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Delivery mechanisms of agricultural information and knowledge to smallholder farmers in Tanzania: A meta–analysis study

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Abstract

Regardless of concerted interventions and initiatives made to foster agricultural information and knowledge delivery to smallholder farmers, access to these resources remains largely poor in rural Tanzania. To gain insights, the present study examined the delivery mechanisms of agricultural knowledge among smallholder farmers in Tanzania. The study employed a meta-analysis approach where 20 extant studies on agricultural information and knowledge in Tanzania were reviewed. During data analysis, Microsoft Excel 2010 was used to perform descriptive statistics analyses. The study's findings reveal that there are various sources and delivery mechanisms of agricultural information and knowledge to the smallholder farmers in Tanzania. The findings further expose that there is no consensus on channels that are most suitable for delivering these resources to rural areas. While some prior studies show mass media as predominant sources, others inform that oral information and knowledge delivery mechanism are a prime sources and channels. Besides, the study reveals that rural Tanzania is not immune to factors that constrain delivery of agricultural information and knowledge. Factors like lack of communication tools, illiteracy, irrelevance of content, packaging information using languages farmers are not conversant with, lack of power supply, and limited income limit information and knowledge delivery and access. To speed up agricultural information and knowledge penetration to smallholder farmers in rural Tanzania, farmers groups, demonstration plots, farmers' field study tours, agricultural shows and NGOs are recommended as sources and channels.

Keywords: Agricultural knowledge, agricultural information, knowledge delivery mechanisms, Tanzania

Introduction

It is common knowledge that in the global community today, information and knowledge are driving forces of various production sectors. Nicholas-Era (2017) informed that agricultural information and knowledge are regarded as crucial resources and key requirements in efforts to transform the agricultural sector. In the same regard, a study conducted by Mtega, Ngoepe and Dulle (2016) revealed that among other factors, access to agricultural information and knowledge can influence change and lead to progress in the agricultural sector by empowering people with the ability to make informed decisions on food production. From this, it is important

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to note that the development of agricultural sector in Tanzania depends on the availability of appropriate agricultural information and knowledge (Mkenda et al., 2017). This view was also supported by Kaske, Mvena and Sife (2017) who assert that in order to bring substantial development in the agricultural sector, access to timely, reliable, and relevant agricultural information is critical. In fact, this signifies that the prosperity and growth of the agricultural sector will actually depend on smallholder farmers' ability to acquire, access, and use relatable agricultural information and knowledge. Other scholars (e.g. Mwantimwa, 2019; Silayo, 2016; Gunasekera and Miranda, 2011; Lwoga et al., 2011) noted that access to agricultural information and knowledge can influence change and lead to progress in the agricultural sector by empowering people with the ability to make informed decisions on agricultural production. In all, success in any farming activity has a link to proper usage of agricultural information and knowledge.

While supporting the importance of agricultural information and knowledge to smallholder farmers' production, Nyamba (2017) informed that agricultural knowledge has always been an important component of agricultural development processes. Likewise, a study conducted by Funom and Soyemi (2019) in Nigeria, on information dissemination among soya beans farmers' reports that information and knowledge can bring change in the way people do farming. This is so due to the fact that a well-informed farmer is in a good position to make decision on what to grow, where, when and how to do it in order to have positive results. Nyamba (2017) adds that the most commonly searched information by farmers has been on know-how aspects which give them fundamental agricultural facts. This corroborates findings by Mittal and Mehar (2015) that expose that farmers always require latest agricultural information on inputs, technology, seed, pest and weed management, agronomic practices, prices, and government run agricultural schemes or programmes. This suggests that efforts to improve agricultural production need to be well organized and coupled with functioning integrated agricultural information and knowledge delivery mechanisms (Mubofu & Elia, 2016). In support, a study carried out by Das (2012) discloses that access to timely and relevant agricultural information and knowledge can translate into success in farmers' efforts to up their productivity. As a result, scholars (e.g. Mwalukasa, 2013; FAO, 2017) opine that successful delivery of agricultural information and knowledge to the smallholder farmers is very important in efforts to improve food production.

