

The information needs of agricultural researchers and extension workers in Zimbabwe. An overview of the findings

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Abstract

Agriculture plays a pivotal role in the economies of many developing economies because it contributes significantly to their Gross Domestic Product (GDP), labour force, sustenance and exports. The sector accounts for more than 30% of the GDP and 60% of total employment in sub-Saharan Africa, excluding South Africa. Zimbabwe is no exception; agriculture provides an income to over 75% of the country's population. This paper reports on a study that examined agricultural information and the role that is played by researchers and extension workers as an intermediary between researchers and farmers. The study focused on researchers and extension workers in the public sector, covering 16 research institutes and 44 districts. A questionnaire was used to collect data, most of which was analysed using the Statistical Package of Social Sciences (SPSS), with content analysis used in the case of open-ended questions. Although three different sets of data were collected through questionnaires, interviews and observation, this paper reports only on the results of the questionnaire which was distributed to researchers and extension workers.

1. Introduction

This paper reports on a study that examined the information needs and challenges of agricultural researchers and extension workers in Zimbabwe. For various reasons, agricultural extension services in Zimbabwe are currently experiencing numerous challenges. A lot of these have to do with staffing and inadequate information access by extension staff, which prevents them from adequately addressing farmers' information needs. There is growing concern about the preparedness of extension workers to deal with challenges on the ground. The Herald (March 14, 2006) provides the example of an extension worker who has knowledge about general farming but is deployed to work in an area where there is a need for expert advice in soya bean production. There are also concerns about information access and how the lack of technical information on farming affects extension officers in their failure to attend to farmers' problems in time (The Herald, Tuesday, November 27, 2006: B2). Such are the characteristics of the research and extension system in Zimbabwe and the problems afflicting farmers. This study sought to provide a detailed analysis of the

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dissemination of agricultural information and suggest solutions to improve its access and utilisation.

Many studies have been carried out on agricultural knowledge and information systems in Africa. For example, Mwala, (1997), Ekpenyong (2001) and Dulle (2001) all focused on the role of libraries; Aina (1990), Kaniki (1992), Majid & Eisenschitz (2000), Stefano (2005), van den Ban (1999) and Meyer & Boon (2003) focused on the information needs of farmers and researchers; Mchombu (2001), Rivera (2000) and Rees (2000) looked at agricultural information sources; and Kiplanga't (2004), Enakrire (2007) and Chapman (2003) focused on the role of information and communication technologies (ICTs). Other studies have focused on agricultural knowledge and information systems within geographical boundaries, for example Rees (2000) looked at agricultural knowledge and information systems in Kenya; Obaa, Mutimba and Semana (2005) looked at agricultural knowledge and information systems in Uganda; and Ozcatalbas, Brumfield and Ozkan (2004) focused on agricultural knowledge and information systems in Turkey. Wesseller and Brinkman (2003) focused on bridging information gaps between farmers, policy makers, researchers and development agents. The current study looked at the provision of information for research and extension services and the impact of the accelerated land reform exercise in Zimbabwe. It also looked at the changing nature and expectations of research and extension work

Agriculture plays an important role in the economies of many developing economies, contributing significantly to their Gross Domestic Product (GDP), labour force, sustenance and exports (Stamoulis, 2001). Agriculture accounts for more than 30% of the GDP and 60% of total employment in Sub-Saharan Africa, excluding South Africa (World Bank, 2007). Zimbabwe is no exception; agriculture is the dominant sector in the country's economy, contributing 15 - 20% of the Gross Domestic Product (GDP) and providing an income to over 75% of the population (Muir-Leresche, 2006:99). However, there has been a decline in GDP contribution from 23.7% in 1999 to 14.6% in 2003, which Moyo, Moyo and Matondi (2004) attribute to the reduction of the area planted in relation to crop type. The government of Zimbabwe, through various local and external initiatives, is currently going through an agrarian reform programme which has had a significant impact on both food production and poverty alleviation. According to Mudhara (2004:61), the ability of Zimbabwe to improve the contribution of agriculture to the country's Gross Domestic Product (GDP), lies in the ability of A1⁴ and A2⁵ farmers to push the productivity of land to levels achieved before the land reform, or even improving on the levels previously attained by Large Scale Commercial (LSC) farmers before the land reform.

