

**AGRICULTURE EXTENSION SERVICE DELIVERY IN A SEMI-ARID
RURAL AREA IN SOUTH AFRICA: THE CASE STUDY OF THORNDALE
IN THE LIMPOPO PROVINCE**

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ABSTRACT

Poverty, geographical isolation and being poorly served by agricultural workers, education, health, transport, communication and other services characterise the rural environment in most developing countries. Agricultural productivity and its associated agricultural extension services are important to the livelihood activities of rural communities. For rural communities to fulfil their respective roles, they require access to productive services information on input supply, new technologies, early warning systems for drought (pests and diseases), credit, and market prices. Agricultural extension service has been identified as an important part of the intended transformation of the agricultural sector. In South Africa, farmers consider the effectiveness of extension services in relation to receiving technological information and advice for purposes of crop and livestock production. The paper discusses the role of agricultural extension services in agricultural production in Thorndale, situated in the Savannah biome of the Bushbuckridge region in the Limpopo Province, South Africa. A questionnaire survey was used in the collection of data. The results indicated that the majority of the farmers do not have access to the services of extension officers. Yet, some farmers have infrequent contacts with extension officers and information, and the magnitude of extension services have been restricted to verbal instructions rather than demonstrative, innovative and hands on practical guidance to farmers. The majority of the respondents approximately 97% are farmers who engage in agricultural production, consisted of small-scale approximately 97% and commercial 3% farmers. The approximately 38% of households who have had contacts with extension officers indicated that the advice and assistance they received entailed farming practices such as buying seeds needed for crop production and storage of the produce harvested for eventualities such as drought or famine. Others include nursery making, correct crop spacing and fertilizer application, planting, transplanting, herbicide application, timely planting and early weeding. The study concluded that extension officers need to visit and guide rural farmers regularly with improved farming technologies and services. Further, capacity development and logistical assistance should be strengthened towards improving the current extension services to the rural communities.

Key words: Farmers, underserved, extension, drought, productivity

INTRODUCTION

Poverty, geographical isolation and being poorly served by agricultural workers, education, health, transport, communication and other services characterise the rural environment in most developing countries [1]. The information needs of rural communities are embedded in the hierarchy of their livelihood activities. Poverty has tremendous and negative impacts on societies in general and rural dwellers in particular, affecting their style of life and their very existence. Hence, it is essential to reduce or eradicate poverty to ensure improvement in the style and standards of living, and ensure the availability of basic capabilities in society in general and rural areas in particular. This prominently involves improving productivity in the agricultural sector. This can be partly done through the transfer of technical (TOT) advice and information from agricultural extension officers.

A prerequisite for the African continent's economic development lies in the improvement of agricultural development and performance [2, 3]. This may result in an increase in the purchasing power of rural dweller, which may further lead to higher effective demand for industrial goods in Africa. Improvement in agricultural productivity depends on the removal of a couple of structural constraints that affect the sector. Prominent among these is access to needed agricultural production information.

The majority of black people in South Africa live in the rural areas [4], thus agricultural productivity and its associated agricultural extension services are important in relation to their livelihood activities. For rural communities to fulfil their respective roles, they require access to productive services [3], information on input supply, new technologies, early warning systems for droughts (pests and diseases), credit, market prices and competitions.

Agricultural extension service has been identified as an important part of the intended transformation of the agricultural sector [5]. For instance, a group of Asian scientists and field workers perceived the effectiveness of extension services in relation to the adoption of rice-fish farming [6]. In the case of South Africa, farmers consider the effectiveness of extension services in relation to receiving technological information and advice for purposes of crop and livestock production.

The advancement of local producers through the dissemination of technical advice and/or information relates importantly to issues of increasing high quality agricultural productivity [7] especially with regard to small-scale farmer. Agricultural technology is largely disseminated through good agricultural extension services. Extension services have several functions including the provision of technical advice about specific technologies, preparation of training/extension materials on those technologies, provision of secondary data on example soils, climate, prices, encouragement of farmer-to-farmer extension advice, participatory experiences and sharing of results in a wider sense and using the knowledge of farmers' situation and

questions to influence extension policy [8]. It is essential that the technologies are effectively disseminated to the clientele with the use of the most appropriate communication channels, taking into consideration the socio-economic and cultural contexts of the farmers. This will ensure the availability of and accessibility to information to all concerned and interested end-users. The study examines small-scale farmers' access to agricultural extension services and explores the role of agricultural extension services in agricultural productivity in Thorndale.

