

Developing Android Based Application Model for Provision of Real Time Marketing and Agricultural Information for Small Holder's Farmers in North Shoa Zone, Ethiopia

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Abstract: The recent developments of information and communication technology have led generation to have eased access to information, Farmers' acquisition of market information through ICT tools is potential use of this application in developing country. Despite the broad potential of ICTs that benefits farmers; they have not been spread evenly, the developing countries particularly the rural population have been significantly been left out of the information revolution. Getting access to market and marketing information's are restricted by factors such as less road infrastructure, under education, financial problems, poor communication skills, poor technology coverage, less ICT technology usage and problems of getting real-time information about nearby market. Traditional trend of farming and selling product in local markets is followed in Ethiopia. Developing of Android-Based Application Model for Provision of Real-Time Marketing and Agricultural Information For Small Holder's Farmers in wide comprehensive set of areas and has newly attracted significant number of studies. Different kinds of experiments are conducted and summarized to identify various problems in existing farmer's problem. Developing Android Based Application Model for Provision of Real-related to time Marketing and Agricultural Information for north Shewa zone is new idea based on its new feature, which adds extra information compared to the existing research done on this area. Various techniques are proposed and experimented for analyzing of the data gathered from the farmers and observation areas by using SPSS software. Similarly, various models are proposed for Developing Android Based Application Model for Agricultural, but the researchers proposed new model Developing Android Based Application Model for Provision of Real-Time Marketing and Agricultural Information for Small Holder's Farmers. Several interesting combinations of mobile application analysis and prediction techniques are realized to attain efficient and effective results.

Keywords: Android Model, Android, Small Holder's Farmers, Real Time

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I. Introduction

Information and communication technologies (ICTs) generally refer to an expanding assembly of technologies that are used to handle information and aid communication. These include hardware, software, media for collection, storage, processing, transmission and presentation of information in any format (i.e., voice, data, text and image), computers, the Internet, CD-ROMs, email, telephone, radio, television, video, digital cameras etc. The advent of personal computers, the Internet and mobile telephone during the last two decades has provided a much wider choice in collection, storage, processing, transmission and presentation of information in multiple formats to meet the diverse requirement and skills of people. ICTs are believed

To bring about social and economic development by creating an enabling environment. Almost every single activity in the modern world is becoming more dependent on the application of ICTs for one use or another. The benefits of ICTs reach even those who do not themselves have first-hand access to them. Through ICTs, for example, a doctor in a rural village can get up-to-date information regarding certain diseases and can use that information to advice and treat patients; an agricultural extension worker can learn new technologies, rainfall forecasts, commodity prices, etc. and use that information to advice farmers in rural villages; etc.

ICT is an umbrella term that generally covers the 'new' ICTs of computers, the internet, satellite wireless technology and digital libraries. But ICTs also encompass the more conventional technologies or the 'old' ICTs such as telecommunications infrastructure, cell phone, Radio, Television, Newspapers. Hence, ICTs

have existed for a very long time, since the invention of radio and television. However, in recent times, ICTs have received a greater attention, with the advent of the computer, Internet, and the World Wide Web[1].

In today's world, there is hardly any aspect of modern living that does not require the use of information technology. All sectors of the economy that range 2 from agriculture to medicine, from engineering to banking and from Military to Space Science are benefiting from ICT technologies [2].

With specific reference to agriculture, modern farms make use of computers and other Information & Communication technologies with a farm management system to keep track of inputs and outputs, weather forecast, early warning and decision support systems for crop management [3].

The difference ICTs can make, particularly in the area of agricultural development and food security, was among the issues addressed during the World Summit on the Information Society (WSIS) Plan of Action. The plan calls for measures to 'ensure the systematic dissemination of information using ICTs on agriculture, animal husbandry, fisheries, forestry and food, in order to provide ready access to comprehensive, up-to-date and detailed knowledge and information, particularly in rural areas.

ICT can be used in almost every step of agricultural production that include among others in input procurement, production, distribution and marketing of agricultural produce. Knowledge, communication and information exchange have influenced farmers decisions on what to plant, when to plant it, how to cultivate and harvest and where to store and sell and at what price, the integration of ICT can help to improve the performance of agricultural development [4].

Android is an open source mobile phone operating system developed on Linux environment by Open Handset Alliance led (OHA) by Google. Android is recently, the most commonly used operating system on the globe. And it is increasing in its users, mobile phone, tablets when compared with other mobile phone operating system. For installation and configuration it includes Android SDK, ADT plug-in, AVD manager, and java. It passes through different APIs to get access application framework layer. Android developers use Java and Xml to develop application. Hence, for developing mobile phone user interface we have used android operating system.

