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An overview of agricultural extension in Botswana and needed reforms

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Crops and livestock sectors constitute agriculture in Botswana. The sectors are dominated by small-scale farmers engaged in traditional production systems. National Agriculture Policy calls for an effective extension service to ensure continued farmer capacity building, increased efficiency and production by the sectors. Several extension approaches adopted over 79 years have been replaced one after the other since 1926 to find the extension service that best addressed production needs of farmers. However, it has proven over the years that the national extension system is not responsive to the needs: hence the decreasing contribution of agriculture to the wellbeing of Batswana. The paper adopts an historical approach to discuss the evolution of agricultural extension in Botswana: the challenges, interventions, policy and other initiatives implemented to make extension effective. Document analysis provided data on past and present extension programs, and rationale for new reforms. Institutional pluralism, cost-recovery, and decentralization are recommended to strengthen the extension service.

Key words: Agricultural extension, extension approach, extension reform.

INTRODUCTION

Agricultural extension remains a powerful strategy for rural development throughout the world; no nation expects to achieve growth in agriculture without an effective extension service (Anaeto et al., 2012). Presently, agricultural extension cannot only focus on increasing production, but should also recognize the presence of other institutions that support farmers. The institutions, together with extension must facilitate the farmers' efforts to solve problems; link them to markets and other players in the agriculture value chain. They should provide services to farmers; help them obtain information, skills, and technologies to improve their livelihoods.

The transfer of technology (ToT) model, a dominant extension approach for developing and disseminating innovations in most African countries, has limited success with promoting sustainable agricultural development (Van den Ban, 1999) because the role of agricultural extension has changed (Karbasioun, 2007; Allahyari, 2007). Agricultural extension certainly needs re-focusing and re-

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positioning to better address the problems of the poor as dictated by the new global context (Toness, 2001).

In rural areas, many farmers do not have the most up to date information on how to grow food efficiently and economically. Therefore, improving their knowledge and providing physical resources necessary for implementation can dramatically increase the level of productivity. Increased farmer knowledge means more improved agricultural practices and therefore more food and income (Rosegrant and Cline, 2003; Mission 2014: Feeding the World). This increase in agricultural production can be attributed to acceptance of technological changes at the rural farm level (Anaeto et al., 2012), and can be achieved through an extension service that goes beyond technology transfer to include facilitation, training to ensure learning, appropriate skill development by farmers, promoting farm groups and dealing with marketing issues.

The focus of agricultural extension should primarily be changing attitudes and behavior of farmers through training. Secondly, the economical focus is to increase farmer income, crop yield, improved financial management and food preservation skills. The third focus of agricultural extension is social; this includes improved health of farmers, leadership skill development and increased desire to participate in own development (Asiabaka, 2002; Anaeto et al., 2012). The over-arching focus should be on the fit between an extension system and the national agricultural policy context as this determines the effectiveness of the system and its operations. In addition, current extension services should be ready and willing to partner with diverse groups of service providers and agencies. This is to support farmers with the skills required in making informed decisions and choosing the best options (Davis, 2009).

More than 60% of the populations of most developing countries is poor, lives in rural areas and depends on agriculture for their livelihoods (World Bank, 2007).These are the people who lack the functional knowledge essential for increasing agricultural production and income generation, to further alleviate poverty. Agricultural extension therefore, plays a critical role in facilitating agricultural productivity and achieving the desired development outcomes such as poverty alleviation (Vercillo, 2011).

LITERATURE REVIEW

Botswana's agricultural system comprises two sectors, crops and livestock, dominated by small-scale farmers engaged in traditional production systems. The relative performance of agriculture dropped from 42% of Botswana's grosss domestic product (GDP) in 1966 to 2.37 in 2014 (World Bank Indicators, 2012). A number of factors such as access to roads, electricity, telecommunication, grain storage, and sanitation are associated with the decrease in the sector's contribution to the economy (Republic of Botswana, 2009).

Botswana National Development Plan 10 (Republic of Botswana, 2009 to 2016) recommends several goals to enable attainment of desired results in the agricultural sectors and increase agricultural productivity. These are; facilitating the growth and competiveness of the agricultural sector, enhancing farmers' willingness and sustainable resource management skills, and availing essential resources to the agricultural and related sector and improving management skills. In addition, commercialization, private sector engagement, and effective extension services are recommended for improving performance of agriculture.