Agricultural research can be broadly defined as an activity aimed at improving the productivity and quality of crops and animals through genetic improvement, better protection (inoculation, pest control), irrigation, efficient marketing and better management of resources (Loebenstein and Thottappilly, 2007:3). Agricultural extension, on the other hand, involves the transfer of agricultural information and technology to the farmers, and facilitating the transfer of information from the farmers to researchers (Pazvakavambwa and Hakutangwi, 2006:217). According to Umali-

⁴ A1 represents newly resettled farmers in villages and self contained plots of about 5 hectares (2000-)

⁵ A2 represents commercial farming land use meant to empower black indigenous farmers (2000-)

Deininger and Schwartz (1994:1), the backbone of all agricultural extension endeavours is the transfer of agricultural information to enhance the productive capacity of farmers. Agricultural information systems ensure that the information generated by agricultural agencies, institutions and researchers is collated and made available on request.

2. Purpose of the Study

The aim of the study was to investigate the information needs and challenges of agricultural researchers and extension workers in Zimbabwe. The study sought to answer the following research questions:

- a. What are the information needs of agricultural researchers and extension workers in Zimbabwe?
- b. What are the information seeking behaviour patterns of agricultural researchers and extension workers in Zimbabwe?
- c. What role do researchers and extension workers play in the dissemination of agricultural information to farmers?
- d. What means and processes are in place for managing information generated by the Ministry of Agriculture, Mechanisation and Irrigation Development's research and extension divisions and research institutes?
- e. What is the level of ICT development within the Ministry of Agriculture, Mechanisation and Irrigation Development's research and extension divisions and research institutes and its impact on the generation and dissemination of agricultural information among researchers and extension workers?
- f. What is the significance of stakeholders' collaboration with the Ministry of Agriculture, Mechanisation and Irrigation Development's research and extension system and what role do they play in the generation and dissemination of agricultural information?
- g. To what extent do researchers and extension workers utilize indigenous agricultural knowledge in the generation of agricultural information?
- h. What knowledge gaps exist and what are the challenges and constraints affecting the extension and dissemination of agricultural information?
- i. What recommendations on a national agricultural information policy can be derived from the study?

3. Methodology

Zimbabwe is administratively divided into ten provinces of which two - Harare and Bulawayo - are urban, and sixty districts. In investigating the information needs of extension workers, we focused on eight provinces excluding Harare and Bulawayo, namely Matebeleland South, Matebeleland North, Midlands, Mashonaland West, Mashonaland Central, Mashonaland East, Manicaland and Masvingo Provinces. We

investigated the district extension offices but not the village and ward extension services nationally due to the numbers involved. However, we did look at selected districts and ward extension services in Mashonaland Central Province because it was considered to be representative in terms of agricultural practices. According to Foti, Nyakudya, Moyo and Chikuvire (2007:30), Mashonaland Central is a province characterised by a wide variety of land tenure typologies: communal areas, newly resettled small-scale (A1), newly resettled large-scale (A2), small-scale and large-scale commercial, and old resettlement. It is also made up of areas of varied agricultural potential ranging from agro-ecological region II to region V⁶ with the dominant extension services being provided and managed by the government. Researchers were drawn from DR&SS's research institutes distributed throughout the five agro-ecological zones, and included researchers at Head office. The Directors of the three divisions, namely Crops Research, Livestock and Pastures Research, and Research Services were interviewed.

The study utilised both quantitative and qualitative methods; questionnaires were distributed to sampled respondents, while interviews were conducted with key informants and librarians. An observation schedule on the state of libraries was also conducted. The respondents were drawn from the eight provinces and research institutes as defined in the target population. Mashonaland Central Province produced the highest number of respondents because extension officers and supervisors and ward or village extension workers were included in the study. The number of districts that participated in the study was forty-four (44) from the projected sixty (60). Sixteen (16) out of seventeen (17) research institutes responded, although there were variations in responses per institute.

4. Results

The results are summarised in sections 4.1 to 4.7.

4.1. Characteristics of the respondents and the research environment

The number of districts that participated in the study represented 73% of the expected total number of districts, while 94% of the research institutes were represented in the survey. The Ministry of Agriculture's organogram was clearly defined, meaning that the study was able to capture responses from the highest level of directors to the ward extension workers, as well as the research officers at the various institutes. However, the vacancy rate was also of concern and this was attributed to staff departing for greener pastures and retirement. The study was not able to capture responses from some researchers because they were on study leave, suggesting that there was continuous education among the staff at the ministry.

