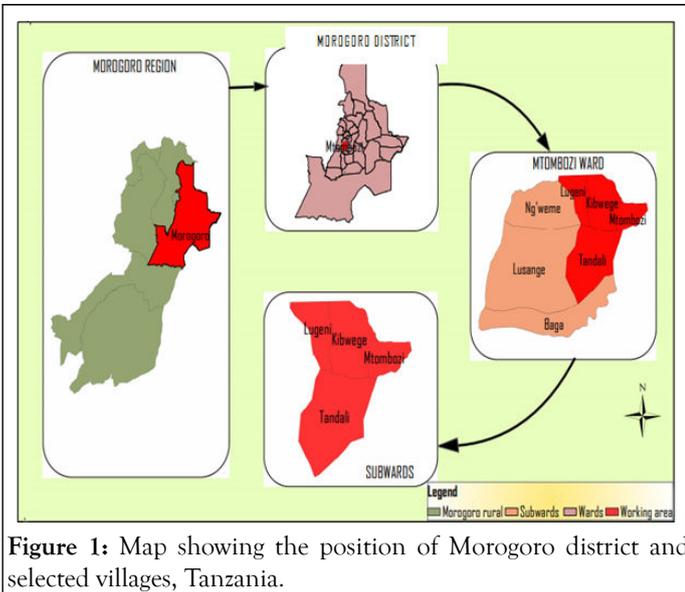


Figure 1: Map showing the position of Morogoro district and selected villages, Tanzania.

Research design and data collection methods

The study adopted the cross-sectional research design where data was collected once at one point in time. The design helps to save time as it allows data to be collected faster and it is expensive. Data was collected using the household survey method using questionnaires. Before the data collection exercise, data collection tools were pre-tested aimed at ensuring clarity. Smallholder farmers were asked for their consent before the data collection exercise.

Sampling procedure and sample size

A purposive sampling procedure was used to select districts, wards and villages. The selection criteria for the district, wards, and villages were spices farming engagement and marketing as compared to other areas. Again, simple random sampling was used to select 170 smallholder spice farmers from SAT register and other agriculture offices.

Data analysis

Quantitative data collected was analyzed through STATA 16. Both descriptive statistics and regression models were used. A binary logistic model was used to analyze socio-economic factors influencing smallholder spice farmers' access to market information. The binary logistic model has been chosen since the response variable (Accessibility of marketing information) is binary with attributes (1=yes, 0=no). The following is the mathematical notation of the model used.

$$\text{logit } y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \xi_i \text{ where } i=1,2,3, 4, \dots, 9$$

In the binary logistic regression equation above, the letters represent the following:

Logit y is the response variable (dependent variable).

X₀ is the constant term in the model

X₁ = Sex

X₂ = Age

X₃ = Marital status

X₄ = Education level

X₅ = Income

X₆ = Means of accessing news

X₇ = Family participation in farming

X₈ = Electricity availability

X₉ = Transport ownership

X₁₀ = Farm size

ξ = Error term (other variables that might affect the model but have not been considered in the model).

β₂,, β_k are the coefficients of independent variables respectively.

RESULTS AND DISCUSSION

Respondents' socio-economic and demographic characteristics

Table 1 below, shows the socio-economic and demographic characteristics of respondents. The study findings below show that the majority of respondents (61.2%) were male. The study findings further show females were 38.2%. Suggesting that men tend to participate mostly in community activities than females while females concentrate on domestic work [21-25]. The study finding is inconsistent with the finding by Benson, et al. in their study which found that females were higher, engaging in farming than men. It was also revealed that the majority (35.3%) of respondents were between the age of 36 years-45 years. They were followed by the age group between 46 years-60 years who were 21.8% of all respondents. This implies that the majority of the study population was labor force in agriculture activities and were at the active age of which influence exchange of information (Table 1).

Table 1: Socio-economic and demographic characteristics of respondents (n=170).