Extension approaches in Botswana have evolved over time since 1926 as the search for a service that best addressed the problems constraining agricultural development continued. An extension approach is a structural framework to the delivery of services and therefore, defines the organizational and leadership structures. An Approach determines the purpose, objectives of extension, clients, needs, programs, methods and resource requirements (Axinn, 1988). Through extension service, government availed programmes, appropriate resources to improve crops and livestock sectors; these are the reason why after 79 years, current policy acknowledge the relevance of extension and regard the service as integral to innovative technology required to increase agricultural productivity (Republic of Botswana, 2012a).

The purpose of this paper was to discuss agricultural extension in Botswana, past and present approaches, programs, and initiatives to support extension services, and agricultural production in order to promote food security. The specific objective of the paper was to discuss the challenges of agricultural extension and recommend appropriate reforms. The paper starts with a narrative of the evolution of extension since 1926, to describe past and present extension services and reveal recurring challenges. The paper then discusses appropriate extension reforms and identifies those that can best address challenges of agricultural extension in Botswana.

METHODOLOGY

The study adopted a qualitative research approach, and an historical method based argument that "the past is causally related to the present": the present can be understood with reference to the past. Therefore, a process-series, sequence-pattern and cycles exist to reveal a basis for any social activity. The argument of historical methods is that past knowledge is a prerequisite for present knowledge (Ghosh, 2003). According to Creswell (2003), identifying patterns is critical to qualitative study. Therefore, this study relied on content analysis of published and unpublished documents to provide the data. Sources of data comprised of

Botswana government documents, conference proceedings, journal articles, and informal interviews, discussions with Ministry of Agriculture officials, extension workers, extension experts, and farmers.

DISCUSSION

Evolution of agricultural extension

The first agricultural extension activities reported in 1926 targeted dairy production. The responsibility of the first extension agent, the dairy inspector, was finding best management practices for dairy production and persuading farmers to adopt the practices (Hobb, 1985).

In 1935, the Department of Agriculture was established with a mandate to conduct research on crop and pasture agronomy, and to promote pig, poultry and forestry production. Other livestock production services were provided through the Department of Veterinary Services (DVS), which had been established much earlier to advise farmers. The extension approach adopted then by the DVS was the “Foremen Farmers” also referred to as “Cattle Guards”. The foremen farmers were the innovators, engaged in more advanced production systems (Lever, 1970).

The emphasis of extension in the 1940s shifted to small scale, traditional sector agricultural production, leading to the establishment of two small scale irrigation schemes in 1947. The Cooperative Demonstration Pilot Scheme (CDPS) became an established extension approach, and marked the birth of a full-fledged National Agricultural Extension Service (Lever, 1970). The CDPS extension approach required extension agents to conduct demonstrations on the farmers’ fields to disseminate new technologies to a wider population of farmers. Despite the high yields attained on demonstration plots, many farmers failed to continue once they did not have access to subsidies provided through the CDPS. Thus, there was no sustainable technology adoption induced by the program.

The Pupil Farmer Scheme (PFS), an approach based on a concept borrowed from Zimbabwe, replaced the CDPS in 1962 (Lever, 1970). In the PFS extension approach, one extension agent worked with and targeted 15 to 25 farmers. To qualify as a Pupil Farmer, an individual or a household had to own a plough and draught oxen, and should have cleared the bush and de-stumped his or her field. As the pupil farmer progressed and production methods improved, he or she was promoted to progressive, improved, and then master farmer (Baker, 1988). Five years into implementation, PFS had registered a total of 4,150 farmers, which then accounted for 16% of the farmer population in Botswana. The scheme had 1,700 pupil farmers, 1400 improved farmers, 750 pupil livestock men (engaged in livestock farming only), 200 progressive farmers, and 100 master farmers. No extension programs specifically targeted unregistered farmers (Mrema, 1995).

During implementation, the PFS approach faced numerous challenges such as lack of coordination, inadequate supervision of staff, lack of equipment, poor transportation, poor housing, and selective and limited coverage (Baker, 1988). Therefore, the ford foundation supported consultancy was commissioned by the Botswana government in 1972/73 to review the existing national rural development program. The consultancy recommended a shift in focus from subsistence to commercial farming, and the replacement of the PFS by a more ‘modern’ approach, Integrated Rural Development Program (IRDP) that could reach more farmers (Chambers and Feldmann, 1973).