In terms of qualifications, the majority of the researchers had a bachelor's degree, 21.4% had a Masters degree and one had a Doctorate. According to the informants,

⁶I - Specialised and Diversified Farming Region

II - Intensive Farming Region

III - Semi-Intensive Farming Region

IV - Semi-Extensive Farming Region

V - Extensive Farming Region

the number of postgraduates with Masters and PhD qualifications would have been higher had more researchers responded to the questionnaire. Among the extension workers, 34.8% had certificates and these were based at ward or village level. The certificate qualification still remains the minimum qualification for extension workers at this level, although in retrospect, the Danida (1991) upgrading of colleges foresaw the raising of qualifications to diploma level. The number of respondents with diplomas amongst extension workers was 14%. In terms of age, the extension workers were generally older than the agricultural researchers. The majority of the extension workers (36%) were between 40 and 49 years old, with another 15.1% above 50 years. 39.3% of the researchers were between 20 and 29 years of age, while 73.2% of the researchers were 39 years old and below. This analysis corresponds with the work experience of the respondents, which showed that the majority had less than 10 years of work experience (63.4% of the extension workers and 85.7% of the researchers). Male dominance was evident among the respondents with females constituting only 33.3%, even when the data was analysed according to the category of the respondents.

4.2. Information needs and information seeking behaviour

In this section we focused on two questions: i) What are the information needs of agricultural researchers and extension workers in Zimbabwe? ii) What are the information seeking behaviour patterns of agricultural researchers and extension workers in Zimbabwe?

The information needs of farmers and researchers varied in terms of the type of information required, with no specific inclination to a specific discipline. The information needs also varied according to whether the respondents were researchers or extension workers. Information on range management, animal breeding, agricultural engineering, dairy farming and plant breeding was the top-rated among extension workers, while information on horticulture, crop protection, agronomy, and plant diseases and pests was on the bottom end of the scale. For researchers, the type of information rated highly was information on tobacco culture, agricultural engineering, dairy farming, animal health and poultry, while information on climate change and soil fertility and advisory information was less important. Variations between the researchers and extension workers' needs were also evident. For example, while information on tobacco culture (96%) was the most highly rated by researchers, only 27% of the extension workers indicated that they required it. Overall, the information needs of the researchers and extension workers were numerous within the agricultural discipline and covered the major areas of animal science, crop science, agricultural engineering, and advisory and policy development.

Information on agricultural economics or marketing was conspicuous by its absence, perhaps included under policy and advisory development, although it would have been visible on its own. Farmers need to be advised on market-related information, particularly on selling their produce and the long term benefits derived from honouring contracts with the Grain Marketing Board (GMB), banks and institutions that would have funded their farming inputs, against the short term benefits of defaulting and side marketing. It would be prudent for researchers and extension workers to require such information in order to help the farmers. FAO (2005) observed that agricultural marketing information played an important role in improving food marketing systems and promoting food security by giving farmers accurate knowledge on price movements, and thereby enabling them to identify competitive trading opportunities. FAO (2005) asserts that accurate and timely

agricultural marketing information also enables farmers to make more informed decisions and minimises the loss that would be caused by the overproduction of certain commodities.

The information seeking pattern of the respondents was mainly determined by the information sources and their availability (proximity and format). Most of the agricultural extension workers indicated that their first port of call when in need of information was their departmental collections, with 90.7% indicating a preference for printed sources. In contrast, most researchers consulted internet sources and hence showed a preference for electronic sources. In fact all the researchers (100%) considered the internet to be a very important source. The need for current information in research is vital, and the internet is believed to address this need. The library as the first port of call was poorly rated; only 14% of the extension workers and 10.7% of the researchers indicated that they would visit the library first. The respondents were able to indicate the importance of the various sources of information in keeping up with their areas of work. Consulting knowledgeable person in the field/supervisor, and face-to-face conversations/discussions were mentioned by large 95.3% and 92.4% extension workers respectively. Technical reports were considered to be very important by the majority of the respondents, followed by books and professional meetings and workshops. Technical reports are handy as they can also be used as quick reference sources.

