

# Rural Smallholder Farmers' Awareness and Use of ICT-based market information Sources in South Africa

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## Abstract

The utility of ICTs for providing market information to rural smallholder farmers is growing rapidly, and access to reliable information and sources is considered crucial for beneficial market interaction. This study explored critical factors contributing to usage of electronic sources for market information search among rural smallholder livestock farmers. Using data collected from 129 respondents through a non-random sampling technique; descriptive and regression analysis was applied to identify key factors responsible for their awareness and use of ICT-based market information sources. Level of education was found to be a driver of awareness of ICT-based sources, and use of these sources was influenced by farmer-specific characteristics such as household size, education, income, membership of cooperatives and herd-size. The key ICT tools used was radio and mobile phones, widely available in the study area. Identified constraints to use of these ICTs include cost and patchy network signals in some areas. Policy interventions to reduce cost of mobile phone services and expansion of base stations; including practical recommendations for improved programming in radio and television offerings, are considered indispensable for greater uptake of e-information sources among smallholder livestock farmers.

**Keywords:** *awareness, livestock farmer, ICT-source, market information, rural, smallholder*

## Introduction

The role of market information and its availability has been the subject of numerous academic and policy discussions. The problem of information access is exacerbated among smallholder farmers, as a result of socio-economic factors and personal characteristics. These factors such as their location, distance to market centres, lack of assets, poor infrastructure, compounded by low levels of education culminate in poor access to market information, results in increased transaction costs and subsequent exclusion from market participation (Sibande, et al. 2015; Okello, et al. 2014; Shiferaw, et al. 2008).

Efforts have been made to enhance the prospects of market participation among smallholders, through emphasis on the provision of access to market information. These interventions as reported by Okello, et al. (2010) have aggressively adopted Information Communication Technology-based media, to promote market information transfer to farmers and include the use of such tools as mobile phones, internet-based platforms, print media, digital radio and television.

In South Africa, the use of mobile technologies is pervasive, with greater penetration rates than other ICTs. Estimates show more than 56.7% of households in South Africa have access to mobile phones, considered as one of the highest penetration rates within and outside the African continent (UNICEF, 2012). There is emphasis by government on the development of a vibrant ICT sector, with a national ICT strategy to address penetration, particularly for formerly disadvantaged communities.

There is uncertainty regarding ICT deployment within the agriculture sector, and not clearly discernible which specific ICTs are used and how widespread the service. Though Orthmann (2000) explored ICT usage among established players in commercial agriculture, relatively little or no information exists regarding availability and use among smallholder farmers. A major focus of ICT use in agriculture is to meet farmers' information needs, and information demand as an emerging paradigm for agriculture (Adebayo and Adesope, 2007), requires innovative methods of service delivery especially to rural communities in developing countries. There is a general agreement that ICT-based information systems can contribute to livelihoods support and improvements through dissemination of information on alternate resource uses, markets, prices, income and support services (Nikam, et al. 2004; Moloi, 2007).

Farmers in rural communities receive market information primarily through established social circles, with limited access to extension agents or ownership and use of ICTs. Access to market

information enhances smallholder market participation, and ICT-based sources are vital for providing access to market information for smallholder farmers (Okello, et al. 2014). The adverse effect of poor access to market information, such as moral hazard and adverse selection which increases transaction costs have been noted (Sibande, et al. 2015; Barret and Carter, 2013). In recognition of the need to strengthen farmers' access to markets and other support services in Africa, a number of interventions have emerged which utilise ICT-based platforms. This emergence of ICT-based information sources corroborate the importance of establishing communications frameworks, and optimizing the utilization of ICTs and other existing traditional communication methods, to facilitate access to information for smallholders in Africa.

However, despite the numbers of these ICT-based interventions aimed at providing agricultural information services, the factors determining awareness and use of ICT-based sources of market information (e-information) among smallholders remains doubtful. This is as a result of emphasis on the outcomes from such interventions. Very few studies have explored the awareness and use of ICT-based market information sources in South Africa, especially among smallholder livestock farmers. The objective of the study therefore was to investigate the awareness and use of ICT-based sources for market information by smallholder livestock farmers. Specifically, the study explored availability of ICTs within the area, assessed awareness and use ICT-based information sources, and determined the factors influencing awareness and use of ICT-based information sources.

