

SCALING UP THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES FOR SMALLHOLDER WOMEN FARMERS IN THE COVID-19 PANDEMIC CRISIS IN KENYA

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Abstract

Women play an important role in agriculture in developing countries making up over 50 percent of the smallholder farmers. In Kenya, farming is done under smallholder farm systems dominated by women farmers. Information on agriculture production is shared by agricultural extension agents through education activities like demonstrations and farm visits, a situation that is favourable to women farmers. The mitigation measures to prevent the spread of COVID-19 pandemic challenge sharing of information through these traditional extension methods. Information and Communication Technologies (ICTs) sector is well developed in Kenya and presents opportunities for agricultural extension agents to overcome the emerging challenges. This paper is based on a theoretical review of literature on scaling up the use of ICTs for agriculture development, and particularly by women. Scaling up involves the realization of more quality benefits to people over a wide geographical area fast, equitably and in a sustained way. The power of ICT in knowledge management plays an important role in meeting challenges related to sharing and disseminating information and innovations. ICTs are further recognized as crucial in changing the delivery of agricultural extension services. Diffusion of Innovation Theory and the Technology Acceptance Model indicate that innovations are adopted based on the perceived usefulness people attach to them. In scaling up, the advantage of ICTs use in meeting the agriculture information needs of the smallholder farmers must be clear to increase adoption and sustainable application.

Keywords: Agriculture Extension, COVID-19, Information and Communication Technologies, Scaling up, Women Smallholder Farmers

Introduction

Women are responsible for half of the food production in the world and produce 60 to 80 percent of food in many developing countries. In Sub-Saharan Africa, 50 percent of the agricultural labour is made up of women (World Bank, 2014; Food and Agriculture Organization [FAO], 2011). Women are at the frontline in food production and food security at the household and community level (Onyalo, 2019). In Kenya, agriculture is regarded as the backbone of the economy contributing about 25 percent of the Gross Domestic Product (GDP). Agriculture further supports the livelihoods of 80 percent of the population. In addition, the agricultural sector employs over 40 percent of the population and contributes to the livelihood of more than 70 percent of the rural population (Republic of Kenya, 2017). Agriculture in Kenya is dominated by smallholder farming in parcels of land of about 2 acres in which around 80 percent of agricultural production occurs (Muriithi, Bett and Ogalleh, 2012; World Bank, 2014). Thirty percent of farming households in Kenya are headed by women who derive the livelihoods of their families from their farms. Women are thus important stakeholders in the agriculture sector taking key roles in small animal farming, food preservation, processing, marketing and food utilization (Republic of Kenya, 2017). Hence it is critical for the government of Kenya to respond to the needs of women in agriculture. In particular, information needs in agricultural production must be addressed appropriately (Onyalo, 2019).

The Sustainable Development Goals (SDGs) aligned to Agenda 2030 have been adopted by many governments. Goal 5 on gender equality has one of the targets as empowering women

through Information and Communication Technologies (ICTs). The target emphasizes the need to enhance technology and specifically ICTs in order to promote the empowerment of women (FAO 2018). Goal 9 on Industry, Innovation and Infrastructure, target 8 emphasizes the need to increase access to ICTs so that they are available and accessible in the least developed countries by the year 2020. In the year 2003, the Food and Agriculture Organization (FAO) gave recommendations for bridging the digital divide at the World Summit on the Information Society (WSIS) in Geneva, Switzerland. The recommendations outlined important factors for success in the use of ICTs. The factors included agriculture content from trusted sources and mainstreaming gender and diversity, access and participation and having the right mix of technologies. The potential of ICTs in communication presents an answer to the devastation on economic and social activities brought about by the COVID-19 pandemic in the world.

COVID-19 or Corona virus was declared in March 2020 as a pandemic by the World Health Organization (WHO). The disease has quickly spread into many countries throughout the world (WHO, 2020). As a respiratory disease, COVID-19 is highly contagious and is spread through close contact. This is when people speak and the saliva droplets or discharge from the nose of an infected person reaches the eyes, mouth and nose of another person. Contact can also be when people shake hands and touch contaminated surfaces. Since there is no treatment for the disease, the recommendations by World Health Organization (WHO) to prevent its spread involve community mitigation strategies. They include suspending events in which people gather together, social or physical distancing to prevent close contact between people and home quarantine of members of households. The Kenya government has recommended that people work from their homes to avoid infections and to prevent the spread of the disease. This means that agricultural extension officers cannot hold meetings with farmers and the visits by farmers to government offices to seek information are limited.