The different sources were useful to the respondents although the level of importance varied. The rate of frequency of use of the different sources also varied. Sources that were not utilized by 20% or more of the respondents included theses and dissertations, librarians and library staff, list serve or discussion forums, internet sources, sources of contents and conference abstracts. However, all the sources were consulted at some point. There was demonstrated usage of other referral sources and the respondents were able to identify titles relevant to their subject areas. Although these were outdated, they pointed to the state of the immediate (library) collections. Electronic resources were grossly underutilised given the amount of full text articles available in the AGORA and TEEAL databases. The respondents had access to electronic resources like AGORA, although it was limited to those who had access to the internet. The TEEAL database was also available to the respondents but it meant travelling to the Central Library in Harare. Some of the respondents confirmed using these resources, although they found travelling to be a significant challenge.

The researchers and extension workers also used libraries as part of their information seeking processes. The study showed that the majority of the researchers had access to a library or information resource centre in their work environment or community, but the majority of extension workers did not have such access. In terms of frequency of use, the majority of both categories who had access visited the libraries monthly. Government circulars, departmental and personal collections, newspapers, the radio, training materials were mentioned as alternative sources of information by those who did not have access to libraries. The types of materials accessed in the libraries included traditional print sources, books, journals and government publications, and this may have been due to the absence of other material in these libraries. The respondents indicated that at different times, they sought assistance from library staff when using libraries, although 11% never sought such assistance. In terms of fulfilment in the use of the libraries, the majority indicated that they did not always find what they were looking for. Most of the libraries did not have an active inter-

library loan (ILL) facility in place. Other libraries, particularly those of universities and NGOs, were also consulted by the respondents because they provided alternative sources of information. School libraries were also consulted. However, the majority of respondents still felt that the libraries were offering meaningful service.

4.3 What role do researchers and extension workers play in the dissemination of agricultural information to farmers?

Researchers and extension workers play a significant role in the dissemination of agricultural information to farmers. This was shown in the purpose of seeking information, and in their ability to identify the farmers' perceived needs. The majority of the extension workers (86.6%) indicated that their main reason for searching for information was in order to be able to assist farmers. For researchers, assisting farmers was considered to be a second priority after research. As noted earlier, extension involves the transfer of agricultural information and technologies to the farmers and reciprocally, from farmers to the researchers. However, lack of technical skills and preparedness on the part of extension workers affects the assistance they render to farmers. According to The Herald (18 March 2011), the Ministry of Agriculture acknowledged that some farmers were not willing to work with extension workers because they lacked the requisite skills. In efforts to address this, the ministry was embarking on equipping these extension workers with necessary skills and upgrading their educational requirements from certificates to diploma qualifications. Every extension worker was also going to be given a farm management handbook to use.

In order for information to be relevant, it must be available in a timely manner and when it is most required. The respondents' information needs were observed to be seasonal and also differed between researchers and extension workers. As discussed above, one of the reasons for seeking information was in order to assist farmers. Information was mostly sought during the planting season and least required during the harvesting season. Researchers and extension workers have to plan well and proactively respond to these trends. Not doing so would negatively affect the role played by researchers and extension workers in helping farmers. This plays out against the backdrop of the land reform programme which has resulted in many new farmers, exerting insurmountable pressure on the research and extension systems. The respondents indicated that the land reform programme had affected the way they conducted their work, meaning that there is a need to redefine roles or incorporate new responsibilities into what researchers and extension workers do. The new farmers need guidance on farming practices as most were formerly subsistence or small scale farmers who had moved into commercial farming. All this requires additional skills and refreshing on the part of the respondents. Other information challenges mentioned include lack of conservation policies and lack of material in appropriate languages.

In enhancing their role, facilitating communication between researchers and extension workers is considered to be very important. The study demonstrated that while there was communication between researchers and extension workers, the majority (70.2%) were not satisfied with the level of communication between the two groups with respect to disseminating agricultural information and innovations. The majority of the researchers indicated that they were able to communicate with extension workers, but 55.2% of extension workers never communicated with researchers. The dissolution of the Committee on on-farm research and extension (Cofre) was seen as having widened this divide and its resuscitation would provide a platform for better

interaction. The lack of communication was attributed to the lack of an interface and limited resources, among other reasons. However, the scope of the problems that were successfully communicated did cover crops, livestock, pests, pesticides and diseases, animal health, farm production and marketing, and this communication was ultimately benefiting the farmers.