## Methodology

### *Study location*

The Alfred Nzo District Municipality in the Eastern Cape Province is predominantly rural, situated between the O.R. Tambo District Municipality, Ugu District and Sisonke District

municipalities of Kwa-zulu Natal Province. It is made up of 4 local municipalities namely Matatiele, Umzimvubu, Ntabankulu and Mbizana. Subsistence agriculture is the predominant source of livelihoods, with extensive communal grasslands suitable for livestock production.

#### *Target population*

The population for the proposed study, are all smallholder livestock farmers who reside and have farming units within the three identified areas, Mbizana, Umzimvubu and Matatiele local municipalities, in the Eastern Cape Province. The total unit of analysis is 150 farmers, which combined selected livestock farmers in three local municipalities within the study area.

#### *Data collection and analysis*

Primary data was collected by using a structured questionnaire which was administered to 150 farmers. From this number, 129 questionnaires were correctly completed with 21 questionnaires voided. The data collected was entered into an SPSS version 15 database, analysed using descriptive statistics such as frequency distribution and percentages. Tests of significance were also used to explore relationships between the variables in the data.

#### *Instrumentation and reliability*

The questionnaire for this study comprised various questions which were sub-divided into sections. The reliability of the instrument was tested by taking several measurements on the same subject, and a Cronbach alpha score of 0.74 was obtained for the items. The score was higher than the acceptable score of 0.70, indicating a degree of acceptable consistent scoring for the items that made up the questionnaire sections.

## **RESULTS AND DISCUSSION**

#### *Demographic characteristics of respondents*

The data collected from the survey was analysed as shown below in the following table which provides the characteristics of the respondents.

Table 1 Demographic attribute of respondents.

Variable		Total (129)	Percentage
	Female	47	36
Gender	Male	82	64
	<36 years	9	7
Age	36 -55 years	43	33
	56+ years	77	60
Marital status	Single	35	27
	Married	59	46
	Other (divorced or widowed)	35	27
Education	None	22	17
	Primary	47	36
	High School	25	20
	Post High School	35	27
Cooperative member	No	112	87
	Yes	17	13
Herd size	50 or less	43	33
	51 - 100	46	36
	More than 100	40	31

Source: Questionnaire survey in Alfred Nzo District, 2017.

Male respondents comprise 64% of the total number while 36% of the respondents were female. Only 7% were youth aged less than thirty-six years, and those between thirty-six and fifty-five years represent 33% of respondents, with respondents fifty-six years and over comprising 50% of the study population. The figures indicate that the majority of livestock farmers are older males.

The majority of respondents (53%) had between five and seven persons in the household, while 18% of respondents had between eight and ten persons in the household. Large household sizes are commonplace in rural areas, especially in the Eastern Cape Province, as extended families live within the same compound. The data shows that 53% of respondents either had no formal education (did not attend any school) or only had a basic primary education (6 years or less). Most of the respondents (87%) do not belong to any farmer cooperative.

### *Availability of ICTs in surveyed households*

In order to determine if respondents from the survey had access to ICTs, the survey instrument had question requiring respondents to indicate available ICT tools in their household. The response received is shown in the figure below.