Over the years, the government of Tanzania has been making numerous efforts to foster the delivery of agricultural information and knowledge to smallholder farmers so as to improve production. Among these, notable ones with focus on access to agricultural information and knowledge include the formulation of the National ICT Policy in 2013 and its amendment in 2016 that aims to transform the agricultural sector from subsistence to a commercialized one (URT, 2016). Another initiative is the establishment of community telecentres in various places such as Lugoba, Mpwapwa, Ngara, Dakawa, Kilosa, Mtwara, and Kasulu so as to ensure smallholder farmers, especially those with minimal access to telecommunication services, have access to agricultural information and knowledge. Apart from that, the government provides training to extension officers and deploys them throughout the country to ensure that smallholder farmers get reliable and timely agricultural information and knowledge for agricultural development. Along these government efforts, big mobile companies such as Vodacom, Tigo, and Zantel have established mobile services through which smallholder farmers can request for and access agricultural information and knowledge related to their production activities.

Despite these intensive interventions and initiatives to enrich the delivery of agricultural information and knowledge to smallholder farmers, the delivery of these resources, in Tanzania, remains largely poor. On this, Nyamba (2017) informed that despite the importance of agricultural information and knowledge to smallholder farmers, most farmers in developing

countries, Tanzania in particular, lack access to them. Evidently, although considerable amounts of agricultural knowledge generated, only a small portion of it reaches smallholder farmers (Siyao, 2012). This constrains efforts to improve agricultural development. In other words, unavailability of reliable and timely agricultural information and knowledge to smallholder farmers is responsible for the poor agricultural production (Mwalukasa, 2013, & FAO, 2017). Surprisingly, prior literature (see Siyao, 2012; Mtega, 2017; Mwantimwa, 2017) reveals that in Tanzania, the production of agricultural information and knowledge by the Ministry of Agriculture, agricultural research institutes, different agencies and higher leaning institutions is good enough to meet the current needs of smallholder farmers. On the whole, little research attention has been paid by researchers to synthesise results from studies on agricultural information and knowledge delivery mechanisms. Against this background, the present study examines extant literature on delivery mechanisms of agricultural information and knowledge among smallholder farmers in Tanzania. Specifically the study systematically reviews results of previous studies on sources of agricultural information and knowledge provided to smallholder farmers; channels used to deliver agricultural information and knowledge to smallholder farmers and challenges undermining the accessibility of agricultural information and knowledge among smallholder farmers in Tanzania.

Literature review

To increase agricultural production, proper mechanisms for delivering agricultural information and knowledge from the producers to the smallholder farmers must be in place. Studies (e.g. Ballantyne, 2009; Sarker and Itohara, 2009; Siyao, 2012) reveal that access to agricultural information and knowledge increases smallholder farmers' awareness on different agricultural developments and challenges hence allowing them to take appropriate livelihood actions. In the same context, Dulle (2008) adds that agricultural information and knowledge acquaints people with news and better farming methods, improved seedlings, modern pests control measures, and storage mechanisms. In line with the prior studies, a study conducted in India by Bachhav (2012) found that the use of agricultural information and knowledge such as those on weather trends, agro-forestry, agricultural incentives, improved seed varieties, and best farming practice are important for smallholder farmers to improve productivity (Misaki et al., 2015; Mtega, 2018).

Along that, Opara (2008) argues that there is no doubt about the ability of relevant and reliable agricultural knowledge to improve agricultural activities. This suggests that if the produced agricultural information and knowledge do not reach smallholder farmers, transforming agriculture and smallholder farmers' livelihoods remains impossible (Musawi, 2014). Fanon and Soyemi (2019) inform that agricultural information and knowledge delivery is the avenue for transferring agricultural innovations and techniques to smallholder farmers through appropriate media in order to achieve increased level of productivity and sustainability. Also, Chizoba and Anunobi (2017) in their study informed that for agricultural production to improve there should be adequate knowledge, education, and adoption of modern farm practices. It is worth noting that effective delivery of agricultural knowledge can successfully fuel a rise in agricultural production by helping smallholder farmers in their decision making about various farm matters including the uptake of innovative farming technologies (Mwantimwa, 2012 & Silayo, 2016).