AGRICULTURAL EXTENSION SERVICES IN SOUTH AFRICA

Several attempts have been made to improve the agricultural extension sector of the South African economy. Among others, Kiplangat [4] observes that the South African white paper on agriculture published in 1995 facilitated the new vision for agriculture in line with the country's constitution. Globalisation, the removal of impediments to free trade and the entrance of small-scale farmers were some of the changes that promoted another look at agricultural policy in South Africa. Also outlined are the importance of comprehensive information on agricultural conditions such as physical and marketing conditions, and production constraints as a prerequisite for planning and the formulation of policy. It also reiterated the need for effective linkage between research, farmers and other stakeholders [9]. This focus has resulted in a shift from commercial agriculture to resource-poor farmers. Equitable access to the appropriate and effective extension and training is to be ensured, with emphasis on farming communities that were disadvantaged in the past. Previously, the government had two parallel extension services, one for commercial agriculture and another in the self-governing territories (for small-scale farmers) [7, 10]. The post apartheid period of growth has provided opportunities for reparation and reform that is encouraging unity and inclusion in many areas [11].

In South Africa, the major service institutions were geared to white commercial agriculture. Thus, while the interests of white commercial farmers were catered for, small-scale farmers (mostly blacks) had limited or no access to support services. Where the small-scale farmers had some access to farmer support services, the quality of the services has been inferior [7]. It has been argued that TOT reinforces social inequalities because it benefits producers who are better endowed than others in material, intellectual and social resources [12]. However, despite the fact that formerly white institutions are re-orienting their activities to address the needs of small-scale farmers (for example the Agricultural Research Council and the Land Bank), and former homeland agricultural service institutions (for example agriculture development corporations and provincial departments of agriculture) are being restructured, many small-scale farmers still do not have access to support services [7].

Roles of extension service and officers in agriculture

The roles of extension service in the broader system of agricultural and rural development lie in providing information for the government, particularly its research establishments on the productive performance and farmers' potential and the ways that research in particular should respond to farmer requirements. Extension service

also provides assistance to smaller-scale farmers to organise themselves into groups, where appropriate, to gain access to finance and other production requirements, and to market their produce through group action [10]. In addition, extension service also provides assistance to rural communities seeking to better manage local agricultural and natural resources through new forms of organisation, such as livestock associations, water-user associations and land-care groups, to mention but a few.

South Africa has a large proportion of extension officers with an average of 1:487, probably one of the most favourable ratios in Africa, comparing favourably with that for developed countries. Extension officers are key players in agricultural development. They act as a bridge between researchers and farmers, hence providing a two-way communication flow between researchers and farmers. Theoretically in South Africa, most farmers would be assumed to have contact with extension officers. However, in terms of training and ability to address farmers' needs, the quality of extension officers is much lower [7]. Further, extension officers and systems often lack on-the-ground supervision by managerial staff including inadequate incentives for good performance, all of which result in poor productivity and low morale.

A THEORETICAL BACKGROUND ON AGRICULTURAL EXTENSION APPROACHES

The approaches used in agricultural extension service delivery have been classified under four paradigms, namely TOT, problem-solving, education and human development [13].

Transfer of technology

The TOT has been described as proactively changing behaviour in the form of the adoption of new technology that is externally developed, already available and tested or management practice through the provision of information, opportunity and persuasion [14]. This is a one-way model from science to practice [13], in which the user is the passive receiver [14]. Hence, knowledge is perceived as a product that flows from science to the user [15].

The TOT model has been criticised because technology is not adapted to or suitable for the specific situation that an individual farmer is confronted with [13]. As indicated earlier, it also tends to reinforce social inequalities because it benefits producers who are better endowed than others in material, intellectual and social resources [12]. Finally, it ignores the knowledge, skills and farmer adaptive abilities. Despite all these criticisms, TOT is still a commonly used extension paradigm [14].