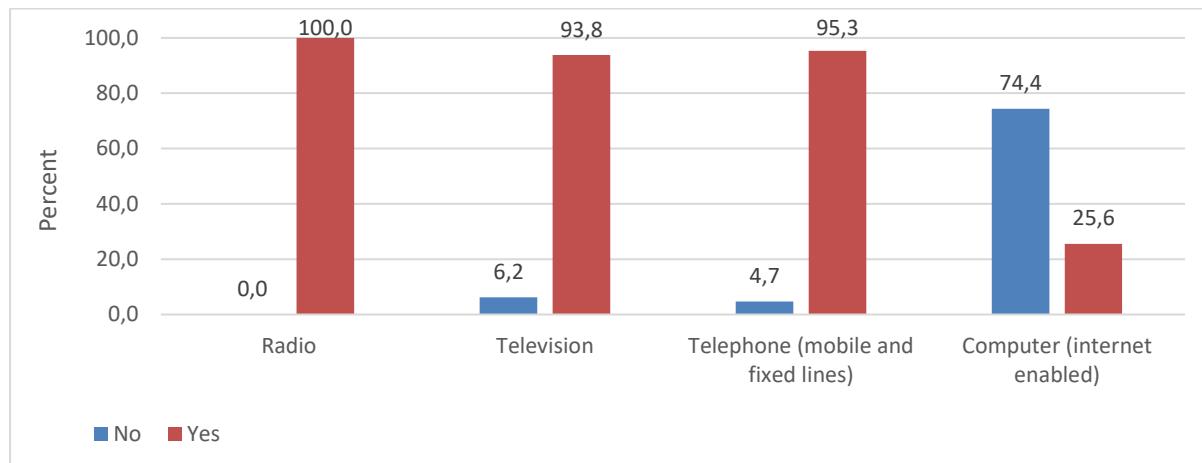


Figure 1 Availability of ICTs in respondent's households. Source: Questionnaire survey 2017

The result from the survey indicates that all respondents had a radio set, an indication of its universal access. Also 94% of respondents had a television and 95% of respondents also had a mobile phone. Most respondents (74%) did not have a computer in their household. The overwhelming ownership of radio, television and mobile phones by respondents, notwithstanding the rural nature of the populace, provides opportunities for utilizing ICTs to provide various services to farmers.

### *Awareness and use of ICT-based information sources*

Availability of ICT tools and the perception of respondents regarding usefulness of these tools are factors which influence awareness and subsequent use of ICTs to receive market information. The respondent's awareness and use of ICT-based market information sources was captured using the questionnaire schedule and is shown in the table below.

Table 2 Respondents awareness and use of market information sources.

		Aware		Use	
		Freq.	%	Freq.	%
<b>ICT sources</b>	Radio	24	18.6	24	18.6
	Phone	41	31.8	41	31.8
	Television	7	5.4	7	5.4
	Computer	2	1.6	2	1.6
	Sub total	[74]	[57.4]	[74]	[57.4]
<b>Non-ICT sources</b>	Other farmers, family & friends	43	33.3	43	33.3
	Extension Officers	8	6.2	8	6.2
	Auction venue	4	3.1	4	3.1
	Sub total	[55]	[42.6]	[55]	[42.6]
Total		129	100	129	100

Source: Questionnaire survey in Alfred Nzo District, 2017

The data indicates that 57% of respondents in the survey were aware of an ICT-based market information source. Also, all the respondents who are aware of ICT-based market information sources have used an ICT tool for seeking market information. For specific ICT sources such as radio, mobile phone, television and computers, approximately 19% of respondents are aware of radio and the same percentage of respondents use radio as a market information source. The survey result shows that approximately 32% of respondents are aware of mobile phones as a source of market information, with the same number of respondents using mobile phones as their market information source. Only about 5% of survey respondents indicated awareness of television as a market information source, and use television to obtain market information. For ICT-based sources, less than 2% of respondents were aware of internet-enabled computers as market information sources, and a comparable number have used it to search for market information.

Respondents are also aware of and use non-ICT based sources for their market information. These sources include other farmers, friends and family, extension officers and attendance at livestock auctions. Almost 43% of survey respondents were aware of non-ICT based market

information sources, and used these sources to obtain market information. Specifically, more than 33% of respondents were aware of other farmers, friends and family members as source of market information. The same number of respondents had also obtained market information from these sources.

Approximately 6% of respondents identified extension officers as source of market information and use this source to obtain market information. This result is consistent with findings by Acheampong et al. (2017) from a similar study in Ghana where their result indicates that many of the respondents are unaware of services from extension agents. However, the finding is at variance with that by Msffe and Ngulube (2017), where they found that Extension officials were mostly identified as source of information among poultry farmers in Tanzania.