II. Literature review

Effective adoption of Information and Communication Technologies (ICT) has a proven record of attaining significant economic, social and environmental benefits at local, national and global levels. In the developed world, ICT demonstrated that it is the pivot of socioeconomic development. With the help of ICT, these countries have successfully transformed their economy to be knowledge based. Today there is almost no economic sector that is not supported by ICT applications [7].

However, the developing countries have been significantly been left out of the information revolution. Especially, rural communities are neglected and deprived of substantial access to ICTs. The digital divide happens largely due to the high cost of putting up modern ICT infrastructure, low literacy, low income and limited number of service providers. The absence of basic telecommunication infrastructure, dominance of the English language in the contents of the internet and lack of demonstrated benefit from ICTs to address ground-level development challenges contributed to the low level of usage of ICT services [7].

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The advent of modern Information and Communication Technology started in Ethiopia, with the introduction of telecommunication that dates back to 1894. Written sources tell that, it was at that time, the first long-distance telephone line in the country was installed between Addis Ababa and Harrar. Then immediately an extensive open wire line system was laid out linking the capital with all the important administrative cities of the country. Ethiopian Telecommunications Corporation (now Ethio Telecom) is the oldest public telecommunications operator in the African continent [13] .During Italian invasion, the whole telecommunication network was destroyed in the country. The Telephone, Telegraph and Postal services were re-organized in 1941, after the country fully regained its independence. In 1952 the Imperial Board of Telecommunications (IBTE) was established by proclamation No. 131/52.

The Board had full financial and administrative autonomy and was in charge of the provision and expansion of telecommunications services in the country [14]. As stated in [15] the development of markets improves input-output market interface and this is important for productivity growth. In agriculture, education and access to knowledge creates conditions that enable farmers to acquire, use information for decision making regarding allocate, and technical matters effectively. The World Development Report 2008 emphasized that agricultural extension plays an important role in agricultural development and in promoting sustainable, inclusive and pro-poor economic development[16].Also access to ICT can have a tremendous positive impact on sustainable development and poverty reduction in [17].Extension services help to disseminate information regarding the technology relevant for their geographical areas and cropping system and generate awareness among farmers by recommending the appropriate quantity and quality of inputs and their timely use. It also educates farmers about good agricultural and crop management practices. However, recent stagnation and in some regions total breakdown of extension services has led to large gaps in the farm yield and crop productivity.Insufficient extension services and poor access to information has impeded the transfer of technology at the farm level. The results of the situation assessment survey of farmers conducted by the National Sample Survey organization [18].Information needs are growing rapidly with the introduction of modern technology, hybrid seeds and changing climatic conditions. Thus, farmers often find that their traditional knowledge, experience and guess work to make decisions for day-to-day activities are not very effective in changing circumstances. The high cost of delivering information through face-to-face interaction, crumbling extension services and poor market information has paved the way for the use of modern information and communication technology (ICT) like mobile phones in disseminating agricultural information to targeted farmers.

III. Advantages of ICT for agriculture

Global attention came back to agriculture due to the price hike in recent years, resulting partly from long-standing negligence on diffusion of appropriate technology that stagnated production in the face of a rising population. Increasing production is a major challenge facing present agriculture. Smallholder farmers which dominate the landscape of developing world need to improve farming through acquiring adequate knowledge and information. Agricultural extension services provide critical access to the knowledge, information and technology that farmers require to improve the productivity and thus improve the quality of their lives and livelihoods. It is hence crucial to provide farmers with the knowledge and information in a quality and timely way. Although some ground-breaking tools like the telecenters can serve as major catalysts for information, knowledge and development opportunities, the access for farmers in remote villages is restricted due to the lack of infrastructure[19] . The generation and application of agricultural knowledge is increasingly important, especially for small and marginal farmers, who need relevant information in order to improve, sustain, and diversify their farm enterprises.

Agriculture can require substantial knowledge transfer to farmer and among farmers, including information about successful farming practices, new technologies or controls of pest and disease outbreaks, and new markets. In Ethiopia, information technology (IT) projects that support such information flows are rapidly growing, with many initiatives in operation today. Its can directly support farmer's access to timely and relevant information, as well as empower the sharing of knowledge of the farming community itself. ITs in agriculture have the potential to facilitate greater access to information that drive or support knowledge sharing. It's essentially facilitate the creation, management, storage, retrieval, and dissemination of any relevant data, knowledge, and information that may have been already been processed and adapted [20].