Characteristics		Frequency	Percentage
Sex of respondent	Male	104	61.2
	Female	66	38.8
Marital status	Married	118	69.1
	Divorced	13	7.9
	Widowed	8	4.8
	Single	31	18.2
Education level	None	22	12.9
	Primary school	132	77.6
	Ordinary secondary	15	8.8
	High school	1	0.7
Age category	18-28	25	14.7
	29-35	27	15.9
	36-45	60	35.3
	46-60	37	21.8
	60 and above	21	12.3
Farm size	1-3 Acres	146	85.9
	4-5 Acres	12	7.1
	5 Acres	5	2.8
	6 Acres	2	1.2
	Less than 1 acres	2	1.2
	More than 6 acres	3	1.8
Annual spice income	100,000-300,000	70	41.2
	300,000-600,000	38	22.4
	600,000-1200,000	30	17.6
	1,200,000-1800,000	11	6.5
	2,000,000 Above	21	12.3

Study findings in Table 2 below, also show the majority (69.1%) of respondents were married. This suggests that the majority of spice farmers had settled permanently engaging in farming activities. The study further shows 77.6% of respondents had primary education, 8.8% had ordinary secondary education and 12.9% had no formal education. According to Oduro-Ofari, et al. agriculture improvement can be realized only with education, without education good agriculture performance cannot be achieved. Also, education influences information searching.

On-farm ownership, the study findings below, shows that the majority (85.9%) of respondents own one to three acres while those with less than one acre were 1.2%. This finding implies that the majority of respondents depend on agriculture as their main economic activity and thus access to market information is necessary for realizing a profit. The study findings further show only 1.8% of respondents owned six acres and above, suggesting that spice farming is largely practiced in small-scale farming. According to the national annual agriculture report of Tanzania

2021, smallholder farmers occupy 99.4% of agricultural land while 0.6% is occupied by larger-scale farmers (URT, 2021). On annual spice income, results show the majority of respondents (41.2%) had annual spice income between 100 000 TZS-300 000 TZS.

The influence of socio-economic factors on accessibility to market information among smallholder spice farmers.

This objective was analyzed by using a binary logistic model where predictor variables were socio-economic factors and the outcome variable was accessibility to market information (Table 2).

Table 2: The binary logistic regression model showing the influence of socio-economic factors in accessing market information among smallholder spice farmers (n=170).

Variable	Co-ef.	Std. Err.	z	P>z	95% Conf.	Interval	EXP (β)
Sex	0.62232	0.4567	1.36	0.173	-0.2727	1.5173	1.863
Age	0.03119	0.0167	1.86	0.062*	-0.0016	0.064	1.032
Education	1.55349	0.0256	2.19	0.029**	0.29233	1.5829	4.728
Marital status	-0.1591	0.2137	-0.7	0.457	-0.5778	0.2597	0.859
Farm size	1.13002	0.7032	1.61	0.108	-0.2481	2.5082	3.096
Annual spice income level	0.19045	0.1595	1.19	0.233	-0.1222	-0.503	1.209
Means of accessing news	-0.5047	0.2379	-2.1	0.034**	-0.9709	0.0384	0.604
Family participation in farming	-0.0567	0.215	-0.3	0.792	-0.4782	0.3648	0.945
mobile phone ownership	1.56713	0.2578	2.98	0.021**	1.29233	2.5829	4.793
Electricity availability	1.19109	0.5685	2.1	0.036**	-0.0768	2.3053	3.291
Transport ownership	0.19202	0.6278	0.31	0.76	-1.0385	1.4225	1.212
cons	-4.3385	2.4574	-1.8	0.077*	-9.1548	0.4779	0.013

Note: ** means the level of significance at 0.05 (95%); * means the level of significance at 0.1 (90%)

The goodness of fit of the model is significant as the probability for the association by Wald *chi-square* (n^{-1}) between predictor variables and the response variable is lower than the levels of significance used (90% and 95%). This strongly allows the model to be used for interpretation based on the assessment of the influence of socio-economic factors towards accessing market information among smallholder spice farmers.

Electricity availability

Electricity availability plays a significant role in stimulating economic and social development in many rural communities. Results presented that electricity availability was statistically significant at $p < 0.05$. This suggests that there was a statistically significant association between electricity availability and access to market information. Therefore, farmers with electricity had an increased likelihood of accessing market information compared to those without [26-31].

Similarly Magesa, et al. in their study conducted in Tanzania reported that smallholder farmers who had electricity were not experiencing a challenge in accessing market information compared with smallholder farmers who had no electricity in rural areas. Again in their study conducted in Ethiopia and El Salvador had similar findings which showed that electricity availability has contributed to access market information. However, both argued that affordability, reliability, and quality of electricity should also be considered. This means availability of electricity only does not guarantee an individual spice farmer accessing market information other factors need to be considered.