Problem-solving approach

Problem-solving is an important part of extension work [13, 15]. Assisting individuals in finding solutions to technological or management problems is one of the functions of extension advisory or consultancy. In farmers' practice, problem-solving is an often used format for the transfer of knowledge, with the use of their expertise which is

given to farmers by individual advisers [16], or a group of advisers. These 2 different groups have different roles to play in this context, in which case the consultants have specific specialist knowledge, whereas the farmers need to be competent in deciding on the type of expertise they require, to provide a basis for the consultant's advice [13, 16].

Learning and adult education approach

Learning in study groups is a means of proactive informal education that seeks to help individuals to better understand their situation [14, 15]. To be able to gain insight into the learning process that takes place, adult learning theories may help. Consequently, learning cycles and styles have been used to describe the study group learning process. However, while being used as a conceptual framework in adult learning, the technique of learning cycles and styles has not really been used in agriculture. The learning cycles include concrete experience; observation and reflection; the formation of abstract concepts and generalizations and, hypothesis for future testing, which leads to new experiences, thus closing the cycle. The learning process has been observed as a continuously recurring process which is governed by one's needs and goals. The approach is indicative of the fact that individuals develop their own learning cycles. Four learning styles, namely, divergent learning, assimilation, convergent and accommodative learning have been identified as associated with the different stages of the learning cycle [17].

Human development approach

In human development, extension is a means to the facilitation and stimulation of individuals or groups to take the initiative in the definition of problems and in the seeking of solutions to individual and societal concerns including opportunities [14, 15]. This extension paradigm consists of participatory approaches that are based on participation, adult and action learning principles. The participatory approach is adopted because of the increasing complexity of agricultural and environmental problems, the uncertainty associated with recommendations, and a need for local learning communities.

These approaches have merits including ensuring the recognition of local ways of knowing, and draws on accumulated knowledge and experience on the farm; supports local innovation and adaptation; involves stakeholders in research that has a financial and/or social impact on the farming community; acknowledges the value of sharing information and ideas among farmers; encourages producer ownership both of problems and solutions; makes use of the group processes for learning. However, these approaches have been criticised since farmers may not recognise problems because they may be new to them (for example, environmental problems), in which case non-participatory approaches may be added; there may be the prevalence of a tyranny of situations that may cause possible rejection of ideas; further the dissemination of knowledge developed in groups may be limited to the group itself [18].

METHODOLOGY

The study area is Thorndale (31°28'E; 24°39'S), forming part of the former Gazankulu homeland, located in the savanna biome of the Bushbuckridge region of the Limpopo Province, South Africa [19]. The Bushbuckridge region (31°0'-31°35'E; 24°30'-25°0'S), borders the Klaserie-Orpen Road in the north, stretching to the Drakensberg escarpment in the west, to the border with Kruger National Park and the Sabie-Sand Game Reserve in the east. The study area reflects the characteristics of the majority of communal lands in the country, since it was created for relocated (particularly black) families during the apartheid regime. The area is remote, and relatively unstudied, which justifies its selection for this study. This region experiences prolonged dry weather conditions annually, and extreme drought events in certain years (for example, 1982/1983; 1992/1993; 2002/2003). Mean annual rainfall is approximately 550 mm to 600 mm, most of which is received between October and April, usually in the form of convectional thunderstorms. Mean annual temperature is approximately 22°C [20]. The Bushbuckridge region falls within a geographic area in the north of South Africa that like other areas is prone to severe droughts. This can result in significant rainfall deficits and drought variability. The area experiences both prolonged and extreme droughts, and milder seasonal droughts, which, coupled with delays in rainfall periods, forces inhabitants to be more dependent on the savanna woodlands.

The community has an estimated population of 450, comprising of 71 households [21], out of which 34 households were selected, representing approximately 48% of the total number of households. To facilitate the collection of primary data and ensure that it is fairly representative of the community, the simple random sampling technique was adopted and used in the selection of 24 male-headed and 10 female-headed households. This constituted a sample unit of 34 households for the study, consisting of 34 respondents from the ages of 26-85 years. The interviews consisted of both open- and closed- ended questions. The design of the study took into consideration the fact that some members of the population cannot read and write and, therefore, could not fill the questionnaire. The administration of the questionnaire thus took the form of interviews as opposed to self administration.