The IRDP combined rural and agricultural extension service delivery and as such covered many aspects of rural development such as rural infrastructure, water supply, health, rural industries and agriculture. More funding for research, agricultural credit schemes, and subsidies for agricultural inputs were also recommended (Mrema, 1995). Through this approach, agricultural extension emphasized group methods and worked through farmers associations, and individual farm visits. Farmer associations are regarded as important to the success of agriculture in Botswana; especially for priority areas of production such as piggery (Republic of Botswana, 2011).

In addition, Batswana farmers are by nature used to working in groups to maximize their production (Willet, 1981). To promote group formation, the Ministry of Agriculture (MoA) established the Agricultural Management Association (AMAs) Act Number 18, Chapter 35:08 in 1986 which it provided the guidelines for registering farmer associations or clusters and the structures to monitor and support groups; for example, to qualify for registration, and venture into a collective project a group is required have five members or more and a constitution (Republic of Botswana, 2011).

The Accelerated Rural Development Programme (ARDP) replaced the PFS in 1973 to 1976. The program turned to be a success only as a rural extension system, and in providing services and building rural infrastructure (Chambers, 1977). It did not improve agricultural productivity and production (Odell, 1978). In addition, the implementation capacity of the ARDP was reportedly low as only 30% of the allocated budget had been used by the end of the three years. This poor performance was attributed to a lack of trained workforce. After the review of the program, the Ministry of Agriculture (MoA) commissioned several human resource development projects, including the expansion of the Botswana College of Agriculture in 1979 to 1984, then the only College in the country offering tertiary level education in agriculture. This offered personnel of the Ministry of Agriculture opportunities for higher training at Bachelors

and Master's Degree levels.

The search for better extension approaches and better programmes continued: prior to the formal adoption of the Farming Systems Research and Extension (FSR/E) approach, various research activities affecting farmer practices such as the British funded Dryland Farming Research Scheme (DLFRS, 1971 to 1983), Evaluation of Farming Systems and Implements Project (EFSAIP, 1985), and the Integrated Farming Pilot Project (IFPP, 1975 to 1985) were set up. The objectives of the DLFRS were to investigate constraints of arable agriculture and develop solutions for making crop production more reliable; hence the development of a minimum tillage cropping system, 'Makgonatsotlhe', a locally designed two-wheeled tool bar plough. Minimum tillage cropping system had several packages recommended for on-station experimentation.

The DLFRS, EFSAIP, and IFPP actually introduced the work of the FSR/E in Botswana (Frankenberger and Mitawa, 1988). The EFSAIP and IFPP projects were established to test the recommendation of the DLFRS; the EFSAIP was responsible for both on-station and on-farm implement development and testing, while the IFPP worked with technologies developed by the DLFRS. After screening by EFSAIP, the IFPP tested the technologies under farm conditions and farmer managed trials (Baker, 1988). The trials by the DLFRS and EFSAIP revealed that the Makgonatsotlhe system was not that effective when used on-farm. Yield increases were marginal as compared to those attained from the traditional seed broadcast method, and equipment was expensive. This was yet another technology that failed and was abandoned in the 1970s.

In 1975, the Botswana Government through the influence of the farming systems movement and the Farming Systems Development (FSD) approach by the FAO, introduced the Farming Systems Research and Extension (FSR/E). This subsequently led to the establishment of four FSR/E projects as an alternative to the Accelerated Rural Development Program (ARDP) (Chambers, 1977). The projects included the Farming Systems in the Southern Region (FSSR), Agricultural Development Ngamiland Project (ADNP), Molapo Development Project (MDP), and the Agricultural Technology Improvement Project (ATIP). The projects tested farmers' reactions to technical packages recommended through on-station research and collected information about farmer practices and constraints (Republic of Botswana, 1987). The testing of research recommendations on farmers' fields by the IFPP, ADNP and MDP projects however, found the packages inappropriate and unworkable (Frankenberger and Mitawa, 1988).

More programs of the ATIP were implemented in 1982 by the Department of Agricultural Research (DAR) to ensure generation of relevant technologies, a function critical in agricultural productivity (Acquah, 2003). All four projects, FSSR, MDP, ADNP and ATIP proved successful in developing and testing technologies for resource-poor farmers (Republic of Botswana, 1987). The MDP aimed to improve farming skills of Molapo farmers through improved water and crop management. Farmers also needed better understanding of the floods such as frequencies in order to develop appropriate crop management plans.