In the past, television and radio were the main electronic broadcast technologies used to reach rural communities; however, in the past two decades, Internet- and mobile-based channels have emerged. It's now include computer-based applications and such communication tools as social media, digital information repositories (online or offline), and digital photography and video, as well as mobile phones [21] [22].

However, in agriculture, despite the rapid spread and potentialof ITs to facilitate farmer's access to information, many of the initiatives face common challenges, such as issues of sustainability, affordability, ease of use, accessibility, scalability, and availability of relevant and localized content in an appropriate language [23].

Information and Communication Technologies (ICTs) have been thought as the best method for bridging the information gap for rural farmers with respect to information related to innovative practices, technologies, Government policies, credit facilities, and markets [24]. Several media and communication channels are used to communicate agricultural information in rural areas[25] 26] mention radio, mobile phones, television, fax, Internet and digital technologies, print (products of the press) and computer based or computer mediated modes as common media used in information dissemination and communication.

The case for the mobile phones being more important especially in disseminating and communicating agricultural information in order to improve agricultural extension services in developing countries, has been

argued by researchers and practitioners that are deploying ICT tool for development [27]. For instance, in India mobile phones based system have been opted as a means of reaching rural farmers in which a small, but relevant amount of data is transferred to farmers via SMS (short message service) text messaging[28][29] define value chains as the series activities that extend from farmers to consumers. Also, they state that in between there are intermediaries who add value to agricultural food products in various ways, including processing, packaging, certifying, transporting, distributing, whole selling and retailing to the end consumer[30].

IV. Related works

The performance of local markets plays a decisive role in promoting economic growth and reducing poverty in Africa. An important question is whether there is infrastructure for farmers to find information on potential buyers and prices offered. New market information services based on mobile communication technology provide opportunities to linking buyers and sellers efficiently, thus improving opportunities to reduce poverty. One goal of this study was to examine how small-scale farmers in Ghana and Uganda use mobile phones to obtain market information. Similar farm-household surveys were carried out separately in northern[31] [32][33] in 2011-2012. Each household was visited by enumerator collecting information on household's demographic characteristics, assets, marketing patterns and incomes the data were summarized and analyzed statistically [34].

Over the years in Ethiopia, could be attributed to the weak research-extension-farmer linkages. This could be addressed by the use of improved access to agricultural advisory services (AAS) The current advancements in Information and Communication Technologies (ICT s) have brought a new opportunity for enhancing AAS [35].

ICT is emerging as an important medium for communication and exchange as well as a tool for development at local and community levels. However, in most developing countries this potential is yet to be effectively leveraged [36]. Among the modern ICT s used in Eastern Ethiopia mobile phones are widely used among the farmers [35].

Modern ICT s, especially mobile phones can and support drive participatory communication, including Communication from those on the margin of traditional research-extension process and used to deliver services to the larger numbers of rural people than they could not reach before. According to Trading Economics, (2014) there were more than 25 million mobile phone subscribers in Ethiopia as of 2013 with majority users being urban dwellers[36].Based on the previous study in the area of agriculture mobile based information gathering in Ethiopia and other country there are some papers which is done of mobile application supports, but this research is different than the existing papers due to the full information about farmer supporting information such as land preparation ,seed selection, weather prediction, pre-sowing information, weed management or pest management information, harvesting information and market information for farmers and buyer as it is described in figure 4.5.5

V. Methodologies

As explained well in [37] a research methodology is a way to systematically solve the research problem as well as understood as science of studying how research is done scientifically. The research methodology of this research study concentrates the different methods. The researcher used different research methodologies in order to find the problems, like distributing of questionnaires, direct observations, interviewing the farmers and farmer training center employees.

VI. Data Collection And Analysis Methods

For any research study selecting suitable data collection methods is the major duty of any researcher. In this research study data observation, document analysis and direct observation were used to collect primary and secondary data. For the purpose of this research we used primary data source, secondary data source and sampling techniques, the data source was collected from five areas like Arerty, shewrobit, Mehalmeda , Alemketama and BasonaWorean respectively.

VII. Data Description And Interpretation Method

The survey uses structured questionnaires collected by trained local survey assistants via personal interviews English version of the questionnaire was translated into local language and to developing android based application model for provision of real time marketing and agricultural information for small holder's farmers in North Shoa Zone to understand the problems and reveal data from the gathered information from different users .Therefore the researcher was used SPSS statistical software to describe each variables in order to find the real and valuable information . The developed model also used for provision of real time marketing and agricultural information for farmers. In this regard different SPSS graphs was used to interpret

each variable values to predict real information for modeling about real time market information for the selected area of north showa zone.