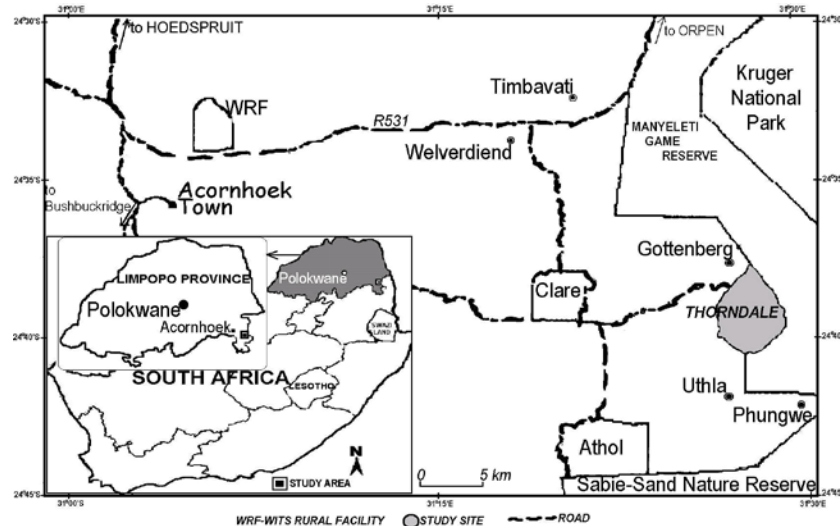


Figure 1: Map of South Africa showing Limpopo Province and the study site, Thorndale [21]

Descriptive statistics were used in the analysis of the data, through statistical computations used in organising and describing the characteristics of the data set of the sample and the relationships existing between the variables of the sample [22]. Frequencies were used in breaking down the overall data into categories and were presented as percentages of the total [22, 23]. The process of analysis entailed two stages, the first of which entailed the development of themes and codes and the second involved the usage of the codes. The kinds of themes include dealings and the duration of contact with extension officers. However, adopting Botayatziz's [24] postulations, within the first stage, the data-driven approach was used in the development of codes. From the data-driven approach, codes were generated from the raw information.

Further, by employing the use of chi-square statistics [22], the survey sought to examine the association (if any) between access to agricultural extension services and improvement in agricultural productivity. To guard against weaknesses involved in interpreting chi-square results based on small samples, the data was further subjected to Cramer's V test. The Cramer's V, like most measures of association, ranges between 0 (no association) and 1 (perfect association). There is no direct interpretation of any particular value of V between 0 and 1. However, anything under 0.1 is considered very weak [25].

The paper illustrates small-scale farmers' access to agricultural extension service delivery and its effect on productivity and livelihoods. The study presents and analysis of the major challenges of poor farming communities in relation to extension services beyond the study area using supplementary information obtained from documentary sources. Such poor farming communities are located in the various agro-ecological zones where small-scale poor farmers lack sufficient access to and benefit from extension services. The supplementary information also a discusses leveraging

political will and financial backing towards the movement of the programme forward by way of making the scope of the problem model complete, significant and useful..

RESULTS

Dealings and the duration of contacts with extension officers

Farmers need to have contacts with extension officers with the aim of receiving advice regarding their productive activities. The majority of the respondents, approximately 97%, are farmers who engage in agricultural production, consisted of small-scale approximately 97%, and commercial, 3% farmers. This is further composed of crop producers approximately 27% and a combination of crop and livestock producers approximately 73% (See Table 1 for details). Three percent of farmers who do not engage in agriculture production engage in other livelihood activities such as trading; extraction of non-timber forest products (NTFPs), dress making, among others.

However, the results indicated that the majority of Thorndale's farmers 62% are unable to have contacts with extension officers for a couple of reasons. The first is being engaged in crop production and yet lack the opportunity to deal with an extension officer. Second, there is the issue of exclusion resulting from outreach. Finally, the extension officers do not visit the farmers on prior agreed dates and times. However, a minority 38% did have contacts with officers. Farmers in this category have contacts with extension officers with varied durations ranging from once a month to once in two years. Fifteen percent each of the farmers indicated that they have contacts with the extension officers and once a year respectively. Some others also had Three percent have contacts with the extension officers once between two to three months as well as once in every two years approximately 6% (Figure 2). This variation in the duration of contacts with extension officers may be attributed to misconceptions of the meeting times between the two parties.