Reviewed prior studies indicate that agricultural information and knowledge comprise innovations, advice, techniques, skills, technologies and regulations that are supposed to be

delivered to the smallholder farmers. For example, Adio et al. (2016) classify agricultural information and knowledge that are required by the smallholder farmers into mainly four categories namely; technical/scientific, commercial, socio-cultural, and legal. According to the authors, technical agricultural knowledge are those created by researches in universities, agricultural research institutes, colleges, and private research organizations while commercial information is generated by business agencies and financial institutions on matters such as markets, prices and credits. Socio-cultural knowledge on the other hand, are those on traditional agricultural practices while legislated laws of production and distribution of agricultural produces fall under the legal knowledge category.

Agricultural information and knowledge exist in various sources and formats before being delivered to farmers for usage. To support this, Adhiguru (2009) asserts that smallholder farmers receive agricultural information and knowledge from a multitude of sources. A number of studies have indicated various sources and channels of information and knowledge used to deliver these resources to smallholder farmers. For example, Adhiguru, Birthal and Kumar (2009) classified the information sources into two categories namely; one-way multipurpose communication sources and two-way multi-purpose sources of agricultural information. According to authors, sources like training, demonstration plots, agricultural shows, farm field tour, NGOs, fellow progressive farmers, cooperate societies, buyers and input dealers are considered as two-way while radio, television, and newspapers are one-way sources. Kumar (2010) adds that while some channels support two-way traffic, others are one way. For instance, print media a channel that exists in form of newspapers, magazines, posters, fliers, banners, brochures, books, leaflets, newsletters, and reports and accessible through libraries and information resource centres are is one of the key sources of agricultural information and knowledge for smallholder farmers (Luambano, 2013; Yusuf, 2014; Mkenda et al., 2017).

Regarding the accessibility of agricultural information and knowledge from various sources, Yusuf (2014) informed that smallholder farmers can be provided with agricultural information and knowledge from various sources through different mechanisms such as agricultural extension services, fellow farmers, meetings, workshops, seminars, print materials including brochures, newspapers, magazine, fliers and posters as well as broadcasting media such as radio and television. On the same context, a study conducted by Musawi (2014) exposed that due to the technological advancements, agricultural information and knowledge can be delivered electronically through the Internet, telephone lines, mobile phone technologies, radio, and audio visual resources. Similarly, a study conducted by Yusuf (2014) on rice production in Mbarali district in Tanzania found that about 52.9% of smallholder farmers mention radio as a reliable mechanism for delivering agricultural information and knowledge, followed by extension officers (50.6%) and relatives (49.4%). However, Duta (2009) revealed that lack of electrification, costs of batteries, and unfavourable timing of radio and TV programmers hinder smallholder farmers' access to agricultural information and knowledge delivered through electronic media. Also, Ngogo (2013) conducted a study on the marketing of fruit assets and found that the most predominant information delivery mechanism for Tanzania rural dwellers are fellow farmers, extension officers and broadcasting media such as radio and television. Yusuf (2014), citing Rivera (2007) was of the view that extension services are vital in the delivery of agricultural information and knowledge to the smallholder farmers and making sure that farmers are used to desired technologies.

However, despite the fact that authors mention various mechanisms of delivering agricultural information and knowledge, the actual usage of these mechanisms is a far cry of what it needs to be. Challenges such as lack of access to useful knowledge and information, lack of information centres, inadequate extension officers, and ignorance of information sources are some of the factors undermining the delivery of information and knowledge (Galadima, 2014). Similarly, Opara (2008) adds that delivery of information is limited by a number of factors which include

the low literacy level, lack of access to radio and television sets, lack of financial resources, inadequacy of human capacity, and lack of legal frameworks at national and international levels to support information service provision to rural areas. On the same note, Babu et al. (2012) also observed that the major constraints to information access for smallholder farmers is poor availability and reliability of sources, lack of awareness on information sources available, and untimely provision of information. In addition, Daudu et al. (2009) noted that financial constraint, inadequacy and unreliability of information infrastructure, lack of information professionals, and the presence of irrelevant information are some of the factors that affect the delivery of agricultural information and knowledge to small-scale farmers.