Weak linkages between administration team and Regional Agricultural Office (RAO) as well as lack of trained conterparts proved to be a major problem of the MDP. The main problem of the ADNP was lack of clarity regarding execution of project objectives and development of research priorities. This was further complicated by lack of linkages between the Department of Agricultural Research and other government programs such as the Accelerated Rainfed Arable Production and Drought Relief (ARAP&DRP) (Republic of Botswana, 1987).

According to Frankenberger and Mitawa (1988), ATIP excelled the most in strengthening research-extension linkages and enhancing extension effectiveness in technology transfer. The ATIP paved way for establishment of research-extension linkages with programs of other government departments and organizations; thus, promoting effective technology transfer (World Bank, 1985). The relevant organizations at that time were the Department of Agricultural Field Service (DAFS), Division of Planning and Statistics (DPS), Arable Lands Development Programme (ALDEP), Rural Industry Innovation Center (RIIC), Farm Machinery Development Unit (FMDU), and Botswana College of Agriculture (BCA). The linkages also supported cost-effective institutionalization of Farming Systems Research Extension (FSR/E) work (Frankenberger and Mitawa, 1988). The FSR/E had limited impact on agricultural productivity. It also failed in:

(1) Testing and developing of relevant technologies for small farmers with limited resources
(2) Improving linkages between research, extension and other development institutions
(3) Improving farmer confidence in research and extension
(4) Skill development and improved institutional capabilities, and
(5) Developing research infrastructure in the agricultural regions.

Other constraints of the FSR/E approach were:

(1) Lack of trained personnel
(2) Unwillingness of personnel to work in remote areas
(3) Lack of coordination of project activities by different

departments of MoA and other government ministries, and
(4) Lack of funds to support the FSR/E (Frankenberger and Mitawa, 1988).

National initiatives supporting agricultural extension

Institutional support

Extension services become powerful when they do not stand alone but have programs that provide for inputs, subsidies, and credit (Contado, 1997). In 1995, programs such as the Financial Assistance Policy (FAP) were implemented. The FAP had subsidies to speed up farmer transition to new forms of production such as piggery, dairy, horticulture, and smallstock. Arable Land Development Project (ALDEP) (1981/82 to 2007/2008), Accelerated Rainfed Arable Project (ARAP) (1985/86 to 1995/96), and the Integrated Support Programme for Arable Agriculture Development (ISPAAD) (2008 to date) were the 5 programs specific to arable farming. Livestock Management and Infrastructure Development (LIMID) of 2007, the Fencing Component, 1991 and the National Master Plan for Dairy Development (NAMPAADD), 2002 targeted livestock improvement (Agenda 21-Botswana; Republic of Botswana, 2009).

In 2008 ISPAAD replaced ALDEP, the aim of ISPAAD and ALDEP was to improve arable farming and increase production through fencing of fields. This was to protect crops from damage by roaming livestock and game as well as assisting farmers to obtain requisite inputs. Packages offered by ISPAAD were:

(1) Provision of drought power
(2) Potable water
(3) Seeds
(5) Fertilizer and herbicides and facilitation of access to credit and fencing
(6) Establishment of agricultural service centers (Republic of Botswana, 2013).

To further improve adoption, ISPAAD targeted three farmer categories according to area of production and level of operation; assistance was customer-packaged according to subsistence, emerging, and commercial farmers. Specific objectives of two phases of the Livestock Management and Infrastructure Development (LIMID) 2007 up until 2010 were:

(1) Promotion of food security through improved productivity of livestock, cattle, goats, sheep, and Tswana (indigenous breed) chickens
(2) Improving the management of livestock
(3) Improving range resource management, utilization and conservation
(4) Provide infrastructure for safe and hygienic processing of poultry (meat)
(5) Eradicate poverty.

The programme offered seven packages: small stock, guinea fowl, and Tswana chickens targeting resource-poor households; others specific to infrastructure development comprised animal husbandry and fodder support, borehole and well equipping, borehole drilling and reticulation and borehole/well purchase, and cooperative poultry abattoir construction.