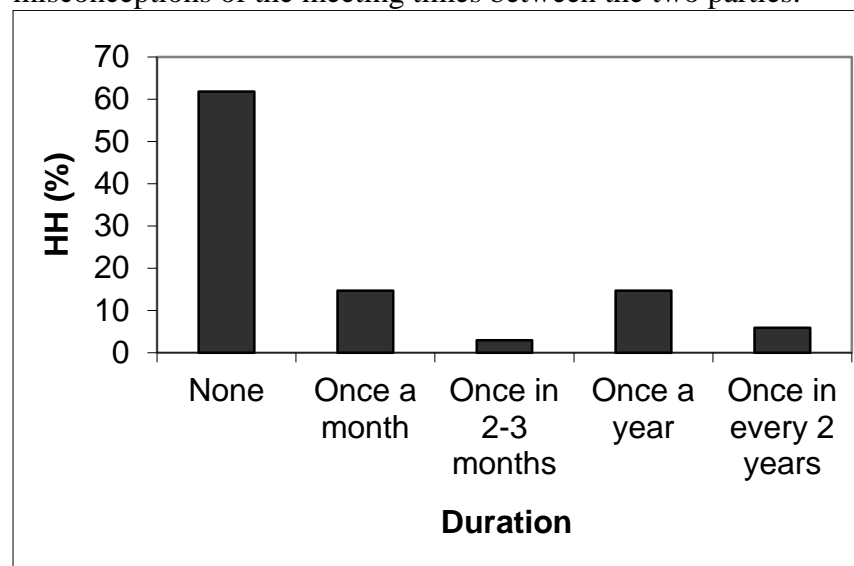


Figure 2: Contacts with Extension Officers

Source: Computed from field survey (2005)

Out of the approximately 38% of farmers who had contacts with the extension officer, 39% were males and approximately 61% were females. This shows that predominantly female farmers 62% have contacts with extension officers due, probably, to the prevalence of more female- and quasi female- headed households. This implies that these female farmers have autonomous control over the opportunity to access extension services that come their way including the benefits thereof. This strengthens women's ability to improve yield, profits, efficiency and effectiveness with implications for their production activities and income generation capacities, since more yields is associated with higher generation of income.

The study explored the existence of an association between access to extension services and improvement in agricultural productivity, by subjecting the data to Cramer's V statistical test. The result (Cramer's $V=1$) does suggest a strong association between the two variables. In confirmation, farmers in the category above indicated that the advice and assistance they received from the extension officers entailed farming practices such as provision and buying seeds needed for crop production, planting, weeding including storage of the produce harvested for droughts or famine eventualities; o starting home and community gardening, and sometimes money among others. In addition to learning how to prevent the mortality of livestock, farmers obtained medication and/or vaccination for livestock. Others included nursery making, correct crop spacing and fertilizer application, sowing, transplanting, herbicide application, timely planting and early weeding. The farmers indicated that such advice was useful because farmers obtained financial resources required for production purposes. The advice also yielded good results, for instance, enabling the storage of produce, especially maize meal and finally the community could start sale of its produce (see Table 2 below).

However, 8% of farmers stated that the advice was not useful to them since their livestock continued dying (Table 3). The affected farmers explained that the extension officers were deceiving them. This may imply that such farmers did not believe or have confidence in the advice received from the extension officers. Broadly speaking, such farmers were unable to receive the exact advice required for their specific and unique situations and/or needs. Or such farmers just did not apply the knowledge imparted to them, or did not take it seriously.