A study conducted by Daniel et al. (2013) reveals that access to correct information by smallholder farmers seems to be unsatisfactory due to poor coordination of agricultural extension services. Also, in this regard, Swai (1993) found that the ratio of extension officers to farmers is very poor; making the information provision role not manageable. Similarly, Dulle et al. (2014) adds that lack of information services, inadequate number of extension agents, inadequate funds, and lack of awareness on information sources were the main factors affecting information delivery to smallholder farmers. Apart from that, Mkenda et al. (2017) reports that all these challenges that might influence the accessibility of agricultural information and knowledge to farmers are associated with institution, physical, social, and intellectual factors. According to the author, institutional factors are those related to unwillingness, poor information dissemination, or poor linkages between research institutes and farmers. Along that, social factors are those related to fears that block efforts to meet information needs within a society while physical factors are those related to inability to contact the appropriate information providers due to some physical factors. On the other hand, intellectual factors have to do with lack of necessary training and expertise to acquire information.

Methodology

The study employed a meta-analysis approach which is a systematic review and integration of findings from previous studies (Haidich, 2010). The approach was employed to examine the delivery mechanisms of agricultural information and knowledge to the smallholder farmers in Tanzania. This study was a desk research in nature. This was preferred due to the fact that desk research provides researchers with baseline information for further studies (Mwantimwa, 2020). The studies reviewed were published by different scholars (e.g. Mtega, 2017; Lwoga et al., 2011; Barakabitze et al., 2015; Mkenda, 2017; Mtega & Ngoepe, 2018 etc.). Twenty (20) studies selected were conducted between 2011 and 2018. The retrieved studies were conducted in different regions such as Iringa, Morogoro, Dodoma, Tanga, Kagera, Mbeya, Arusha, Ruvuma, Morogoro and Kilimanjaro; all in the mainland Tanzania.

Prior to analysis, a thorough literature search was conducted and relevant articles were identified. Literature searched from different databases and retrieved through Google Scholar by using a customer range (i.e. 2011 through 2018) and sorted by relevance has been used in the study. Customer range and sort by relevance were important parameters during the literature search. The choice of this time interval was necessary to accessing current studies. To get relevant studies related to agricultural information and knowledge, different terms (e.g. “agricultural information and/or Tanzania”, “agricultural knowledge and/or smallholder farmers Tanzania”, and “delivery of agricultural information and knowledge” were used to generate search results. These terms helped to access relevant extant studies conducted in Tanzania.

During data analysis, contents in the twenty studies were identified, categorised and critically analysed to determine how agricultural information and knowledge are provided to the smallholder farmers in Tanzania. In particular, three themes (i.e. sources, channels of agricultural information and knowledge and challenges limiting the access and use of agricultural information and knowledge) were used. Accordingly, descriptive statistics (i.e. frequency and percentages) were performed by using Microsoft Excel 2010 to generate study results.

Study results

Sources of agricultural information and knowledge

Sources of agricultural information and knowledge are diverse. To gain insights on those reported to be used to provide agricultural information and knowledge to smallholder farmers, the retrieved literature were reviewed. Analysis on sources of agriculture information and knowledge indicated that farmers used wide range of sources as Table 1 presents:

Table 1: Sources of agricultural knowledge and information in Tanzania

Sources of information and knowledge	Frequency	Percent	Rank
Mass media (e.g. TV & radio)	20	100	1
Researchers/advisors	16	80	2
Print sources	16	80	3
Neighbours/friends	16	80	4
Farm groups	16	80	5
Agriculture exhibitions	12	60	6
Extension officers	12	60	7
Training/seminars	12	60	8
Village executives	12	60	9
Mobile phones	8	40	10
Posters	4	20	11

In general, the results expose that smallholder farmers rely on multiple sources of agricultural information and knowledge. Specifically, the study results reveal that all (100%) the reviewed studies reported that mass media were used to deliver agricultural information and knowledge to the smallholder farmers. In particular, Television and radio were the main sources reported in the studies reviewed. This is followed by neighbours/friends, research advisors, print materials and farm groups which were reported by a majority (80%) of the reviewed studies. The results further inform that three fifths (60%) of the extant literature reviewed show that smallholder farmers in Tanzania get information and knowledge from public extension officers, agricultural exhibitions, training and agricultural seminars. Print sources such like posters were least reported (20%) in the literature reviewed.