An evaluation study of LIMID phase l, showed the scheme excelling: the programme increased population of small stock, Tswana chickens, and clients found it useful as it improved lives. The study revealed low access to programmes by youth and infrastructure development component with the least access by all beneficiary groups. This was attributed to failure to raise required client contribution (Republic of Botswana, 2010a).

The National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD), a 10 year program focusing on dairy, horticulture, and arable farming was established in 2002. Its main aim was to improve the performance of agriculture and ensure economical and sustainable use of natural resources. The specific objective was to promote competitiveness by agriculture and reduce reliance on imports that can be viably produced locally. The NAMPAAD aimed at transforming traditional or subsistence farmer operations to commercial level as well as upgrading the management skills and technology application of commercial farmers (Republic of Botswana, 2009). The core mandate of NAMPAADD was to coordinate and lead the implementation of the Master Plan in conjunction with the relevant departments of the MoA and other stakeholders. The program, unlike others, had no financial assistance component but assisted farmers with the preparation of business plans for loan applications to financial institutions.

The NAMPAADD focused on dairy farming with dairy herd of minimum 50 cows, rain-fed of land size (150 ha) and irrigated (1 to 2 ha) agriculture as such operations can give farmers reasonable returns and continuation in production. The program worked with 78 pilot farmers, 59, 10, and 9 for rain-fed, irrigated, and dairy farming respectively and used selected Production and Training Farms (PTFS) to train farmers and extension workers. Four PTFS were established: Ramatlabama (610 ha, rain-fed), Dikabeya (7 ha, irrigated), Glen Valley (7 ha, irrigated), and in Sunnyside (170 cows, dairy). The PTFS served as demonstration farms for new technologies, training facilities, and production units for commercial farming. Even though with little impact, production on PTFS and regular farmer training continued. Minimum technology adoption was linked to costly technology and

target output recommended by the production schemes (Republic of Botswana, 2009-2016).

Policy support

A review of the agricultural sector undertaken in 1989 in Botswana led to the development of a new agricultural policy in 1991. The policy adopted household and national food security to replace national food self-sufficiency as one of its objectives, and identified several challenges for agricultural extension including the need for:

(1) An extension system design that gave maximum economic benefit and promoted national production plans emphasizing agriculture as well as non-farm.
(2) Economically sound advice on farm techniques that are relevant to farmer situations,
(3) Targeted policy packages and subsidies for specific farmers,
(4) Adoption of commercial rather than subsistence production approaches by farmers, and
(5) Private-sector service provision.

Some initiatives supporting policy objectives include the development of Small, Medium, and Micro Enterprises (SMME) in agriculture instrumental to improved agricultural production, rural household food security and poverty eradication (Republic of Botswana, 2009-2016). The Local Enterprise Authority (LEA), launched in 2004, supports local business development especially small, medium, and micro enterprises (SMMEs) projects. The authority provides several services, business skills training, mentoring, facilitation of market access, credit access, business plan development, and technology adaptation and adoption to SMMEs (Republic of Botswana, 2011).

The Citizen Entrepreneurial Development Agency (CEDA), was another scheme launched in 2001 to offer loans at lower interest rates (than market interest rates), to encourage citizens to invest in enterprise development. The Young Farmer Fund (YFF), a CEDA component introduced in 2006, promotes youth participation in agriculture and business. The program provides loans to young entrepreneurs at lower interest rates and longer repayment periods than those given to other CEDA clients. The Agency also provides enterprise-specific training and mentoring to young farmers.

The National Strategy for Poverty Reduction (NSPR) 2003 was another attempt by government to have an overarching policy framework for poverty reduction; a policy that harmonizes all existing national anti-poverty policies and programmes in order to promote sustainable livelihood and rural development (Republic of Botswana, 2010b). This led to the Poverty Eradication Program of 2012. The programme provides agricultural and non-farm packages such as kiosks, home based laundry, upholstery, tent hire, and pottery. Apart from inputs and materials, beneficiaries undergo training specific to enterprise projects and regular monitoring by the District and Village Extension Teams (Republic of Botswana, 2012a).

The Revised Policy on Rural Development (2003) was yet another framework emphasizing rural livelihood improvement through better public services, developed livestock and crop sectors, infrastructure, employment and income generation (Republic of Botswana, 2001). Other strategies include the Strategic Framework for Community Development (2010), Community Based Strategy for Rural Development (1997), and the Community Based Natural Resource Management Policy (2007).

