THE USE OF MOBILE TECHNOLOGIES AMONGST SOUTH AFRICAN COMMERCIAL FARMERS

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ABSTRACT

Organisations offering extension services provide services to farmers which include the provision of relevant and current information pertaining to agriculture. The increased use of mobile technologies is changing the way farmers access information, specifically by using the Internet. This paper focuses on South African (SA) commercial farmers who currently use the Internet to establish their Internet access profile, the devices they utilise for Internet access and the purpose for which they use mobile technologies.

An Internet and Mobile Device Usage Survey was conducted in the SA agricultural community. Farmers were found to have embraced mobile technology and in excess of 70% of the farmers who participated in the study indicated that they use their mobile devices to access the Internet. No brand of mobile phone or tablet computer was found to dominate the agricultural community. Importantly, close to 50% of respondents indicated that they owned and used a tablet. The primary reason for which mobile devices are used by farmers is for business purposes, including access to information about agriculture. Agricultural organisations offering extension services could benefit from embracing the technology and exploring new ways to provide information services to their farmer base.

1.   INTRODUCTION

South African Agriculture accounted for approximately 2.3% of the Gross Domestic Product (GDP) in 2010, 2011 and 2012, amounting to 72.7 billion ZAR in 2013 (Republic of South Africa, 2013a). The agriculture sector employed approximately 5% of the South African work force in 2013 which was a growth from 630 thousand people in 2010 to 712 thousand in the 2nd quarter of 2013 (Republic of South Africa, 2013b). South Africa's agricultural system is dualistic in nature, comprising the formal well-developed commercial farming sector and the subsistence-based communal activities in rural areas (Sandrey & Vink, 2008: 7). Statistics published by the Department of Agriculture, Forestry and Fisheries indicate that the gross value of South African farming activities in 2012 was made up of 48% animal production, 26% horticulture and 26% field crops (Republic of South Africa, 2012).

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The diverse nature of the South African agricultural landscape has given rise to a number of distinct agricultural industries and organisations. A primary service offered to farmers by a number of these organisations is extension services. Extension services are services employed by agricultural organisations, institutions and bodies to assist farmers to improve agricultural output through provision of relevant, current information and the transfer of knowledge. Agricultural organisations advise and educate farmers, assist in their decision making, strategic planning and stimulate desirable agricultural developments (Fua & Akterb, 2012: 3). The type of information shared through extension services includes information about current market conditions, local agricultural conditions, agricultural research, agricultural best practices, new farming products and new farming techniques.

Previous research (Stone & Terblanché, 2012: 61) conducted amongst farmers in the sub-tropical regions of South Africa found that approximately three quarters of the respondents made use of extension services. In the research study which Stone and Terblanché (2012: 64) conducted, the authors investigated which sources of extension information were highly rated as extremely valuable. Technical extension services were rated the highest at 54%, followed by research, study groups, marketing information, newsletters and finally websites (11%). Jones, Diekmann and Batte (2010: 244) concur with these findings, indicating that the use of extension websites, particularly amongst less educated farmers, was the least used resource.

Changing trends in Information and Communication Technology (ICT) are altering the way farmers gain access to information. The introduction of mobile technologies has changed the way people access information on the Internet. Smith and Charen (2011: 46) are of the opinion that mobile phones are currently the predominant information management tool in the world. The use of mobile phones can improve access to information, reduce the cost of searching for information and improve co-ordination between parties and increase market efficiency (Aker & Mbiti, 2010: 213). The results of a research study conducted to investigate the use of mobile technologies in agricultural extension services amongst rural farmers in India indicated that more than 75% of the farmers participating in the study indicated an improvement in service (Fua & Akterb, 2012: 17).

Statistics available from the World Bank (2008) suggest that 98% of the South African population live in areas which have mobile cellular signal and that 92% of the population are mobile subscribers as opposed to only 5% which have access to fixed line Internet. Research by Goldstuck (2012: 5) found that in 2012, 8 million South Africans access the Internet via their mobile phones. Goldstuck (2012: 12) predicts that by 2014, 10 million people or 20% of the South African population will access the Internet using their mobile devices. It is evident from the aforementioned statistics that the availability of mobile connectivity should not be viewed as a limitation when contemplating providing mobile information services in the South African context. This would hold particularly true in the context of South African Agriculture which is located in areas with relatively low or unreliable forms of fixed line telecommunication and Internet connectivity infrastructure.