Channels used to deliver information and knowledge to smallholder farmers

Apart from relying on various sources to access information and knowledge related to their production, smallholder famers in Tanzania need channels to get these resources delivered to

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them. Findings from the reviewed literature on the channels used to deliver information and knowledge are presented in Table 2:

Table 2: Channels used to deliver agricultural information and knowledge

Channels	Frequency	Percent	Rank
Mass media	16	80	1
Friends/neighbours	12	60	2
Extension officers	8	40	3
Fellow farmers	8	40	4
NGOs	4	20	5
Print materials	4	20	6
Voice calls	4	20	7

The study results show that majority (80%) of the reviewed literature indicated mass media as a channel used to deliver agricultural information and knowledge to smallholder farmers while three fifths (60%) cited friends and neighbours. These results suggest that mass media, friends and neighbours are significantly used to delivering agricultural information and knowledge. Besides, two fifth (40%) of the studies indicated fellow farmers and extension officers as channels for delivering agricultural information and knowledge to the smallholder farmers while a fifth (20%) of the studies reported NGOs, print materials, and voice calls.

Challenges faced in accessing agricultural information and knowledge

To increase understanding on access to and use of agricultural information and knowledge, the challenges that hinder these activities in Tanzania were identified from the studies reviewed. Figure 1 presents various challenges that smallholder farmers experience when accessing agricultural information and knowledge in Tanzania:

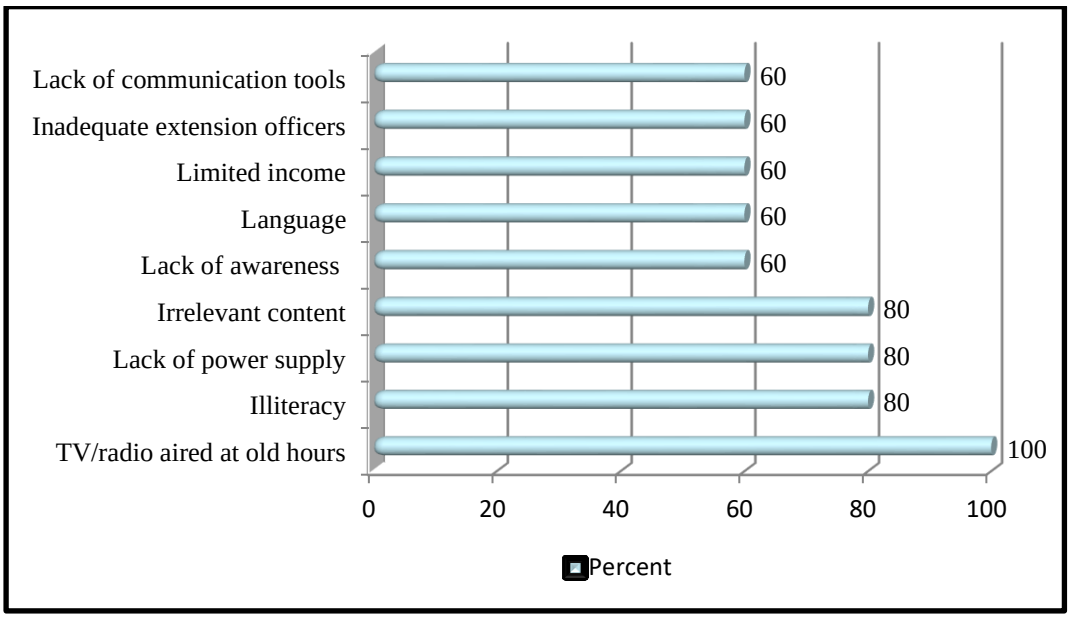

Figure 1: Challenges faced in accessing agricultural information and knowledge

Figure 1 shows that airing television and radio agricultural programmes during odd hours or when farmers are in their farms is the biggest challenge hindering smallholder farmers' access to agricultural information and knowledge as revealed by all (100%) the reviewed studies. Likewise, majority (80%) of the studies showed that illiteracy, irrelevance of content, and lack of power supply in rural areas affect smallholder farmers' access to agricultural information and knowledge. The results further disclose that three fifths (60%) of the reviewed literature reported inadequacy of extension officers, lack of communication tools, lack of awareness, language difficulties, and limited income as the other challenge faced by the farmers in accessing agricultural information and knowledge.

Discussion

The study sought to examine delivery mechanisms of agricultural knowledge to smallholder farmers in Tanzania through Meta –analysis. Specifically the study has determined the sources of agricultural information and knowledge provided to smallholder farmers; identified channels and mechanisms used to deliver agricultural information and knowledge to smallholder farmers and; explored challenges faced by smallholder farmers in accessing agricultural information and knowledge in Tanzania.

The study findings show that smallholder farmers in Tanzania depend on multiple sources to access agricultural information and knowledge related to their livelihoods. Basing on the findings, mass media such as radio and television appear to play an important role in delivering agricultural information and knowledge to the farmers. These findings contradict with other studies (e.g. Mwantimwa, 2020; Msofe & Ngulube, 2016; Magesa et al., 2014; Ronald *et al*., 2014; Bachhav, 2012) that inform that fellow farmers, neighbours, relatives and farmer groups are the main sources and outlets of agricultural information and knowledge. From these results, it is important to note that oral communication is a common way through which smallholder farmers get agricultural information and knowledge from sources such as friends, neighbours, family members and extension officers (e.g. Elly & Silayo, 2013; Opara, 2008; Ogboma, 2010; Lwoga et al., 2011). More evidence is provided by Mkenda et al. (2017) that majority (>60%) of the smallholder farmers depend on family members, friends, and neighbours as main sources and channels of agricultural information and knowledge. According to Mtega and Ngoepe (2018), oral communication is most preferred due to its convenience, ease of consulting and because it is believed to be rich in knowledge.

Although the findings of the present study show that TV is one of the important sources and channels, other studies (e.g. Silayo, 2016; Mwantimwa, 2012) revealed that mass media such as television are not accessible to most rural dwellers. Where available, there are a number of factors that might affect their usage. For example, radio and TV programmes that broadcast agricultural information and knowledge are limited (see Mkenda et al., 2017; Opara, 2008). Worse still, the few TV and radio agricultural programmes available are broadcasted during periods that are inconvenient for farmers. Lack of electricity and money constrain access to and usage of radio and TV in rural Tanzania. In fact, television has been found to favour urban areas than rural ones as a result of signal coverage and affordability while radio carters for both rural and urban areas (Mkenda et al., 2017). On a different note, Churi et al. (2012) observed that the effectiveness of radio is questionable in terms of content relevance and delivery timing. These are not supported by numerous studies, particularly those by Raza et al. (2020), Mbwangu et al. (2018), and Aldosari et al. (2017) which revealed that radio and TV are more effective channels

to delivering relevant and timely agricultural information and knowledge to smallholder farmers in developing countries.

Besides, the findings suggest that print sources and researchers are also important sources used by the smallholder farmers. However, the question is to what extents are print sources available to and used by the rural dwellers who are mainly smallholder farmers? Another question is on reading habit. Studies (e.g. Silayo, 2016; Luambano, 2013; Isowe, 2007) elaborate that print sources are made for literate communities that can read and write. It is also noted from these studies that majority of literate smallholder farmers have poor reading habits. Generally, the ineffectiveness of print sources of agricultural information and knowledge is associated with poor literacy level and lack of reading habit among smallholder farmers in rural areas. Along that, print information materials are still a challenge since they are usually not timely accessible (Mkenda, 2017). On the whole, print sources enrich the literate (those able to read and write) with knowledge while leaving out the illiterate masses. This is not the case in Maharashtra (India) where Bachhav (2012) found that one of most preferred sources of agricultural information and knowledge were newspapers. Despite the findings showing that researchers are important sources of agricultural information and knowledge, most of research outputs are not communicated or delivered to the smallholder farmers (see Siyao, 2012).