The spread of COVID-19 pandemic has presented not only health but also social and economic crises that have implication on various sectors (Doss, Njuki and Mika, 2020). Women farmers like working in groups and form important networks among them that enable sharing ideas and solving problems. COVID-19 challenges the role of women in agriculture because of the restrictions on how they interact with one another, with agricultural extension officers and researchers. The limitation in movement and social gathering means that agriculture extension services are to a great extent reduced. Further, the women cannot meet in their groups from where information on new agricultural innovations is often shared. The impact of COVID-19 will thus have gender implications that require restructuring of the way service institutions for agricultural information sharing work.

In Kenya, there has been tremendous growth in the ICT sector especially the mobile phone which by 2013 had 31.3 million subscribers. Kenya's Internet Exchange Point (KIXP) is rated as a successful model in the public and private partnership in many developing countries. Kenya is also among Africa's finest in ICT innovation. The status of ICTs in the country thus provides a valuable environment for incorporation in agriculture (Republic of Kenya, 2014). Information and Communication Technology (ICT) is a well-developed sector in Kenya (Birch, 2018) that can be tapped to appropriately overcome the challenges of COVID-19. This paper provides a review of the value of ICTs and how their use can be increased to target smallholder women farmers who contribute immensely to agriculture production. The use of ICTs can ensure that women access information for agriculture production in the pandemic period and beyond.

Literature Review

The literature review addresses the contexts of scaling up, use of ICTs in agriculture and access and use of ICTs by farmers. Scaling up is defined as the process of realizing more quality benefits to people over a wide geographical area fast, equitably and in a sustained way (Ajayi, Fatunbi and Akinbamijo (2018). It is also referred to as the effort to enhance the impact of technologies that have been successfully tested to benefit more people. In agriculture, scaling up implies expanding the beneficial impact of an idea or a technology to realize a greater impact from proven technologies after testing them with farmers. Scaling up has two dimensions; the vertical scaling up and the horizontal scaling up. The former focuses on institutions and incorporates all stakeholder groups and is summed up as institutionalization. Horizontal scaling up refers to geographical spread or expansion of an idea to more people and communities in the same sector. It is termed as scaling out or adoption (Gundel-Hancock and Anderson, 2001). Within the ministry of agriculture, agricultural extension agents play a key role in the dissemination of agricultural information on new technologies. The aim is to improve agricultural productivity and promote food security, improve incomes and reduce poverty (International Food Policy Research Institute [IFPRI], 2009). Agricultural extension agents can therefore take up the role of horizontal scaling up of Information and Communication Technologies (ICTs) for women smallholder farmers.

Information and Communication Technologies (ICTs) are devices, networks, services and applications that include radio, telephones, mobile phones, television and satellites (Food and Agriculture Organization [FAO], 2018). The power of ICTs in knowledge management can play an important role in meeting challenges related to sharing and disseminating information and innovations. ICTs are further recognized as crucial in changing the delivery of agriculture extension services but the challenge is on content, infrastructure and scaling up (Chauhan, Patel and Kumar, 2016). According to Lokeswari (2016) ICTs have tremendous potential to improve agriculture income and livelihoods and this is especially relevant in developing countries. The author suggests that ICTs use should be adopted extensively in the rapidly changing world taking advantage of the digital revolution to reach clients with special needs. Lokeswari from a study in India among smallholder farmers reports that when ICT is used frequently it is considered helpful, beneficial and leads to a positive attitude towards application. The recommendation in the study was to encourage ICT tools use in rural areas through infrastructure development and training on application among smallholder farmers.

ICT tools can provide a wide range of information on technical issues in agriculture for women farmers as well as solve common problems that the farmers encounter (Nkomo, 2018). ICTs like mobile applications can be used by women farmers to learn about best practices and how to improve their own farming in terms of organization and management. Mobile phones are an asset for development that enables the rural poor to respond to opportunities that increase access to information. Findings from a study in Uganda indicated that mobile phones were adopted for agriculture purposes to seek advice and information. They saved time and money, enhanced consultation and coordination. While women used the phone less, they were more likely to use it to access agricultural information compared to the men (Martin and Abbott, 2011). ICTs are also a unique tool in the fight against poverty. They have been associated with increase in efficiency, productivity and communication in areas where they are in use (Freeman and Mubichi, 2017). Various ICT devices like the mobile phone and computers can be the answer to share high quality information and education opportunities to the poorest people in the world (International Telecommunication Union [ITU] 2015). ICTs such as radio, mobile

phones and television are sources of information for farmers in rural areas which can help smallholder women farmers to create networks with one another. The impact of ICTs can be more if spread over a wide area and more so to reach an important group of farmers like women. ICTs offer promising value in the sharing of information and hence can have a positive impact in decision making by women in agricultural activities.