Means of accessing news

Means of accessing news as defined in this study refer to facilities that support farmers in receiving news of which in this study was either a farmer owning (TV or radio, sometimes had

both or had no). Study findings above show that means of accessing news was statistically significant ($P < 0.05$) associated with market information accessibility. These results suggest that there was a statistically significant association between means of accessing news and accessing market information. However, despite being significant, means of accessing news had a negative influence on market information accessibility, this implies that farmers might have their means of accessing news but use them for other things like recreation and not searching market information. The study results are inconsistent with those by Mittal, et al. in their study conducted in India who reported the significant association between owning means of accessing news and accessing agriculture market information. In additional study findings by Chhachhar, et al. had shown that farmers with means of accessing news had a better chance of accessing market information than those who do not own. However, despite being significant, owning means of accessing news does not guarantee an individual smallholder farmer being accessed with market information other factors should be considered.

Age of respondents

Age in one way or another influences an individual effort of accessing information. The age of respondents was statistically significant ($P < 0.1$) associated with accessibility to market information. This suggests that there was a statistically significant association between the age of respondents and accessing market information. This is probably true as the age group between 36-45 is in a better chance of accessing more market information compared to other age groups due to their knowledge on the use of modern communication tools like phones. This might also be true due to the fact in this study that the respondents with age group range between 36 years-46 years are active age group in production and have a high level of interaction, contrary to that age class of 60 and above who probably not accessing market information due to their low level of interactions and know how on the use of modern tools of communication.

Level of education

Education is one of the important key determinants of individual skill that enables in acquiring different skills. Level of education was measured by using binary logistic regression looking whether none or primary education, secondary education, high school, tertiary education, Diploma and University as to whether education factor was influencing the accessibility to market information. The study findings above show that the predictor level of education was statistically significant ($P < 0.05$) associated with accessibility to market information. This suggests that there was a statistically significant association between individual level of education and accessing market information. Therefore, results further imply that as an individual increasing level of education also increases the accessibility of market information compared to those with a low level of education. Suggesting that education can enable an individual to create information networks that support accessing market information. However, in Nigeria which reported contrary findings where he found that level of education was

not statistically significantly influencing accessibility to market information. Ozor and Cynthia argue that education is one of the socio-economic factors which help an individual farmer in the acquisition of technology and in making good development decisions. Also Magesa, et al., argues that illiteracy affects an individual farmer in accessing agriculture market information.

Mobile phone ownership

Mobile phones ownership is important and used by many people in developing countries to access information. A binary logistic regression model was used to determine the influence of mobile phone ownership on the accessibility of market information. The study findings show that mobile phone ownership by the farmer was statistically significant ($P < 0.05$) associated with accessing market information. Therefore, this suggests that an individual farmer who had mobile phones had a chance of accessing market information compared to those who did not own mobile phones [32].

This finding conforms to study findings reported by Adewale in a study conducted in Nigeria which showed that the use of the mobile phone by farmers influenced accessing market information. However, it is argued that the use of the mobile phone in accessing information has some challenges one of them is that of illiteracy since some people can face difficulty in accessing text messages but also phone has some cost implications on their use.

On the other hand, the study findings show that other variables like sex of respondents, marital status, farm size, annual spice income, family participation in farming, and transport ownership were not statistically significant ($p < 0.05$) influencing accessibility to market information. However, two variables annual spice income and farm size had a slight influence on accessing market information but were not statistically significant.

CONCLUSION

The study concludes that electricity availability, means of accessing news, level of education, mobile phones ownership and age influenced inaccessibility to market information. Accessibility to market information among rural farmers is important as it helps farmers be informed with reliable market information, increases their bargaining power and increases the chance of improving productivity. It is therefore recommended that the government of Tanzania and other stakeholders should make sure smallholder farmers are connected with grid electricity in remote areas and introduce tax waivers on mobile phones to support farmers. Also, it is recommended that stakeholders should establish market information programs such as radio programs and educate farmers on their importance. Lastly, it is recommended that government and stakeholders in Tanzania should establish a strong market information system for smallholder farmers that would enable them to access market information and eventually improve spice market performance.

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