Various methods and tools were used in the research-extension-farmer linkage to communicate information to farmers. These methods included the media, such as the radio, television, newspapers and video units, and meetings as a platform. The radio was the researcher's top communication tool and the second most popular tool used by extension workers after meetings. Organisational based methods included publications (pamphlets and posters), internet based sources, community radios, and meetings. Publications were the most popular among both groups of respondents. Public gatherings include agricultural shows, field days, community meetings and farmers' organisations' meetings. Field days were the most utilised in this category. The responses indicate that there was frequent contact between researchers and extension workers and farmers through actual visits to the farms. Only 6.4% of the extension workers and 7.9% of the researchers indicated that they never visited farmers. Visits enable the researchers and extension workers to relate to what is happening on the ground by seeing what the farmers are doing. It also helps them make informed judgements on the solutions they may prescribe to the farmers. Such visits were, however, weighed down by lack of resources such as transport.

In terms of the frequency of use of mass media in communicating with farmers, it was surprising to find that the majority (54.4%) of the respondents then turned to say that they never used the media to communicate with farmers. This response was inconsistent with the reality on the ground. Radio and television broadcasts included programmes in vernacular and other minority languages and often gave listeners the opportunity to pose their questions live. Experts from research and extension were often guests on such programmes to tackle questions on various challenges affecting farmers.

The researchers and extension workers also have a major role to play in bridging the gender divide by assisting female farmers. It was observed that despite women working on the land, they were marginalised in terms of access and ownership. Their information needs were not being adequately addressed by the research and extension system.

4.4. Knowledge management systems and the use of ICTs

For this purpose, the study focused on two questions: i) What procedures are in place for managing information generated by the Ministry of Agriculture, Mechanisation and Irrigation Development's research and extension divisions and research institutes? ii) What is the level of ICT development within the Ministry of Agriculture, Mechanisation and Irrigation Development's research and extension divisions and institutes and its impact on the generation and dissemination of agricultural information among researchers and extension workers?

The information generated by the researchers and extension workers is based on their work, and a lot of it is generated in the form of reports and other publications. It was found that while information was generated electronically (i.e. using computers), it was often distributed and circulated in printed format. Resource challenges restricted

the amount of documents that could be reproduced through print. This was particularly the case during the economic meltdown. The situation is gradually improving as more resources become available. According to the respondents, research results were largely kept in files with minimum circulation or publication. The findings revealed that the information generated from research and extension services was sent to multiple locations as part of the circulation process or for safe keeping. These locations were the central database, Research Council of Zimbabwe, individuals returning their copies, and library departmental collections. The departmental collections were mentioned as the first port of call when researchers were in need of information. What was not clear, however, was who presided over the central database and in what format the documents were kept. It was also disclosed that some information from research was kept as soft copies, but because the technology (floppy disks) had become obsolete, they could no longer retrieve the data. Most of it was now outdated and had no print equivalent.

The Research Council received progress reports which contained information about the project, status, researcher(s) and an abstract. The libraries did not have current reports or material such as annual reports and publications from other units of the ministry. The majority of the respondents (90%) felt that although there was no defined policy on the management of information, it was adequately captured. Because it was 'scattered' in different locations, 57.5% of the respondents indicated that it was not accessible. Overall, the information was either in print or electronic format. The Biometrics and Computing Services Institute did, however, compile the Directory of Research projects, of which some copies were sent to the Research Council of Zimbabwe.

Various ICTs were available to researchers and extension workers. The computer in the office was available to 69.3% of the respondents. Other ICTs included fax machines, television, radio, video recorders, printers, servers, information management systems, telephones and mobile phones. The internet and its resources - email, access to databases (online, networked and stand-alone) - were also mentioned. There was no functional website for the ministry except for the dummy version which contained incomplete information. Most of the respondents had good ICT skills, meaning that the computers were used to do word processing, spreadsheets, to store documents and to connect to the internet. The ICTs were used for a variety of purposes, with research and education at the top of the list. They were also used for communicating with researchers, extension workers and farmers. The various ICTs were found to be effective in communicating agricultural information and there was concurrence between researchers and extension workers to this effect, except for electronic journals and CD-ROM databases which were regarded as ineffective by extension workers. Disseminating agricultural information was mentioned by 25.4%. The ICTs were also used for professional communication with colleagues, personal communication with friends, and to communicate with publishers. Some respondents also mentioned that documents can now be attached to email and communicated between authors and researchers.