However, women face a triple challenge in the digital divide, that is, digital, rural and gender. Gender divide numbers in ICTs indicate that in Sub-Saharan Africa 30 million females are not digitally connected. The International Telecommunication Union (ITU) in (2017) estimated that in Africa the proportion of women using internet was 25% lower than that of men (FAO, 2018). The triple divide in particular affects women in rural areas whereby they are marginalized with respect to access and use of ICTs compared to men. Women also have limited knowledge and skills in the use of ICTs. While ICTs provide a variety of ways for sharing information with farmers there exists inequalities in access that leave out women farmers often favouring men. When rural women have less access to information and communication technologies compared to men, it means they may not make informed choices on agriculture production.

Wayan (2018) indicates that there are three errors of concern in the use of ICTs for agriculture intervention. They are that; ICTs are gender neutral; smallholder farmers are a homogenous group and having interventions that focus only on women. Hence a gendered approach is important in promoting the use of ICTs in a way that will benefit smallholder women farmers. This would require finding the status of ICTs use by both men and women. It is also necessary to appreciate that men and women have different and specific needs, challenges and opportunities in using ICTs. Men and women have different opportunities in the use and access to ICTs determined by availability of the physical infrastructure and socioeconomic factors like knowledge and skills. Gender thus becomes a mediating factor in ICTs use. It means that rural women in developing countries have least access to ICTs due to lack of financial resources. Technological or language illiteracy, cultural norms that may discourage use and ownership of technologies are additional barriers (Tata and McNamara; 2011; Manfre, 2011). In order to be effective, ICTs should thus be designed to overcome gender specific constraints (Manfre and Nordehn, 2013).

According to Syiem and Raj (2015), constraints farmers face in use of ICTs like the mobile phone are varied. They include lack of; confidence and skills in operation, awareness of how to use it properly to derive its benefits and attitudinal barriers. Most phones use the English language in their menus which many farmers may not understand. The authors suggest the need for training and practical exposure on use of mobile phones to benefit farmer for agriculture and rural development. Wayan (2018) suggests that a family-centred or community-centred approach to the use of ICTs is required. This will help not to alienate women from their husbands especially because ICTs are usually shared in the family. A technology like the radio can be controlled by the men. Women access the radio only when their husbands are not using it. A family-centred approach can result in more equitable sharing of ICTs in a way that benefits both men and women engaged in farming. For instance men can own and access the radio the whole day but women intermittently most likely when men are not using it. Agriculture information programmes that target women can also be scheduled at times that women can receive the information (Freeman and Mubichi, 2017).

A study by Kante, Oboko and Chepken (2016) found that perception of the value of ICTs, the quality of information and cost influence adoption. A perception towards ICTs of compatibility, relative advantage and simplicity had a positive influence on adoption and so was quality of information received through ICTs. On the other hand high cost of ICTs had a negative influence on adoption. Individual characteristics like income, education, age, livelihood activities and gender most of them attributable to women farmers can also influence technology adoption (Freeman and Mubichi, 2017). ICTs can also be understood from the e-agriculture perspective which is considered an important option in sharing innovative approaches in agriculture production. E-agriculture involves the designing, developing and applying of innovative ways in the use of ICTs with a main focus on agriculture (Food and Agriculture Organization [FAO], 2018). The expectation in e-agriculture is to boost agriculture and rural development. This is by enhancing access to information that will help those who depend on agriculture as a means of livelihood. The components of the strategy incorporate funding, coordination and identifying key actors in the design and implementation. The e-agriculture strategy guide was developed in collaboration between International Telecommunication Union and Food and Agriculture Organization. It can be a key starting point for a country to develop its own strategy and master plan for agriculture information sharing benefiting especially the women farmers.

Pandemics and epidemics often require more time of caring for the sick by women. The closure of schools increases more work for women as they take care of their children. In addition, COVID-19 requires additional sanitation especially hand washing and hence more need for water that is a burden for women (Doss, Njuki and Mika, 2020). Smallholder women farmers can thus be targeted as a special needs groups because of the circumstances in which they work and the resources to which they have access. Women, further, have multiple roles in the family and community as mothers, caregivers, foods producers in the farms and processors for sale and utilization by members of the family.