Mobile devices include hand held devices such as: smart phones (mobile phones which can run customised software), personal digital assistants (PDAs) or tablet computers. Mobile devices have the ability to gain additional functionality through the installation of applications (apps). Mobile apps typically provide users with services, albeit in a simplified form, similar to those provided on personal computers (PCs). Chang, Chen and Zhou (2009: 740) list the minimum requirements of smart phones, indicating that smart phones must have the ability to: make voice calls, access the Internet, send and receive E-mail, access corporate database servers, send and receive Short Message Service (SMS), Multi-media Messaging Service (MMS) capabilities and provide Instant Messaging (IM). Gartner predicts that growth in the mobile phone market will continue, albeit at a slower pace, to in excess of 2 billion units by 2017. Gartner, as cited by Cox (2013: 1), further forecasts that the sales of tablets will surpass the sales of desktop PCs and notebooks by 72% by the year 2017.

In the history of mobile technology and specifically mobile communication, Dr Martin Cooper is credited with making the first phone call from a mobile device on 3 April 1973. It is estimated that in the four decades since this historic event, the proportion of the world's population which has access a mobile device has grown to an estimated two thirds of the population. Dutta and Bilbao-Osorio (2012: xv) suggest better reach, convenience and functionality and lower costs as the main reasons for the growing dominance of mobile technologies.

Historically, organisations have vigorously sought to guard the information contained within their Information Technology (IT) systems. Massé (2008: 58) however, recognised a trend in which organisations are beginning to share information with people outside the organisation. As a result, organisations have begun adopting technologies and supplying tools which allow consumers access to and manipulation of the data within their IT Systems. The shift from interaction by customers and suppliers with service representatives within an organisation to interacting with technology to create service experiences is supported (Curren & Meuter, 2005: 104; Meuter, Ostrom, Roundtree & Bitner, 2000: 50).

Prudence would dictate that agricultural organisations offering extension services to farmers take note of the growing usage of the Internet and mobile technology as a medium for accessing information. A study conducted by Jones, Diekmann and Batte (2010: 245) established that extension services could improve the effectiveness of their programmes by using communication methods that best suited the audience. Diekmann, Loibl and Batte (2009: 870) concur that having information on how farmers search for information is advantageous for extension educators, agricultural professionals, information specialists and marketers when creating effective strategies for disseminating information to farmers. The problem facing South African agricultural organisations implementing or updating communication strategies for extension services is that the extent and manner in which the Internet and mobile technology are used by the farming community may have changed due to the advent of new technology.

The objective of this paper is therefore to:

- Explore the Internet access profile of farmers;
- Determine which devices are used for Internet access by farmers; and
- Understand the purpose for which mobile technology is used in the South African farming community.

In order to achieve this objective an *Internet and Mobile Device Usage Survey* was conducted. The survey targeted individual farmers involved in, or associated with, the South African agricultural community. This paper examines the results obtained from the survey.

The remainder of the paper is structured as follows: The methodology (Section 2) selected for the research is motivated including an explanation of the selected method. The results of the research, including a discussion on the relevance of the findings, are presented (Section 3). Finally the concluding remarks and recommendations flowing from the research are presented in Section 4.

2.   RESEARCH METHODOLOGY

Conducting this research required the collection of information from South African commercial farmers. The five data collection methods most widely used by researchers are: interviews, group discussions, observation studies, document studies and surveys involving questioning (Johnnesson & Perjons, 2012: 26). In all cases the systematic gathering and analysis of data are conducted in order to inform the researcher about the topic under review (Baker, 2002: 103). A distinction exists between survey research and surveying. In survey research, independent and dependent variables are used to define the scope of study, neither of which can be explicitly controlled by the researcher. Prior to conducting the research, the researcher will hypothesise about the predicted results which are either proved or disproved through the survey (Glasow, 2005: 1).

In contrast to survey research, a survey is simply a data collection tool for gathering information about the characteristics, actions or opinions of a large group of people (Pinsonneault & Kraemer, 1993: 77). Research conducted by Orlikowski and Baroudi (1991: 5) found that surveys were used in half of all Information Systems (IS) research projects, making it the dominant research method for IS. For the purpose of this research, the preferred data collection method was surveying. Farmers were selected using self-selection probability sampling. The survey was conducted by means of an Internet based questionnaire promoted through direct E-mail, personal promotion by agricultural company representatives and promotion through the website www.Landbou.com.