Only 3% of respondents indicated awareness of auction venues as a source of market information and have obtained their livestock market information through attendance at animal auctions.

Considering the high number of respondents (57%) who are aware of ICT-based market information sources, and have also used an ICT to source their market information, it may be beneficial to develop market information services that utilize ICTs used by farmers, for reaching them with needed market information.

#### *Constraints to the use of ICTs as market information source*

Many ICT tools such as mobile phone, television, radio and computers are associated with constraints to their use. These limitations in some instance preclude individuals from using such tools. A number of such constraints were identified and the opinion of respondents solicited, with the result outlined in Table 3.

Table 3 Constraints to using ICTs for market information among respondents.

Identified Constraints	Agree		Disagree		Unsure	
	N	%	N	%	N	%
Literacy (read & write)	49	38	66	51	14	11
Poor radio & TV signal	67	52	40	31	22	17
Weak cell phone network	70	54	17	13	42	33
Timing of programs	20	16	26	20	83	64
Lack of electricity	62	48	4	3	63	49
Language used	39	30	21	16	54	54
Cost of ICT equipment	43	33	45	35	41	32

Source: Field survey in Alfred Nzo District, 2017

The ability to read and write was not considered as a limiting factor among 51% of respondents.

More than half of respondents (52% and 54% respectively) agreed that poor signals and networks was a limiting factor in using radio and television including phones. The rural nature of the area with mountainous terrain and widely dispersed settlement patterns largely responsible for this.

A lack of electricity was agreed by 48% of respondents as a constraint to their use of ICT tools, and language used for radio and television broadcast is not considered as a constraint by 30% of respondents. Radio broadcasts and some television programs are provided in the local language, which may explain why few respondents disagree regarding broadcast language as a constraint. Cost of ICT tools was a constraint to 33% of respondents, 35% disagreed that cost of ICTs was a constraint, and 32% of respondents were undecided. The availability of cheap radio sets and simple feature mobile phones is a possible reason why many respondents do not consider cost as a constraint to their use of these ICT tools.

### *Factors influencing use of ICTs for market information*

Specific tool-related factors contributing to the use of identified ICTs were examined. The study focused on the identified attribute of the tool which respondents perceive as contributing to its value as a market information search tool. Using a Likert scale-type division into three groups of agree, disagree and undecided, features of the identified ICT tools such as its availability, reliability, convenience and cost were explored and analysed as shown in the table below.

Table 4 Factors influencing the use of identified ICTs for market information.

<b>Factor</b>	<b>ICT-tool</b>	<b>Agree (%)</b>	<b>Disagree (%)</b>	<b>Undecided (%)</b>
Availability	Radio	57	6	37
	Television	34	8	58
	Mobile phone	47	11	42
Reliability	Radio	53	3	44
	Television	11	11	78
	Mobile phone	30	5	65
Convenience	Radio	54	3	43
	Television	15	15	70
	Mobile phone	28	5	67
Cost	Radio	14	13	73
	Television	8	10	82
	Mobile phone	68	2	30

Source: Questionnaire survey in Alfred Nzo District, 2017

The table above shows that 57% of respondents agree on the availability of radio, compared to 47% and 34% who agreed on availability of mobile phones and television respectively, as market information source. Furthermore, 53% of respondents agreed on the reliability of radio, against 30% who agreed that mobile phones were reliable. In terms of convenience, radio is also considered as the top ICT-tool by 54% of respondents, while 28% and 15% of respondents agree that mobile phones and television are convenient respectively.

The cost of mobile phone usage is a significant factor in its usage, as 68% of respondents agree that cost is a factor when using mobile phones for market information search. This finding agrees with Asogwa, et al. (2012) from their studies among rural farmers in Nigeria, indicating the limited use of ICT tools as a result of their affordability and reliability. Radio is consistent as a top ICT tool depended on to source market information among respondents. This is also consistent with Magesa, et al. (2014) regarding the importance attached to radio, for disseminating market information in developing countries.