DISCUSSION

The results show that a minority 38% of the farmers had contacts with extension officers with variations in duration, while 62% did not. It has been asserted that an increasing number of farmers are excluded from the benefits of technical support services [26]. The variation in duration in terms of extension officers' visitations, for example once a year or in two years is due mainly to the unavailability...or shortage of extension officers, although dates have been set for the purpose of such visitations. Consequently, increasingly more farmers are excluded as stated earlier from obtaining

advisory services. In the long run, the reduction of interactions between farmers and extension officers and/or services may result in new difficulties in designing such services including appropriate and relevant themes. Similarly, observations in relation to the European Union fund's subsidised training programmes in Spain and the United Kingdom find it extremely difficult to identify the most relevant topics for farmers [26]. The supply of advisory services cannot be considered independently from demand, taking into account the fact that interaction plays a key role in the definition of problems and the elaboration of new knowledge. The request and/or demand for and provision and/or supply of extension information are simultaneously determined.

Extension services provision in Thorndale is frost with certain challenges. For instance, the 8% of the farmers as indicated earlier who found contacts with the extension officers not useful had little or no confidence in the advice they received. In keeping with this, Bergevoet and van Woerkum [13] argued that agricultural extension officers have been criticised for ignoring the diversity in approaches to farming activities even among neighbours with similar resources. Some farmers 8% also indicated that the extension officers promised them seeds (starter packs) but did not honour their promises. Another challenge encountered by the services of the extension officers was the farmers' 23% complaints that quality of training and guidance were lacking and, therefore, were inadequate, particularly with respect to the advice to start home and community gardening. This is in line with the theoretical criticism indicated above that technology is not adapted to or suitable for the specific situation that an individual farmer is confronted with [13]. The farmers 8% noted that the amount of time the extension officers spent with them in the community was inadequate. In addition, an essential observation by 8% of the farmers was that things could have been better if the extension officers visited the community, especially farmers more often (see Table 3 above). At face value, these data might actually suggest general satisfaction with extension service delivery among the respondent farmers. Even if this were the case, more still needs to be done to improve the delivery of such services. This highlights the fact that, in reality, the delivery of agricultural extension services in Thorndale is inadequate. Here, the real indicators for the weak extension services are two-fold. Firstly, there is weakness in extension service delivery caused by irregular extension officer visitations to farmers, and the associated monitoring of farmers. A second indicator is failure by extension workers to keep time, or adhere to extension schedules.

These issues may further imply that during most of the farming seasons, extension demonstrations and tours were irregular and often not undertaken, which suggests that there has been little or no monitoring of farmers by extension officers, thus serving as a major weakness in extension service delivery in the study community. Hence, there is the need for the strengthening of the supervision of extension staff by directorate of the agriculture division.

In South Africa, the proportion of farmers reached by extension officers is not known. However, it is generally accepted that only a few farmers are reached by the officers

[27]. It has been purported that approximately 30% of farmers in developing countries are reached by extension officers and unless deliberate action is taken to ensure that extension officers reach the resource-poor and women farmers [28], the majority of those reached will be the richer ones, mainly men [28, 29].

Community gardening as a phenomenon indicated above has implications for the formation of and dependence on social networking and the development of social capital, a significant stance for the development of resilience during drought periods, a common phenomenon in the study community. In this context, therefore, the extension advice received has implications for the development of adaptive capacities in response to droughts. Community gardening, a form of collective community-based management, expands small-scale production and is reflective of other farmers in southern Africa. In an attempt to increase production for market, community gardening affects livelihoods for the better through the provision of employment, improvement in food security and supporting other livelihood strategies such as sending children to school [30]. Collective community-based management can enhance adaptive capacity by strengthening networks that support coping strategies during extreme events and by providing support to the basic resources and ecological systems [31]. Collective action can be seen as the coordination of efforts among individuals to achieve a common goal, which is different from the outcome that would have been obtained if individual self-interest was taken into consideration [32]. These activities might not be directly aimed at improving adaptive capacity for coping with climate change; however, the nature of community-based systems might support this. In other words, the farmers' complaint about the poor quality of training to engage in community gardening if addressed would foster and strengthen social networking in general, and social capital development in particular.

These results are important because extension officers are supposed to assist farmers in the application and adoption of appropriate technology, identify and establish contact with farmers and assist farmers to identify problems and advice on remedies to these problems, identify and forecast pest and disease outbreaks and educate farmers on farming practices. Agricultural extension services are to ensure equity in agricultural service delivery [33] by improving access to the underserved population. However, these results may indicate that a loophole exists in these functions and extension service delivery as a whole. This may imply that some rural communities, including Thorndale are underserved in terms of the delivery of such services. These loopholes need to be strengthened to ensure proper service delivery.