The mobile/cell phone was singled out and was found to be highly used although the frequencies varied. For example, only 8.7% of the extension workers and 16.1% of the researchers indicated that they never used it for communicating agricultural information. The mobile phone was used by researchers and extension workers to share agricultural information with farmers, with other researchers and extension

workers, with colleagues, and with the agri-business companies. In terms of the state of ICT infrastructure, 64.5% of the respondents felt that it was poor. Therefore although ICTs were available, they were still regarded as inadequate. In the laboratories, for example, the equipment was regarded as old, while in the libraries, there were no computers or the internet except for the Central Library. Research stations either did not have or had very few computers and no internet access. Extension workers had the same complaints. Some of the district extension officers had barely any ICTs in their offices.

4.5. The role of stakeholders in agricultural researchers and extension

This question assessed the significance of stakeholders' collaboration with the Ministry of Agriculture, Mechanisation and Irrigation Development's research and extension system and the role that they play in the generation and dissemination of agricultural information.

The study showed that there was collaboration between public and private research and extension institutions and this was done both nationally and internationally. Literature showed that as a government department, the Ministry of Agriculture, Mechanisation and Irrigation Development had ties with other ministries (inter-ministry) and with other units within the same ministry (intra-ministry), for example with the Division of Veterinary Services. At national level, the majority of the respondents indicated collaborating with private organisations (54.1% of the extension workers and 80.4% of the researchers). For researchers, this collaboration mostly had to do with the distribution of projects (75%), staff exchange (66.1%), and extension publications (64.3%). For extension workers, most respondents indicated funding (73%), research facilities (72%) and research publications (64%). The areas of collaboration that focus on research facilities and extension projects result in the generation of publications or documentation, all the while as consumers of information for the processes to be achieved. The study indicates that through this participatory collaboration, researchers and extension workers were able to generate research and extension publications which were useful in disseminating information to the farmers. Collaboration also results in new technologies like new seed varieties. For example, over ten (10) seed companies were contracted by the ministry to produce certified seed for sale to the farmers at the time of study. It was also indicated that private organisations engaged in extension teams for their projects and this resulted in parallel extension systems in agriculture.

Fewer respondents collaborated with organisations and other institutions at international level. The majority of the respondents (64%) did not participate in such collaboration, and of those who did, there were more extension workers (72.1%) than researchers (39.3%). According to the informants, NGOs and organisations such as the International Maize and Wheat Improvement Centre (CIMMYT), Department for International Development (DFID), United Nations (UN) and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) were among those partnering the ministry. For extension workers, collaboration mostly had to do with research facilities, joint research projects and funding, while researchers indicated that collaboration was mostly for extension publications (e.g. International Red Locust Control for Central and Southern Africa - IRLCO-CSA), extension projects and research facilities. These products benefit farmers immensely as the publications are

the result of research output. Other areas include training, technical advice, and funding. However, the respondents indicated that one of the main challenges facing such partnerships was that international organisations tended to stick to their mandate and ended up dictating what had to be done.

The study indicated that 90% of the researchers and extension workers collaborated with farmers' organisations in several areas. Extension workers viewed farmers' organisations as collaborating mostly in funding research and extension programmes, and re-packaging information for farmers. For researchers, three outstanding areas were funding research and extension programmes, providing legal advice to farmers, and repackaging information for farmers. Farmers' organisations also played significant roles in providing farmers with information on current markets and inputs.

The study also looked at the role of stakeholders in research and extension prioritisation and funding, with particular reference to AGRIBANK and projects supported by the Reserve Bank. Agritex, for example, indicated that farmers as stakeholders, through participatory approaches, were able to identify and prioritise their problems, with the extension system helping with implementation and evaluation. Financing for agriculture from the government has declined, and farmers have to turn to banks for support. The study revealed that alternative support through input-support schemes and loans from AGRIBANK suffered setbacks due to defaults on repayment. The 99 year lease agreements were not acceptable as collateral for the commercial banks, so farmers were failing to meet the set requirements for loans. Privatisation and charging for research and extension services were proposed, and although already operational, they are considered discriminatory against the disadvantaged farmers.

4.6. Use of indigenous knowledge (IK) by researchers and extension workers.

We were interested in the extent to which researchers and extension workers utilize indigenous agricultural knowledge in the generation of agricultural information.