*Variables influencing awareness and use of ICT-based market information sources*

Regression analysis was used to explore possible relationships between identified socio-economic variables, and their effect on awareness and likelihood to use ICT-based market information sources by the respondents. The Chi-Square tests involved cross-tabulations between variables such as gender, age, marital status, household size, level of education, other income sources, membership of cooperatives, and herd size against awareness and likely use of ICT-based sources. The results are presented in the table below.

Table 5 Significance of identified variables on awareness and use of ICT-based sources

<i>Characteristics</i>	<b>Aware of ICT sources</b>		<b>Use of ICT sources</b>	
	<i>Value</i>	<i>Exact Sig.</i>	<i>Value</i>	<i>Exact Sig.</i>
Gender	2.199	0.707	7.352	0.178
Age	15.394	0.160	17.158	0.210
Marital status	11.611	0.426	32.575	0.008**
Household size	11.553	0.146	39.185	0.000**
Education	27.152	0.046**	47.047	0.000**
Income	12.477	0.365	29.875	0.022**
Member coop	4.122	0.360	13.602	0.009**
Herd size	7.475	0.484	30.479	0.000**

\*\* significant at P<0.05

From the table above, level of education has a significant association with Awareness of ICT-based market information sources. Other variables showed no significant relationship to respondents' awareness of ICT-based market information sources. This indicates that educated respondents showed greater understanding of the value of ICTs in sourcing information, and highlights the importance of education as contributing to an increase in the sourcing of useful information.

As posited by Masuka et al. (2016), education increases possibilities for ICTs as it is associated with better reception of new ideas. It may also be interpreted that study respondents with little or no education, were unable to differentiate between ICT-based and non ICT-based information sources used; further highlighting the importance of education.

The results show that marital status has a significant association with use of ICT sources for market information. Also household size, education, income, membership of farmer cooperatives and number of livestock, all had a significant association with Use of ICT-based sources.

Large household sizes increase possibility of ownership of an ICT tool. This may explain the significance of household size in use of ICT source. This agrees with Harindranath, et al. (2008), where size of household was influential in the use of ICTs. Also from Sekabira, et al. (2012) an increase in family size marginally increased the probability of farmers adopting ICTs for market information sourcing.

Income sources also enhance the ability of respondents to pay for possible costs involved in utilizing ICT sources for market information; such costs include purchase of airtime, availability and purchase of electricity, cost of batteries for radio, purchase of radio sets among others. Higher incomes are often associated with increased use of ICTs, and explain the

significant association between income and use of ICT-based market information sources. This is in tandem with Donner (2007) where income impacted positively on the adoption and use of ICTs.

Membership of farmer cooperative shows significant association with the use of ICT-based market information sources. Additionally the herd size is significantly associated with use of ICT-based sources. Farmers belonging to cooperatives and owning large herd sizes show more awareness of, and are more likely to use, ICT-based market information sources.

## CONCLUSION AND RECOMMENDATION

The result of the data analysis and discussion indicates availability of ICT tools needed for receiving market information in the study area. Also, it shows that livestock farmers in the study area are aware of ICT-based sources of market information and make use of these sources accordingly. Education was found to drive awareness regarding ICT-based information sources. Age and gender did not contribute to use of ICT-based sources, as the personal characteristics such as marital status, household size, education, other income source, membership of cooperatives and herd size were factors influencing the use of ICT sources.

Based on this, the study recommends as follows:

- Utilizing the universal availability of radio to package more market information for farmers.
- Additional information can also be provided in appropriate formats to farmers to access using mobile phones.
- While television is available, farmers do not get required market information using this source. It is therefore necessary to re-design programmes offered to include information that address market information requirement of farmers.

- Cost of using mobile phones is a factor determining its use among farmers, policy interventions are hence needed to reduce the cost associated with the use of mobile phones. Specifically, data bundles needed for accessing market information may be exempt from charges, or provided free of charge through specific networks and platforms designed to provide market information to users.
- Policy interventions to encourage expansion of base stations among radio, television and mobile network provider is recommended. This will improve the reception of adequate signals in the rural areas.

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