Theoretical Analysis

The scaling up the use of ICTs for women smallholder farmers can be informed by the Diffusion of Innovations theory (DOI) (Rogers, 1995), and the Technology Acceptance Model (TAM) Davis (1989). Diffusion is the process in which an innovation is shared in a social system through time. The innovation can be objects, idea, practice or behaviour that is new to the individuals within a system. Diffusion of innovations states that the rate of adoption of an innovation is determined by how it is perceived by the users. ICTs is an innovation whose use and relevance among smallholder women farmers can be understood in view of the five attributes of innovations described by Rogers. The five attributes of innovations include relative advantage, compatibility, complexity, trialability and observability. Relative advantage is the degree to which an innovation is viewed as being better compared to another already in use. The reference for the assessment is in terms of economic value, social status and any other benefits considered of importance to the individual or group. ICTs can have these values for smallholder women farmers in a variety of ways.

A technology like the mobile phone can be advantageous because it can enable the women farmers to save time as well as improve time management. Since the mobile phone is portable, it eliminates the need to be physically present in a particular place. Thus it helps to overcome social distance and social gathering restrictions because of the COVID-19 pandemic. The women farmers can also save information received through mobile phones from agriculture extension agents for future reference. In addition, decrease in discomfort or social approval or

perception of little risk leads to higher adoption of an innovation. Agricultural extension agents can advocate for greater use of ICTs by capitalizing on strength of saving of time, effort and quick access to required information.

Compatibility deals with the extent to which an innovation meets a felt need. As pointed out by Freeman and Mubichi (2017) the adoption of innovations require training on how to use skills, trust that it can meet their needs, supporting technology and infrastructure. The challenging circumstances of COVID-19, creates a need to access information in a way that is safe hence ICTs become an appropriate intervention. Another aspect of adoption of an innovation is complexity or the extent to which a technology is perceived as difficult to understand and use. A technology is often subjected to a complexity-simplicity continuum. A technology perceived as easy to apply and manage is accepted faster in comparison to one that requires expertise. ICTs use can cause frustration because the women farmers may not have the technical expertise to navigate the applications for accessing information. The women farmers may also have challenges communicating their needs to agricultural extension agents and researchers. Greater use of ICTs by women farmers requires agriculture extension agents to promote interventions to overcome barriers real or perceived that limit their use. This can be through developing simple instructions on self-directed learning on use of ICTs like the radio, videos, internet and mobile phones to access agricultural information.

The Technology Acceptance Model (TAM) developed by Davis (1989) states that the user's motivation or attitude towards a system affects intentions which then lead to a given behaviour (Davis, 1989; Chuttur, 2009). The model has two constructs that can inform behavior towards the use of ICTs. The first is 'perceived usefulness' meaning the degree to which a person believes that a given system would enhance performance in their work. The second is 'perceived ease of use' or the degree to which a person believes that a given system will not require physical or mental effort to use. Also analyzing behaviour towards new ideas, Bandura (1982) explains that behaviour is best predicted by self-efficacy and outcome judgments. Self-efficacy is similar to perceived ease of use or ability to carry out courses of action needed to deal with certain situations. Outcome judgment is about the perceived usefulness or extent to which a decision made will lead to valued outcomes. Perceived usefulness and ease of use raised in the two models can be the focus for ICTs use in agriculture extension activities. In the dilemma of the COVID-19 pandemic, agricultural extension agents can make it the norm to share information with smallholder women farmers through ICTs. Figure 1 illustrates how the use of information and communication technologies can be guided by the Diffusion of Innovation Theory and Technology Acceptance Model.