An Internet based survey was preferred because of the advantage of quick response times, limited cost, high levels of accuracy in encoding data and flexibility to fit the unique research conditions. The qualitative survey consisted of normative information regarding Internet, mobile phone, tablet and application usage. The survey collected nominal data from the target

population only. Statistical inferences about the uses of the Internet, mobile devices and mobile applications are drawn from the information collected. The survey included five sections:

- **Biographical details**

  Questions are directed at understanding the composition of the respondents. Information relating to age, type of agricultural production, language and geographical location is collected.

- **Internet Usage**

  The researcher's aim is to establish the Internet usage patterns of the target population. Relevant information includes the frequency of Internet usage, type of access and type of device as well as the purposes for which the Internet is used.

- **Mobile Device Usage**

  This section of the survey focuses specifically on the target population's use of mobile devices. The intention is to establish the nature of device used and the purpose for which it is primarily used. The survey distinguishes between mobile phones and tablets. Questions also relate to usage patterns.

- **Purpose for which Mobile Technology is Used**

  By extending the device usage section, this section seeks to understand the nature of apps used on the mobile devices used by the target population. Questions are focused on the nature of apps and usage thereof rather than on the specific apps themselves.

- **Personal Details**

  The final section is intended to gather contact information of respondents should they wish feedback from the survey.

3.   RESULTS AND DISCUSSION

The survey was conducted during the third quarter of 2013 during which time a total of 97 questionnaires were completed by commercial farmers. All the major agricultural sectors; animal products (n=67), field crops (n=54), horticulture (n=6) and forestry (n=4) were represented and 13 of the respondents listed involvement in other agricultural activities. The gender of the respondents was predominantly male (82%) compared to female (18%). The vast majority of the respondents (87%) were Afrikaans speaking. Analysing the age categories, 19% under the age of 35, 66% were between 35 and 55 years and the remaining 15% over 65 years of age. Geographically the Free State (24%) accounted for most respondents followed by the Northern Cape (16%), Western Cape (15%), Eastern Cape (12%), Mpumalanga (11%), North West (10%) and the rest of the South African provinces in smaller numbers.

3.1 Internet Access Profile of SA Farmers

Amongst South African farmers, mobile technology is the preferred technology for Internet access. In the survey, 55 of the respondents indicated that they have a mobile Internet connection, 42 indicated that they have wireless connection and 21 have a fixed line connection. Even though the vast majority of the access type was given as mobile, 55% indicated that the primary place of access of the Internet was from the home compared to 32% from the place of work and 10% while outdoors. Given that the sample population was primarily Internet users, 99% indicated that they access the Internet daily, of which 31% spent an hour or less, 40% between one and two hours, 13% between two and three hours and 16% more than four hours a day accessing the Internet. Laptop computers (68%) were found to be the most popular device for accessing the Internet followed by mobile phones (57%), then PC's (46%) and finally tablets (37%). The high usage of mobile phones and tablets indicates a significant acceptance of mobile technology for Internet access.

As expected, high percentages of E-mail (94%) and banking (91%) usage were recorded, business usage also scored highly at 84%. Of importance for this research is that 79% of the farmers indicated that they used the Internet to source information. This supports the proposition that agricultural organisations should actively use the Internet as a medium for information transfer. These results are in contrast to findings in earlier research by Stone and Terblanché (2012: 64) which found that Websites enjoyed relatively low priority for farmers when seeking information. The remainder of uses of the Internet were: news (56%), social media (48%), sport results (19%), gaming (9%) and other activities (9%).

3.2 Devices Used for Internet Access

The typical mobile device has three components, the processing unit, input devices and output devices. Smart phones are the generic term used for new generation mobile devices which exist in parallel with earlier generation phones known as feature phones. Smart phones are differentiated from feature phones in that they have a larger screen, wireless synchronising abilities, extended keyboard, touch screens, a more powerful processor, more storage capacity and full web browser functionality (Andersson, 2012: 28). Chang, Chen and Zhou (2009: 740) divide mobile phones into thee, broad categories: basic phones, multimedia phones and smart phones. Chang, Chen and Zhou (2009: 740) list minimum requirements of smart phones as the ability to do the following: make voice calls, access the Internet, send and receive E-mail, access corporate database servers, send and receive SMS, MMS capabilities and provide IM.

The usage of mobile phones, as reported by farmers during the survey, indicates that smart phone functionality is gaining acceptance in the South African farming community. The first

evidence of this is that two thirds of farmers surveyed said that they use their phones to access the Internet. Secondly, the reported features used and their ranking of features usage further supports this notion. Given that 62% of the respondents use their phones for E-mail and 43% for apps, features only available on smart phones, underpins this conclusion.