Structural support

To implement some of the recommendations from the First National Conference on Agricultural Extension held in 1995, the MoA underwent a major re-structuring conducted through the Organizational and Methods (O&M) study of the government departments. This was to improve coordination and cost effectiveness of services in the related departments of the Ministry (Mrema, 1995). The re-organization led to the split of the former Department of Agricultural Field Services into two parallel agricultural extension systems, one for livestock production and health and the other for crop production and forestry. Another re-structuring of the MoA by the O&M approved by the Cabinet in 2005 was implemented in 2006. As a result, the Department of Animal Health and Production split to become the Department of Veterinary Services and the Department of Animal Production. Extension services merged into one unified service under six Regional Agricultural Coordinators reporting directly to the Deputy Permanent Secretary (Support Services) within the MoA. The Division of Agricultural Planning and Statistics was renamed Division of Research and Statistics, and the Department of Crop Production and Forestry became the Department of Crop Production. A new department of Agricultural Business Promotions was created, while the Department of Agricultural Research was retained.

Constraints and challenges of agricultural extension

One of the goals of the National Policy on Agricultural Development (1991) was that farmers needed to adopt non-traditional production systems such as horticulture, bee-keeping, harvesting and processing veld products in order to diversify agriculture and enhance food security.

Table 1. Factors constraining agricultural extension.

Constraints			
Physical	**Administrative**	**Extension agent**	**Farmers**
Unreliable rainfall	Lack of coordination	Few specialized personnel	Lack of credit facilities
Limited market	Programmes not complimentary	Inadequate in-service training	Absentee farming
Inadequate transport and communication	Programmes not targeted to farmers	Lack of training plans	Poor adoption rate due to negative attitudes
-	-	Low morale	Shortage of drought power
-	-	Shortage of residential and office accommodation	Shortage of farm labour
-	-	Agents spending less time on extension and more on administrative emergencies	Inadequate farmer's organizations
-	-	Lack of support from supervisors	Lack of knowledge and skills on improved farming practices
-	-	No promotion and clear career advancement paths	-

In addition, the policy objectives for commercializing agriculture emphasized entrepreneurial skills. The lack of entrepreneurial skills continues to retard agricultural production in Botswana. Expensive technologies such as seed, hybrid cultivars, chemicals, and machinery challenge adoption by farmers and thus, stress the need for improved extension services (Republic of Botswana, 2000). The National Development Plan-10 (2009-2016) outlines constraints of agricultural production and productivity as:

(1) Farm fragmentation making provision of essential infrastructure expensive
(2) Inadequate resources
(3) Recurring drought
(4) Pests and diseases
(5) Non-affordability of critical farm inputs, and
(6) Technology adoption.

Effective delivery of agricultural extension services is constrained by four groups of factors: physical, administrative, extension worker related and farmer related. Farmers' constraints included lack of credit facility, absentee farmers, poor adoption rate because of negative attitudes, lack of knowledge on improved farming practices, and strong farmer organizations (Sebina et al., 2011). Table 1 shows constraints of agricultural extension by specific category. Problems associated with extension agents and farmers make a longer list. This is a result worth noting as extension agents link the system to the farmers; if the link is disabled, the whole system becomes ineffective (Morse et al., 2006). Tables 2 and 3 outline agricultural extension approaches, projects, and challenges that can be categorized as: administrative, including selective programmes targeting particular group of farmers and production systems; project and administration team linkages and coordination; farmer related challenges comprising of selective coverage, expensive equipment, lack of subsidies and inputs, lack of trained extension workers and poor implementation capacity; and, extension worker related problems such as poor housing and transportation, and poor training.

Reforms for improving extension service delivery

Two types of institutional reforms, market and non-market are recommended to refocus agricultural extension systems in developing countries. The adoption of one or the other depends on the purpose and focus of an extension system (Rivera et al., 2001). Market reforms are used to privatize the management of agricultural and rural extension. This is either by contracting extension service delivery, cost-recovery by charging fees for services, or creating partnerships with farmers' associations. Rivera et al. (2001) classified market reforms into four main strategies:

(1) Revision of public-sector extension systems
(2) Pluralism
(3) Cost-recovery, and
(4) Total privatization.