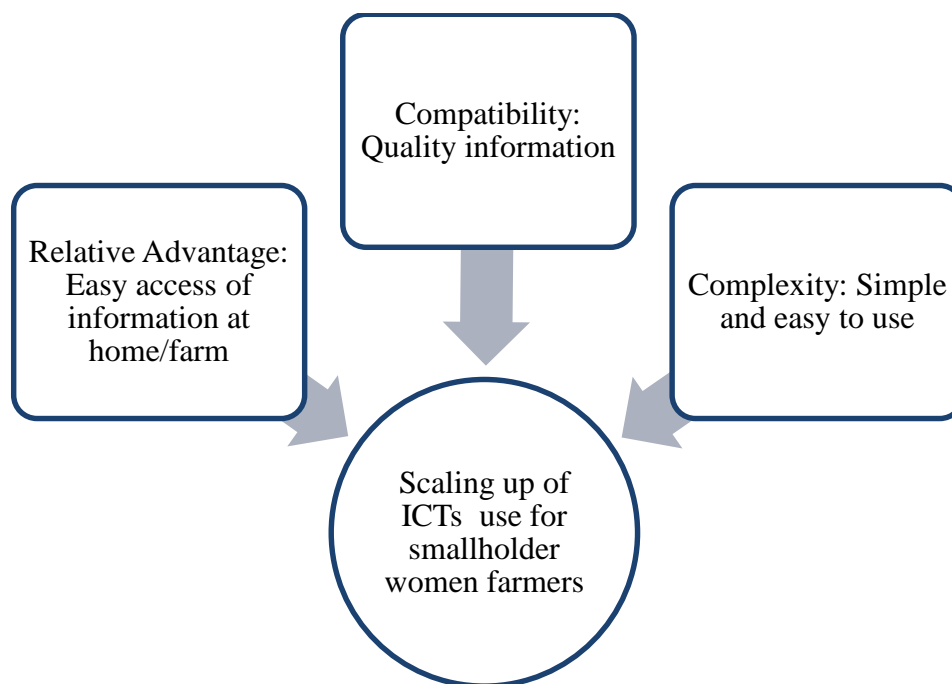


Figure 1: Guideline for promoting the use of ICTs by smallholder women farmers
Adapted from: Rogers, E.M. (1995). *Diffusion of Innovations*; Davis, F.D. (1989). *Technology Acceptance Model*

Application

COVID-19 has presented a new norm in terms of how people work and interact. It includes working from homes, reducing person-person contact and taking advantage of digitalization to communicate. Institutions that work with women farmers in the agriculture sector need to consider expanded use of ICTs. The ministry of agriculture in Kenya can make it a tool to share information on improving agricultural productivity for women farmers. The use of electronic media has gained momentum since the outbreak of the COVID-19 pandemic. Telephones, computers, radio, television and internet have replaced physical transactions that require paper work and meetings in learning and training. Radio, television, computers and internet can foster networks and support systems for smallholder women farmers to acquire and share information. Thus empowering women through ICTs can raise farm productivity and ensure household and community food security amid the COVID-19 crisis. ICTs can expand ways in which women farmers can access information if it is packaged in a form that women can easily use and apply. Agricultural extension agents can emphasize the use of ICTs to share information and innovations with women farmers in a way that is cost effective and efficient. ICTs use can be scaled out by agricultural extension agents to share information that instills knowledge and methods that impart skills to women farmers. The ICTs will counter the information gaps for smallholder farmers that have arisen from the travel and social contact constraints due to the COVID-19 pandemic. Appreciation of women's information needs by agricultural extension agents is therefore important.

The ICTs sector is well developed in Kenya and almost every farmer owns a mobile phone. ICTs use should be adopted extensively to take advantage of the digital revolution to reach

clients with special needs like the smallholder women farmers. It is the role of agricultural extension agents to change the attitude of the farmers toward the use of ICTs. A positive attitude on usefulness and ease of use will enhance application of ICTs in learning new farming methods. Increased use of ICTs will improve efficiency in the agricultural value chain for better outcomes and livelihoods for smallholder women farmers in Kenya. Through radio broadcasts, mobile phones, internet and other ICTs, the women farmers can share and receive information on agriculture development.

Conclusion

Women farmers play an important role in agriculture in Kenya. They are at the forefront of agricultural production and utilization and ultimately contribute in a significant way to food security. Women prefer learning in groups, in hands-on activities and also through face to face contacts with extension agents such as farm visits. The COVID-19 pandemic outbreak presents challenges to sharing of information due to the requirement of maintaining social distance and restriction of group gatherings. ICTs are effective in sharing knowledge, improve access to information and present a solution to overcoming the limitations of COVID-19. Their use will thus ensure women farmers continue receiving much needed information for agricultural production. The impact of ICTs can be greater if spread over a wide area to reach many women farmers. In scaling up, the advantage of ICTs use in meeting the agriculture information needs of the smallholder farmers must be clear. ICTs will be acceptable to smallholder women farmers by ensuring information is packaged in a way that they understand, can access and easily use. Adoption and sustainable application of ICTs will have a positive impact in decision making by women smallholder farmers.

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