For the purpose of this study the researchers was used eleven variables to identify real problems related to farmers day to day activities at each woreda by comparing ten variables with woreda names, variables are displayed by using legacy dialogs bar graphs was selected due to the researchers selects comparison method at all selected woredas Designing Model

In this phase the researcher was design mobile based information system for users based on data gathered after interpretation and all buyers, extension farmers and farmers will use the developed model to exchange real time information about farming through-out farming life-cycle (see chapter 5 more explanation).

VIII. Testing and Evaluation of the system

The developed model was tested and evaluated by taking ten evaluation criteria based on the evaluators conducted by giving the weight values for each closed ended questions to made evaluators response continent to use and twenty evaluators (professionals) are selected purposely.

IX. Data Analysis

The gathered data was converted to excel format to proceed the data's for experimental purpose in SPSS software to generate different statistics types based on their need accordingly by comparing each worada, As the researcher used questionnaires and interview at each woreda. For our study we used eleven variables to extract or reveal hidden knowledge to design mobile based application model information for farmers in the north showa zone woreda's , those variables are: Gender, Age, Educational Background, Agricultural Products, Woreda, Mobile using style, Factor which affects farming, source of information, Source of agricultural input, Selling Method and information dissemination ways and from the variables the researchers was focused on the most factors variables in order to design the model for the farmers based on the respondents .As depicted in the following figures interpretation and discussion are followed.

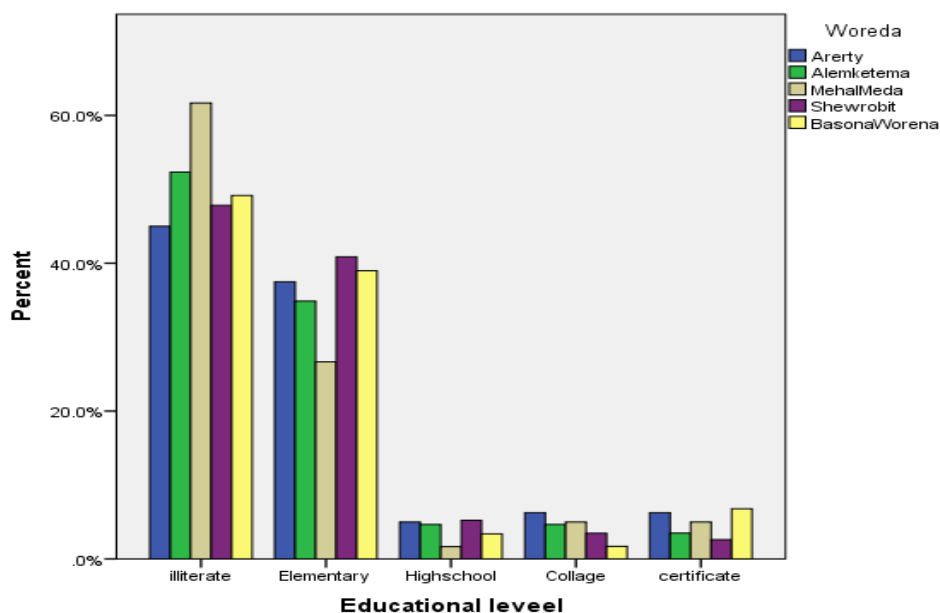


Figure 1: Educational Level of Farmers at each Woreda

From the above depicted on figure we conclude that the educational level of the farmers also as the data generated from the software number of illiterate farmers are higher than other variable values at all woreda. But almost all farmers are the user of mobile phone even if they are illiterate as the researchers gather information through interview and questionnaires about farmer's information's. However, educational level status of each woreda is vary as the researcher get information after feeding information into the software