Indigenous agricultural knowledge was highly utilised, as indicated by 89.9% of the researchers and extension workers, although the frequency of utilisation varied between the two groups. 11% of the extension workers and 7.1% of the researchers did not utilize IK, while 53% of the respondents indicated that they used IK often or very often. Indigenous agricultural knowledge was acquired from a variety of formal and informal sources. The top three sources of IK for both researchers and extension workers were books, conferences/workshops and colleagues, with farmers' groups being the least used source by the two groups. Social gatherings, personal experience, village leaders or elders and agricultural shows were also some of the sources mentioned by the respondents. The information that was often obtained from these sources, in the case of extension workers, was information on plant diseases, pests and plant breeding, while for researchers it was information on tobacco culture and dairy farming. Information on crop harvesting and technology was the least required by both groups. The study revealed that indigenous knowledge derivation transcended the different agriculture disciplines (crop science, soil science, animal science, and post harvest storage) for both researchers and extension workers.

4.7. Knowledge gaps, challenges and constraints affecting the extension and dissemination of agricultural information

The majority of the respondents (68.9%) had below 10 years of work experience. Further analysis also indicated that 37.2% of the extension workers and 51.8% the researchers had between one and five years of work experience. This suggests that they would have required mentoring in order to effectively execute their duties. As discussed above, extension workers lacked the skills that would enable them to attend to farmers' problems. The Herald (18 March 2011) also mentions that the need to develop the extension workers through further training and by upgrading them academically from certificate to diploma level. Staff turnover resulted in the departure of experienced researchers and extension workers, leading to qualified but less experienced replacements.

The respondents identified a number of factors that inhibited their access to agricultural information as well as the major constraints facing agricultural research and extension services. Firstly, lack of requisite ICTs was seen to affect access to electronic information resources. This was particularly evident at the research institutes because they required internet access to use databases that could only be accessed with a password, e.g. AGORA. These resources were limited to the Central Library; the TEEAL database, for example, was not networked to provide remote access. In other words, people had to travel to the Central Library for access. This was compounded by other problems such as lack of transport. Transport facilitates and maintains networks, and this was inadequate according to 63.1% of the respondents, although the ministry was in the process of distributing motorbikes for use throughout the country. Lack of adequate current information, especially in the library collection, was another factor emanating from poor access to databases. Lack of communication between researchers and extension workers also affected the exchange and flow of information. The respondents could not afford to acquire their own materials because of low remunerations.

Inadequate funding was identified as one of the major constraints facing agricultural research and extension services. Lack of funding generally has a ripple effect on the challenges affecting access to information, with one challenge leading to the next. The old state of most of the collections could also be explained by non-existent library budgets - the collections were not being updated and the libraries relied mostly on donations. The financing of agriculture by the government has declined due to the unstable economic environment. Donor funding had traditionally sustained a number of projects and withdrawal has been attributed to the 'unstable' political environment. As with the constraints above, a large majority of the respondents (68.4%) observed that lack of funds resulted in the ministry failing to provide adequate material and human resources. In turn, ill-equipped laboratories and poor ICT infrastructure resulted in poor access to information resources. Old equipment for field and laboratory research affected some of the results, making them less competitive.

It was also felt that the number of farmers did not match the resources at the disposal of the researchers and extension workers. The link between research and extension was considered to be poor due to poor communication, with indications of lack of expertise in some research areas. Material in local languages was another factor that was affecting the research and extension system, although the respondents indicated that they provided assistance with translating some material into local languages. Radio and television programmes in vernacular provided some relief in this respect.

The political landscape and conditions still prevailing on the farms, and the new farmers' lack of farming experience and commitment has also resulted in the misappropriation of resources.

5. Conclusion and Recommendations

The study indicated the existence of research and extension systems within the public sector under the Ministry of Agriculture, Mechanisation and Irrigation Development. The extension system has a structure that cascades from head office (national level) down to provincial level, and district level to ward or village level. This hierarchical structure also determines the employment levels, with subject specialists mainly at provincial level. The research system also has a hierarchical structure which starts from head office and cascades to research institutes and these are distributed in the different agro-ecological zones of the country and Harare.