The scope of the problem model in this study has been expanded to include analysis of the major challenges encountered by farmers located in various agro-ecological zones. These agro-ecological zones include the uplands, mountains, marginal coastal areas and dry lands of South Asia and the Pacific region namely Samoa [34], as well as Sub-Saharan Africa. The Sub-Saharan case pertains to areas where rain-fed agriculture dominants and where there are critical biophysical constraints namely poor access to markets, infrastructure and insufficient access and benefits from extension

services. As a result, poverty rates still remain high in many of these areas among women, indigenous people and other marginalized groups., Particularly these areas are prone to slow productivity and growth, decline in such areas due to natural resources' degradation, albeit soil erosion. In addition, these areas are prone to depletion of soil fertility, overgrazing and deforestation, limited use of soil and water conservation measures.

This is particularly significant because approximately half of the world's hungry people are identified as 'food-poor small farmers' [35]. For instance, the majority of marginal farmers in sub-Saharan Africa are women, who coincidentally form the majority of small-scale farmers, dominating the production of food. Within the context of the above indicated agro-ecological zones, access to land; improvement in staple crop productivity; investment in public goods namely research and infrastructure; and increased service provision to small-scale farmers are the four critical challenges to the potential of marginal farmers to contribute to growth in agriculture and thereby enable them to move out of poverty [36].

A constituent of the problem model is the traditional, centralised, top down public extension systems of which only a fraction is available to women, and charged with being both expensive and inefficient. Privatized extension systems to transfer new technology appears to be the way forward; yet, with deep reservations in relation to how such systems can serve resource-poor small-scale farmers, with the view of creating effective demand. Privatised extension can take a number of forms, ranging from entirely privately funded and delivered services to publicly funded services delivered by private agents [37]. In this context, it is essential to target marginal farmers including female farmers for purposes of efficiency and effectiveness. Further, problem model is also saddled with the non-adoption of new technology by small-scale, resource- poor farmers in these marginal environments. The non-adoption of new technology may be due to the lack of resources to adopt and familiarity with the new technology; and desire to avert risk of new technology. In addition, the notion of non-adoption may be due to technology that does not use inputs that the farmer can produce from his own local resources [38]. Finally, one reason for farmer non-adoption of the technology could be due to "farmers being treated like ignorant recipients of information rather than knowledgeable partners in technology transfer" [39].

Secondly, another major contributor to non-adoption of technology by the small-scale, resource- poor farmers is the incompatibility of the technology and/or the extension officers with cultural beliefs including female farmers. For instance, rural women of the Near East were major contributors to crop production and to certain aspects of farm animal production, yet the extension services especially designed to target women farmers were limited. As a consequence, extension service consists of "largely male extension officers who dealt almost exclusively with male farmers since certain traditional or cultural practices often constrain interaction between women and outsiders" [40]. Often the extension officers and researchers have perceived the small-

scale farmer as too illiterate to understand the technology, uncooperative and unwilling to change [41].

Thus, it is not unexpected that there is unmet need for agricultural extension services delivery in 'semi-arid rural areas of South Africa or in any other African nation, or in South America, North America, or elsewhere in Asia. The challenge in this context is in determining the relative benefit of investment in a way that would leverage the political will and financial backing to move such a program forward.

The determination of the relative benefits of investment in a way that would leverage political will and financial backing is in two folds. First, the decisions that governments make in the form of policies for agriculture influence the level and stability of input and output prices, public investments. Second, this policy trajectory in turn affects agricultural production, costs, revenues and allocation of resources... These policies have implications for agriculture either directly or indirectly. One of the overall objectives for reducing poverty is improved agricultural production. Broadly speaking, agricultural policy entails the main goals of increasing productivity and income growth, especially for small-scale. In addition, there is enhanced food security and equity, emphasis on irrigation to introduce stability in agricultural output, commercialization and intensification of production particularly among small-scale farmers. The last beneficial implication pertains to appropriate and participatory policy formulation and environmental sustainability [42]. It has been observed that in Kenya, for instance, the inability of farmers to afford readily available modern farming technologies has resulted in low productivity and the associated low yields per acre of land is among the main sources of high unit production costs in agriculture [42, 43]. As a result, increasing output through improved farming technologies would inevitably increase farm productivity and hence farmers' incomes, perhaps the objective of policy makers in this context [42].