Market reform strategies can assist with commercialization of agriculture in Botswana with the Department of Agribusiness Promotion (DABP) of the Ministry of Agriculture (MoA) leading the public sector role in promoting business skill transfer, market access and agricultural cooperatives and associations (Republic of Botswana, 2012c).

Table 2. Agricultural extension approaches and challenges.

Year	Extension approach	Challenges
1926	Commodity-specific (focus on dairy only)	Selective services targeting dairy small farmers only
1935	Foremen farmer	Minimal effect on technology adoption and farmer development
1947	Cooperative demonstration plot scheme (CDPS)	No sustainability when project ends Failure to continue because of no access to subsidies and inputs Minimal adoption by farmers
1962	Pupil Farmer Scheme (PFS)	Lack of coordination and Supervision of extension workers Lack of equipment, poor housing and transportation for extension workers Selective services for registered farmers only with little coverage
1972	Integrated Rural Development Programme (IRDP)	Minimal improvement on the PFS Focus only on rural extension and not on agricultural projects
1973	Accelerated Rural Development Programme (ARDP)	Poor implementation capacity due to lack of trained workforce Minimal impact on agricultural production

Table 3. Agricultural approaches and challenges.

Farming systems development approach and farming research extension (FSR/E) projects		
1971 – 83	Dryland Farming Research Scheme (DLFRS)	Failure of minimum tillage technology in the farmers' fields after success in the on-station trials
1975	Agricultural Technology Improvement Projects (ATIP)	-
	Farming Systems In the Southern Region (FSSR)	Developing and testing technology for resource-poor farmers was successful; but, later found inappropriate and unworkable
	Agricultural Development Programme (ADNP)	No clarity of how to implement project objectives and develop research priorities
	Molapo Development Project (MDP)	Weak linkages between administration team of the MDP and Regional Agricultural Office Lack of trained extension staff
1975 – 85	Integrated Farming Pilot Project (IFPP)	Minimal yield increases using Makgonatsotlhe as compared to traditional tillage methods
1985	Evaluation of Farming Systems And Implement Project (EFSAIP)	Expensive equipment that farmers could not afford
2005	Unified Extension System With Regional Agricultural Coordination	No continuity of programmes due to slow staff recruitment in the new department Delayed extension operations due to staff movements in the MoA Lack of a unifying strategy for extension departments of the MoA

The MoA can also finance services but contract delivery of services to commercial farms, agri-shops, NGOs, and parastatals such as Botswana Meat Commission (BMC), Botswana College of Agriculture (BCA), Botswana Vaccine Institute (BVI), Citizen Entrepreneurial Development Agency (CEDA), The Local Enterprise

Authority (LEA), and Botswana Marketing Board (BMB) for specialized technology and information needs (horticulture, seed multiplication, fodder, poultry, inputs) for all types of farmers subsistence, emerging, and commercial as already targeted by programs such as ISPAAD. Engagement of the private sector in sourcing and transportation of seeds and fertilizer from storage facilities is a partnership possibility for availing inputs to farmers (Republic of Botswana, 2012a).

Non-market reforms aim to relieve government ministries of the responsibility for both funding and management of public sector extension service delivery. Most commonly used non-market reform strategies are decentralization, transfer of responsibility of extension delivery to lower tiers of government, delegation to non-government organization, or removal of the entire government responsibility. Three decentralization strategies dominate reform for improving agricultural extension:

(1) Decentralizing the burden of costs for extension through re-designing the fiscal system.
(2) Decentralize national government responsibility for extension through structural reform, and
(3) Decentralize extension program management through farmer participation in decision-making and transfer of responsibility for programs.

According to Rivera and Qamar (2003), a review of institutional constraints helps reveal reform needs. Therefore, three reform strategies, institutional pluralism, cost-recovery and decentralization are best suited to refocusing and improving agricultural extension service delivery in Botswana.