Manufacturers of smartphones include, amongst others: Apple, BlackBerry, Nokia, Samsung, Sony Ericsson, LG, Palm and Motorola. Samsung (31%) was found to be the most popular type of device followed by BlackBerry (29%), Nokia (21%) and Apple (12%). From these results it is evident that in the immediate future, developers working on agricultural applications, in the South African context, would need to cater for at least the top four brands, namely: Samsung, BlackBerry, Nokia and Apple.

Tablets or tablet computers are a form of mobile technology, which has existed since the 1990s. Tablets are described by Atkinson (2008: 11) as computers that consist of a large touchscreen covering a processor unit and are referred to as "slates" where primary input is through the screen via a stylus or finger, although external keyboards may be attached. In 2008, Atkinson (2008: 22) classified tablet computing as a failed technology. Since then opinions have changed dramatically leading Halpern (2010: 1) to describe what she calls the iPad revolution which began with Apple CEO Steve Jobs launching Apple's tablet computer, the iPad, in January 2010. Further product launches, notably by Samsung and Amazon, have entrenched the acceptance of tablets as a viable technology.

Halpern's (2010) opinion is supported in the survey which reported approximately half of the respondents owned and used a tablet. The tablet market is dominated by two types of tablets, those manufactured by Apple (47%) and generic models using Google's Android operating system (40%). As with mobile phones, it is evident that in the immediate future developers working on agricultural applications for the tablet form factor would need to cater for the dominant platforms, namely: Apple & Android.

Evident from the research is that members of the South African agricultural community have adopted the use of tablets primarily for business purposes. The top four product categories used by farmers were E-mail (38%), banking (33%), business (32%) and information (30%). This usage pattern, although subtly different to mobile phone usage, displays the same trend; which is primarily the use of mobile technology for business related activities – and of importance to the research, access to information.

3.3   Purpose for which Mobile Technology is used

Apart from normal Internet browsing, additional functionality is provided on mobile devices (phones and tablets) by means of installed applications (apps). Smart phones are the most significant driver of the development of mobile apps (Cortimiglia, Ghezzi & Renga, 2011: 52). Apps are software systems specifically designed for use on mobile devices with broadband Internet capabilities. Mobile apps are typically pre-installed on the device during

manufacture or downloaded from software distribution platforms, known as app stores. App stores, which were popularised by Apple, provide a single connection point and centralised directory for software (Goul, Marjanovic, Baxley & Vizecky, 2012: 4168). Alternatively organisations may host their own app store providing access to in-house developed apps built for employees, customers and suppliers.

When farmers were asked which applications they had installed on their mobile devices results which would be expected from an agricultural community were produced. Weather apps proved to be most popular (69%), followed by banking (61%), productivity type applications (55%), news (47%), utility type applications (42%), social media (40%) and financial (28%). Interestingly, gaming (13%) and entertainment type apps (12%) enjoyed little usage, which confirms the use of mobile devices as predominantly business devices. When asked which apps where most frequently used, the same pattern emerged. Again weather apps (53%) led usage with banking (43%) second, productivity (38%) third and news (34%).

4.   CONCLUSIONS AND RECOMMENDATIONS

The objective of the paper was to explore Internet access profile, determine the devices used for Internet access and to understand the purpose for which mobile technology is used amongst the South African farming community. The purpose of the research is to inform South African agricultural organisations, implementing or updating communication strategies for extension services, of the extent and manner in which the Internet and mobile technology are used in the farming community.

The Internet profile which emerged from the research portrayed a highly mobile Internet population, using the Internet for predominantly business related activities. During the survey, in excess of 70% of the respondents indicated they use mobile devices to access the Internet. The high usage of mobile phones and tablets for Internet access indicates a significant acceptance of the technology. Further, it is concluded that because 79% of the commercial farmers indicated that they used the Internet to source information, it is imperative that agricultural organisations actively include the Internet as a medium for information dissemination to farmers.

Although laptop computers are the most popular device for accessing the Internet, more than half of the respondents indicated that they use mobile phones and a third use tablets. No brand of mobile phone or tablet computer was found to dominate the market. The implication of these findings is that parties wishing to provide information to farmers would need to consider the different form factors of the various devices and how information would need to be adapted and presented on the devices.

Analysing the applications installed by the farmers on their mobile devices confirms the notion that they are using mobile technology primarily for access to the Internet for business

purposes. Extending on research done by Stone and Terblanché (2012) and Jones, Diekmann and Batte (2010), which emphasised the importance of extension services, this research found that agricultural organisations could enhance communication strategies and service through the effective use of mobile technologies in their extension programmes.

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