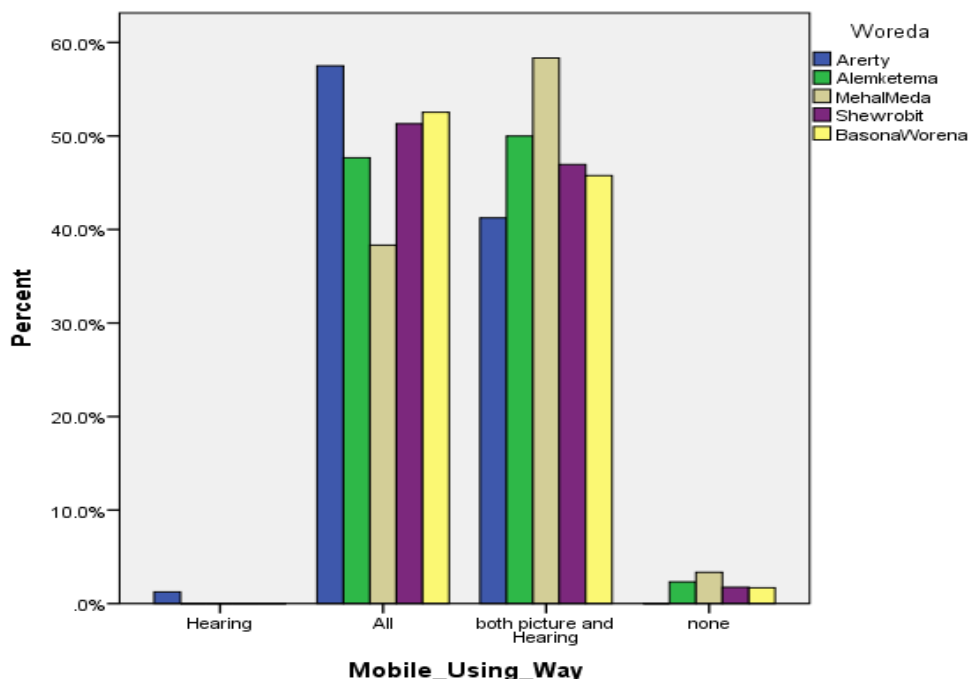


Figure 2:Way of Mobile Using for each Woredas

Considering mobile usage ways of farmers in the figures 2, most of them were used all types' communications ways of interaction like hearing, looking pictures, reading and writing text but not any of them alone.

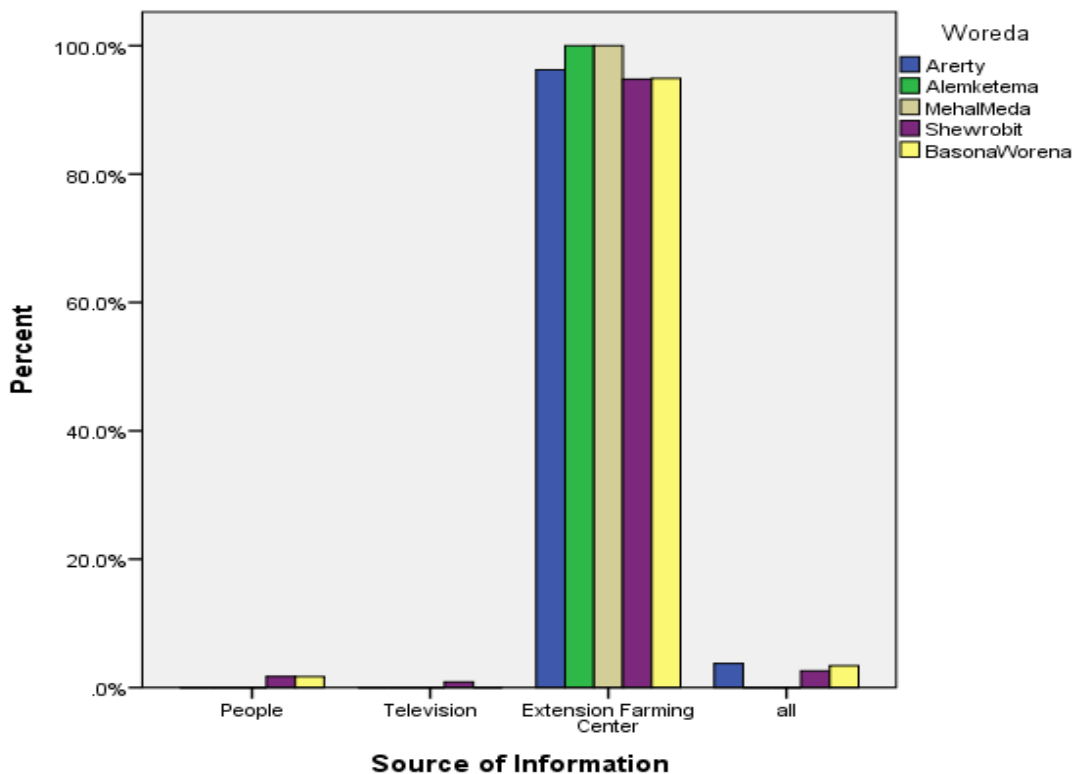


Figure 3:Source of information for each woredas

The above figure 3 indicated that most of the farmers got agricultural and marketing information from extension farming center, but rear source of information were used from people, televisions and all source of information (people, television and extension workers).