Apart from that, agriculture exhibition, extension officers, seminars, village leaders alongside mobile phones and NGOs were found to be commonly used sources of agricultural information and knowledge. Similarly, findings reported by Baloch and Thapa (2016) indicate that trainings/seminars, village executives, and agricultural shows/farmers' field days were the prime sources and channels of agricultural information and knowledge. Likewise, Opara (2008) states that personal experience; workshops, seminars, discussions, meetings, exhibitions, demonstrations, and training are important sources of agricultural information and knowledge. Noting from extant studies, extension officers and agricultural research institutions (ARIs) are more reliable sources (see Misaki et al., 2015). However, this is not reflecting the reality in rural Tanzania where the number of extension officers does not match the number of the smallholder farmers served. The findings from the present study signify that there are inadequate extension officers in Tanzania as supported by Dulle et al. (2014). These findings are similar to those observed by Daniel et al. (2013) that indicate that access to correct information by smallholder farmers seems to be unsatisfactory due to poor coordination of agricultural extension services. This problem is a longstanding considering that was reported that in 1990s, the ratio of extension officers to farmers was very poor making the information provision role not manageable (Swai, 1993).

Furthermore, the findings expose that the delivery of agricultural information and knowledge is constrained by diverse challenges. Lack of awareness on information sources and channels, language problems, and irrelevant contents were the other limiting factors to accessing agricultural information and knowledge. To support these findings, Galadima (2014) found that many rural farmers lack access to useful knowledge and information that could help them to perform at high levels of success in terms of agricultural productivity due to ignorance of information sources. Similarly, Opara (2008) adds that the delivery of information is limited by low literacy level, limited numbers of radio and television sets, lack of financial resources, human capacity, and lack of legal frameworks at national and international levels to support information service provision to rural areas. On the same note, Babu et al. (2012) observed that the major constraints to information access for farmers is poor availability, unreliability, lack of awareness of information sources available among farmers and untimely provision of information. In addition, Daudu et al. (2009) noted that financial constraint, inadequacy and

unreliability of information infrastructure, lack of information professionals, and the presence of irrelevant information are some of the factors that affect the delivery of agricultural information and knowledge to small scale farmers.

Study implications

This study exposes that existing studies are not conclusive regarding agricultural information and knowledge channels that are suitable for rural areas. While some of the studies show that mass media are the predominant sources, others inform that oral information and knowledge delivery mechanisms are prominent. The variations are determined by geographical locations, literacy, development level, timeframe and other factors. The findings further disclose that the reviewed literature does not provide empirical evidence and farmers' success stories on the usage of these sources as well as the delivery mechanisms applicable to the rural settings of Tanzania.

Conclusions and recommendations

Fostering agricultural information and knowledge access from various sources without putting in place appropriate channels is like expecting a human body to function without blood vessels. Undeniably, delivering the produced agricultural information and knowledge to smallholder farmers is very important to foster agricultural production. However, to successfully do so, there is a need for a well-organized linkage between information and knowledge producers, delivery mechanisms, and farmers' readiness to access and use agricultural information and knowledge. This study recommends that information and knowledge produced in various sources should be transferred to farmers through appropriate channels to make impact in their productions. Channels such as farmers groups, demonstration plots, farmers' field study tours, agricultural shows and NGOs are appropriate for delivering agricultural information and knowledge in rural settings. Besides, the ability to apply information and knowledge does not only depend on access to them, but also on farmers' economic status, the nature of farm labour available, and the knowledge the farmers possess on the application of such tools and methods. To make it more meaningful, farmers should be provided with the right type of information and at the right time, using the right channels and with all other necessary infrastructure in place.

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