Institutional pluralism

This is widely promoted in developing countries and it involves contracting out the delivery of public-sector extension services to non-governmental organizations (NGOs), private companies, consultancy firms and farmer cooperatives or associations to enhance capacity building of the private sector. Pluralism allows close cooperation between public and private sectors where government continues funding extension services while the delivery is delegated to the private-sector (Rivera and Qamar, 2003). The success with different models of institutional pluralism and privatization of agricultural extension is reported in Ecuador, Chile, Costa Rica, Sri Lanka, Ethiopia, Kenya, Uganda, Mozambique, and Zimbabwe (Kidd et al., 2000). Pluralism therefore can promote partnership of the MoA as a public extension provider with support institutions, private companies, agri-shops, NGOs such as Veld Products or 'Thusanyo Lefatshing', parastatals, Botswana Meat Commission (BMC), Botswana University of Agriculture and Natural Resources (BUAN), Botswana Vaccine Institute (BVI), CEDA, LEA, and Botswana Marketing Board (BMB) in order to improve relationships and promote private sector capacity building

Cost-recovery

This involves fee-charging: farmers pay for extension services. These are farmers who can afford fees for extension advice. This enables better targeting of specialized groups such as subsistence or small scale and commercial farmers, women and youth, and farmers association to meet different client needs. The MoA can charge fees for extension services and delivery using any criteria, type of farmer, technology, and information. This is a bit radical as most production systems are small scale; however, there are few emerging commercial farmers who are able to pay for extension advisory services. A number of farmers are already paying to enroll themselves and/or their employees for training related to specific production techniques at the Centre for In-service and Continuing Education (CICE) at the Botswana College of Agriculture, presently upgraded to a university (BUAN)instead of attending the same training free of charge at the Denman Rural Training Centre. The MoA, for instance, can give free extension services to subsistence farmers, subsidized services to small scale farmers, and 100 percent payment by commercial farmers such as what prevailed for the Integrated Support Program for Arable Agriculture Development (ISPAAD, 2008).

Decentralization

This enables the MoA to transfer authority and responsibility for agricultural extension to the regions, districts, and villages for more accountability and speedy response to clients. One viable decentralization option is of transfer of responsibility and authority for extension to related organizations already with a mandate for extension advisory, government ministries and departments for better design of specialized programs for agricultural as well as rural extension. This is to enhance relevance, responsiveness, and increase effectiveness (Rivera, 2008). Government may strengthen farmer clusters and associations at different levels in the priority sectors such as piggery, horticulture, small-stock, dairy, grant subsidies, and transfer responsibility for extension to the associations (Republic of Botswana, 2011). In the MoA, institutions such as the Department of Agricultural Research (DAR), BUAN, BMC, BAMB, CEDA, and Botswana Cooperatives Movement (BCM) could deliver commodity-based extension services according to own

area of expertise. Another option that would enhance coordination of the many service providers is that of shifting authority and responsibility for all national extension service delivery to the Rural Extension Coordination Council (RECC) where different stakeholder management levels are represented. This is on condition that a decentralization-specific policy to ensure total transfer of responsibility, powers and finances to the Council, recruitment of own extension personnel, and farmer participation in decision-making is developed. Another decentralization option to improve coordination among many service providers is to give authority and responsibility for all national extension service delivery to the Rural Extension Coordination Council (RECC). This is on condition that a decentralization-specific policy is developed to ensure total transfer of control and finances to the Council and to also provide a structure to the operations.

CONCLUSION AND RECOMMENDATIONS

The purpose of this paper was to discuss agricultural extension in Botswana, past and present approaches, programs, and initiatives to support extension services, and agricultural production. This was to demonstrate the recurring nature of the factors constraining the extension system and recommend reforms for improving the services. The review reveals a remedial pattern to address problems as several extension approaches, programmes, initiatives, and schemes were implemented one after the other since 1926, often concurrently.

Policy initiatives such as FAP, ALDEP, ARAP and presently ISPAAD, NAMPAAD, and others were an attempt to address the problems of agricultural extension. The schemes targeted coordination, access to subsidies, inputs and entrepreneurial skills training; while structural support tackled more the administrative challenges. Unfortunately, this skewed extension agent work to inputs distribution, registering farmers and helping them complete forms for subsidies and credit, Farmers complain generally about no farm visits by local area extension agents; an activity they valued the most (Tladi, 2004).

Factors constraining main extension comprised low adoption of improved technologies by farmers, attitudes of farmers, lack of resources, drought power, lack of highly specialized extension workers, compounded by physical factors such as low and unreliable rainfall and droughts, and lack of a vision and therefore, no extension policy, poor coordination and collaboration by departments and lack of support and training for extension workers. Based on the constraints, challenges of administrative, farmer, and agent or employee welfare nature were identified. Institutional pluralism, cost-recovery and decentralization were recommended to refocus and improve agricultural extension in Botswana.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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