The study articulated the information needs of researchers and extension workers as well as the perceived information needs of the farmers, and highlighted the information-related challenges that they encountered. The researchers and extension workers were found to have attained some qualifications, ranging from certificates (for extension workers at ward level) and diplomas to bachelors, Masters and PhD degrees. On average, the researchers were younger than the extension workers and the majority of both categories had less than 10 years of work experience. This affected their performance, particularly for extension workers in relation to farmers' problems. In terms of gender, there were more males than females among both categories of respondents. The information needs of the respondents covered the major disciplines of agriculture, i.e. crop science, animal science, agricultural engineering and agricultural economics which however not prominently mentioned. Within these disciplines, the types of information were similar, although the frequencies varied between the researchers and extension workers. For example, information on range management was the most sought after by extension workers, while tobacco culture was mentioned by the majority of the researchers.

Various sources of information were at the disposal of the respondents, and these ranged from libraries, to the internet, colleagues, personal and departmental collections, and workshops and seminars. There was a preference for certain sources of material, with researchers preferring electronic sources while extension workers preferred print sources. The ministry's libraries were not adequately equipped to meet the needs of the researchers and extension workers. They were characterised by old material due to lack of funds to purchase updated information sources. The internet was not accessible to many, hampering access to databases and other electronic resources. TEEAL, which is a standalone database, was only available at the Central Library in the head office. Overall, the information sources that were mentioned were considered important and were also consulted, although the frequencies varied.

Researchers and extension workers play a significant role in the dissemination of agricultural information to the farmers. Part of their job is to search for information and to identify the farmers' needs. The research-extension network shows that the extension system provides a link between farmers and the researchers. At the same time, the farmers were able to communicate directly with researchers and vice-versa. Agricultural research prioritisation is determined by the government, national priorities, funding, and through consultation with relevant stakeholders. Research institutes have different priorities, and these may be situational or problem solving

priorities. Agritex's priorities were determined through surveys, consultations, dialogue, etc. Farmers were seen to play an important role in problem identification and priority setting, while researchers and extension workers helped them with implementation and evaluation.

Researchers and extension workers communicated with farmers through various channels, including the media, pamphlets and posters, and through public gatherings such as agricultural shows and field days. There was a dearth of material in local languages, although translations were being made by researchers and extension workers. It was observed that the land reform programme had resulted in the rapid numerical expansion of farmers, and this had put immense pressure on the research and extension systems as the farmers lacked knowledge and the material and human resources were not adequate to meet the new dispensation. Despite the urgency, communication between researchers and extension workers was weak.

The ministry did not have a 'visible policy' regarding the management of information generated by its departments. Although the respondents indicated that the information was captured, it was not readily accessible because of the absence of a central database. Documents were generated electronically but were circulated as hard copies, and the shortage of resources hampered the amount of material printed, restricting circulation. ICTs such as the radio, television, the internet, databases and telephones were used in the dissemination of agricultural information. Lack of access to ICTs such as computers and limited access to the internet had a negative effect on the generation and dissemination of information, and this includes research institute libraries. The mobile phone, although not readily available in the office environment, was frequently used in communicating agricultural information, which suggests that the respondents were using their own mobiles for this purpose.

Agricultural researchers and extension workers worked in collaboration with other stakeholders and organisations at grassroots level and internationally. The benefits derived from this include research and extension publications, research facilities, and staff exchange. Farmers' organisations played a significant role in the research and extension processes by re-packaging information for farmers as well as funding research. The study found that indigenous knowledge prevails and remains relevant in modern day agriculture, as shown by its high utilisation by researchers and extension workers. Indigenous knowledge was drawn from both formal and informal sources.

Funding remains a major challenge that affects the capacitating of research and extension institutions. Donor fatigue has stalled some projects as they cannot sustain themselves. This has resulted in the failure to upgrade existing infrastructure, such as laboratory equipment and information resources, as well as to retain staff as the conditions are not attractive. Privatisation and charging for research and extension services, though providing alternative funding, is considered to be discriminatory against the poor farmers. Farmers also face challenges in securing funding from banks because of stringent conditions such as collateral which they fail to raise. Those who managed to access funds have been accused of defaulting on payment, and this had disadvantaged new applicants.

We recommend that attention be drawn to: the identification of information needs; utilisation of information; improvement of research-extension-farmer networks; a policy for information management and ICT services; adequate funds for the

provision and maintenance of resources; integration of IK in research and extension; and strengthening collaboration with stakeholders. These recommendations should be applied selectively depending on the requirements and challenges being addressed. Future work could focus on the information needs of farmers and the level of penetration and use of mobile phones for disseminating of agricultural information in Zimbabwe.

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