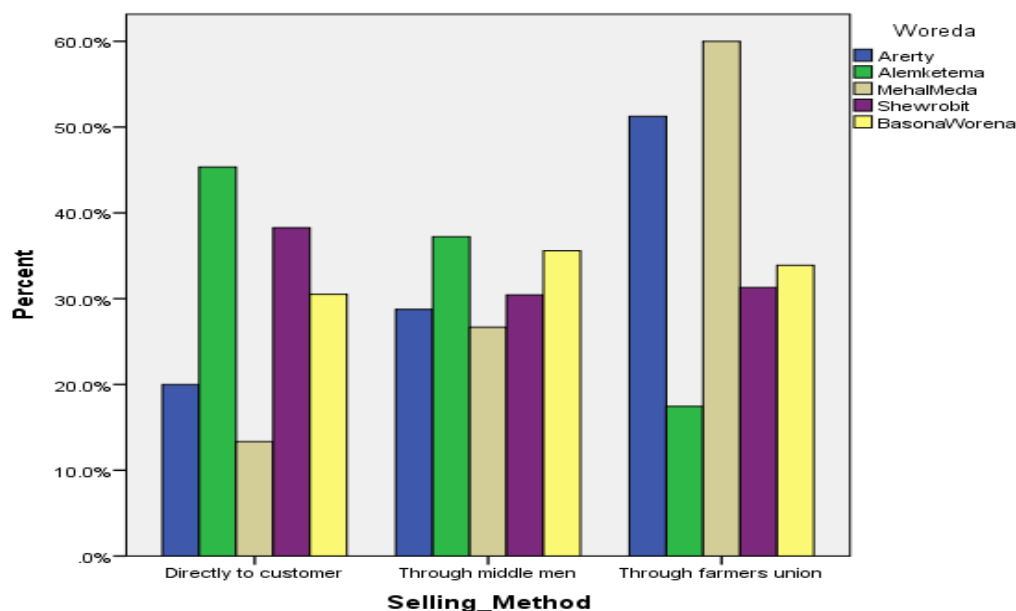


Figure 4: Selling methods of products at each woredas

Figure 4 showed that farmers of the north shewa zone interacted with customer, middle men and farmer union. But, most of the farmers sell their product by communicating with customer directly and through farmers union. There is also middle men with a relative high percentage which is comparable to other selling methods

X. Discussion

In the aforementioned data analysis and interpretations different figures were presented and explained. However, the following discussion were forwarded to incorporate in the proposed model as follows: As mentioned in the above discussion most of the farmers were having male gender in the selected woreda and also they are categorized in an average age range of 45-56 years. Even though the figure show such kinds of demographic information, this variables were not considered in the preparation of proposed model. In this study the data analysis result shows that most of the farmers had not good educational background, this leads to create major impacts on the usage of new technologies as well as to gather and access real time marketing and agricultural information. However, most of the farmers are interested to use mobile application service by interacting through both picture and hearing. Thus the proposed model was developed by considering such kind of issues. Even though, the types of agricultural products which is mostly produced and cultivated were cereal crops; the cash crops, vegetables and animal breeding also moderately practiced. Not only this, some of the crops needed real time market information to sell their products.

As figure out in this study farmers were used different selling methods, but in average direct contact with customers, with farmers unions as well as middle men (brokers). Thus in the proposed model the participation brokers were minimized and the model was permit the farmers to communicate directly to their customers. Most of the farmers got their source of information about agriculture and marketing from extension workers. This information delivery methods does not reach to farmers when they seek information about market and agricultural issues. This challenge was considered in the proposed model. In this study the source of agricultural inputs were not directly delivered to farmers, not only this the agricultural inputs are not reach to farmers on time when they needed. As explained above there are different factors which affects agricultural productivity like: climate changes, crops disease, and lack of technology. However, such factors would minimized by disseminating real time market information and agricultural production process in the proposed model. In this study the information types which is used by farmers are: sowing, weeding management, harvesting and market information. Those information were included in the proposed model to make the information available anytime anywhere accessible.

XI. The Proposed Model

The available network setup, type of devices and user skill and language are among the things that define the most encouraging modules of the Android Based Application Model for Provision of Real Time Marketing and Agricultural Information for Small Holder's. The most appropriate mobile device should be selected based on the information that is being transmitted to and from the mobile device. For example, multi-media files, such as images and video, require mobile devices to have more memory and processing speed

than mobile phones that are designed to handle text only. The modules of the mobile agriculture architecture must include choices that will make it easy to integrate with other platforms (web, mobile and desktop) on agriculture. Also, the available bandwidth is a determining factor that affects the type of data that is transmitted within the network. For example, to transfer a video file, more bandwidth is required than for text, which requires far less data to send or receive. Consequently, the business and technical requirements of the application were to be considered and the necessary adjustments done to accommodate any specific needs of the whole agriculture mobile architecture. Following the discussion, Figure 4 shows the proposed Android Based Application Model for Provision of Real Time Marketing and Agricultural Information for Small Holders of north shewa zone model.

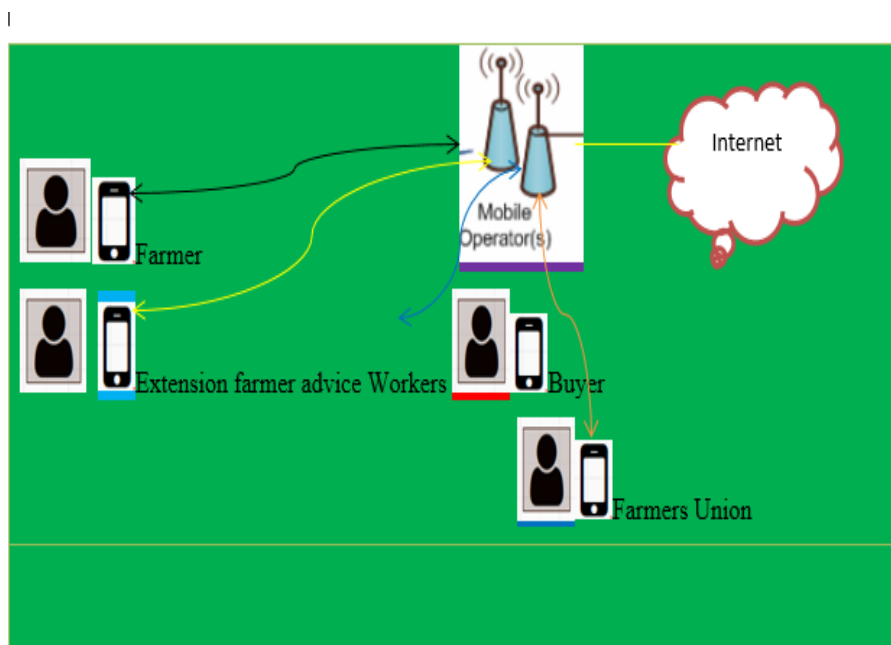


Figure 5: model of Android Based Application Model for Provision of Real Time Marketing and Agricultural Information for Small Holders of north shewa zone

The proposed mobile agriculture architecture was designed to put up the stakeholders in the farming production, whose needs were identified in this research. The model offers an interaction platform between the farmer and other key stakeholders of the farming production, e.g. the seed selection, the extension service provider, the agricultural officer and the government. Each of the involved objects in the architecture needs to use a mobile apparatus to communicate with the essential system through a mobile telecommunication network (**Ethio Telecom**).

Farmer application

From the above figure 5 the farmer is able to get for their agricultural services such as market information, seed selection, harvesting information, sowing information, pest management information via SMS from the extension service provider. The farmers can also communicate with suppliers and buyers through their mobile phone.

The farmer interface will have the appropriate language selection based on their interest (Amharic or English, see Figure 6) on this model based on the language selection the farmers will communicate with extension service providers, buyer, suppliers or farmer with farmer can exchange information to get real time information about farming.

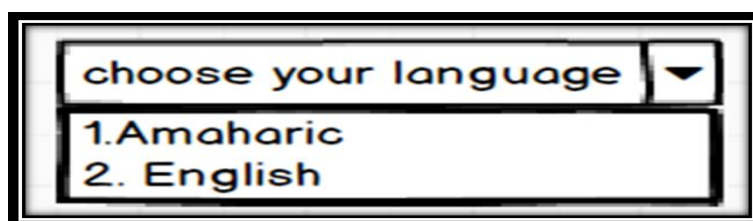


Figure 6: Farmer Language Selection Applications

Based on their selection language the farmers will get the following (Figure 7) information on their mobile phone to get different information based on their needs.

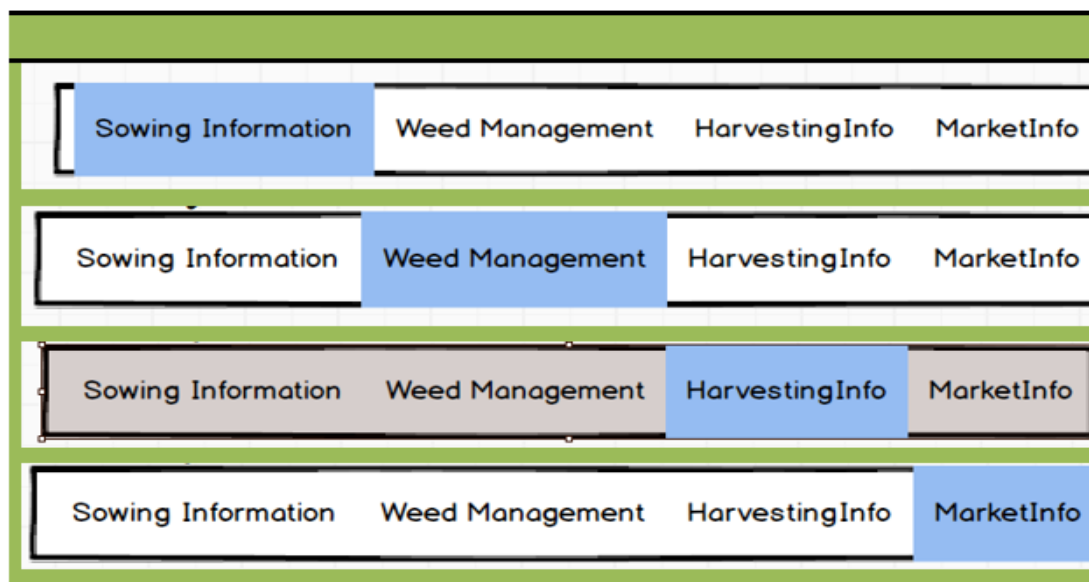


Figure 7: Farmers Application Provide on the Model

XII. Conclusion and Recommendation

Now a day ICT in agriculture play a great role to disseminate real information for the farmers and agricultural extension service providers. Despite the broad potential of ICTs that benefits farmers; they have not been spread evenly, the developing countries particularly the rural population have been significantly been left out of the information revolution. Getting access to market and marketing information's are restricted by factors such as less road infrastructure, under education, financial problems, poor communication skills, poor technology coverage, less ICT technology usage and problems of getting real time information about nearby market according to the analyzed data gathered from the farmers, the analyzed data gathered from five areas of debereberhan zone indicates that the flow of information was not enough through mobile in order to get real time information due to shortage of the technology deliverance to all farmers, the farmers are always dependent on the agricultural workers to get any information about their agricultural input .

Android is an open source mobile phone operating system developed on Linux environment by Open Handset Alliance led (OHA) by Google. Android is recently, the most commonly used operating system on the globe. And it is increasing in its users, mobile phone, tablets when compared with other mobile phone operating system. For installation and configuration it includes Android SDK, ADT plug-in, AVD manager, and java. It passes through different APIs to get access application framework layer. Android developers use Java and Xml to develop application. Mobile applications model in general and mobile applications for agricultural and rural development in particular hold significant potential for advancing development especially in rural areas of semen shewa zone is around 80% of the farmers are interested to use mobile information model, some of them can read text format and moderately some of them can hear by voice averagely, due to this information developing mobile based model application to enhance real time information and advice for the farmer is very important and reducing middle men(brokers) by this developed model can play great role for the farmer in order to get real time market information and agricultural information any time anywhere accessible. The developed mobile based application model was to enhance different services for the farmers and agricultural extension service providers in different ways by improving the former problems with related to agricultural information about real time market information at anytime and anywhere through their mobile phone even if number of educated farmers are less than number of uneducated farmers as the data predicted from the gathered information from the farmers and farming extension workers from each woreda.

XIII. Recommendations

As we already mentioned the importance of mobile based farmer assistance model for small holder farmers in north show zone and it is very important to add the following points: Developing and implementing Android Application for the farmers Applying this model by implementing as a project for all regions (using their local language) and which supports all mobile platforms types Adding more information about farming and assistance techniques are further working at all Ethiopian regions and woredas with their own language by solving language barriers.

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