Leveraging could be said to pertain to obtaining maximum benefits over time with available resources [44]. Governance programmers are expectant of outcomes in capacity accountability and/or responsiveness identified within a programme which can spin-off multiplier and replication effects. Leverage benefits through advocacy and success such that the outcome of a pilot programme can leverage further funding or extension of benefits to a wider group of people or transfer of lessons learnt to other programmers or initiatives. Attaining leverage requires the identification of a scale-up, multiplier or replication within the context of low potential for additional benefits. For instance, when politicians or financiers observe or perceive of some leverage in any given context, the implication is the identification of an opportunity and the associated wider rippling effects that would be identified. Therefore, where leverage is perceived, investment is described and wider effects are supported by stronger evidence. The benefits of leverage or the description of leverage of activities in investments and wider effects with evidence shows significant potential for expansion or replication. This phenomenon is associated with very a high potential for

additional benefits in tandem with the identification of scale-up, multiplier or replication processes [44].

Similarly, financial leverage could be attained when stakeholders encourage a financial revolution through leveraging liquidity in African financial institutions as well as encouraging banks to work in the small-scale agriculture sector. For instance, the Equity Bank in Kenya among others does give credit to small-scale farmers who have no collateral. Secondly, funds in several African countries could be leveraged through the process of risk-sharing instruments in new affordable financing system from commercial banks. In at least 15 African countries, the Alliance for Green Revolution in Africa (AGRA) has been making conscious efforts through these mechanisms to leverage at least another \$5 billion. In this context, politicians do have a key role to play by facilitating investment through measures such as staple crop processing zones or tax holidays for investors. Politicians or governments with an agenda to reduce or alleviate poverty and hunger are most likely the ones to target for the phenomenon of leverage [45].

There is the need to strengthen agriculture through the formation of stronger and more cohesive farmer organizations including one that is well organized with respect to leadership and management. The main aim is to facilitate access to inputs namely fertilizer, seeds and uptake of technologies; access to credit and markets; and development of extension modules for sustainable development. Broadly speaking, there needs to be a re-organization of the extension system to include civil agriculture workers from within the community and the utilization of participatory approaches in disseminating technologies or knowledge and organization. The efficient and effective source of delivering outsourcing extension services is another possibility instead of relying on government extension system. For instance, there are groups in East and West Africa who have been successful in accessing credit and repayments. There is also the significance of ties at the local level and with communities that enhance trust among members, as an excellent tool for credit guarantee among members, while increasing food security and access to market are the key incentives to the uptake of technology [45].

Leverage can be provided towards the attraction of private entrepreneurs who are willing to invest and employ modern farming techniques as a necessity to achieve increased productivity. This in turn leads to an improvement in small-scale farm productivity and increased incomes. Small-scale farming must be changed from producing for subsistence to commercial profitable businesses. The use of technology of agriculture also fosters achievable food security including poverty alleviation. The policy concerns of politicians in Kenya for instance include increasing productivity to lower per unit costs of production, improve the extension service system, improve the link between research, extension and the farmer, improve access to financial services, encourage growth of agribusiness, reduce taxation of agriculture, increase market orientation and improve the regulatory framework. Essentially, the development of the agricultural sector through the boosting of productivity and incomes, and ensuring

food security, irrigation farming and enhancing diversification into non-traditional commodities are the corresponding areas of concern [42].

However, the political elites are heterogeneous in nature as a result of differences in wealth and political clout vis-à-vis recognition in terms of fostering leverage in the policy process. The political elites do not act alone but in alliance with other economic and social elites. In recent years, some of these alliances have long histories along with emerging realignments of actors. In Kenya, for instance, there is a trend of cooptation between the former Kenyan African National Union regime key players and power brokers in the agricultural process into the National Alliance of Rainbow Coalition regime, resulting in continuity instead of the anticipated significant change in the agricultural policy [42].

Poverty reduction strategies targeted at the less favoured agro-ecological areas, should entail alternative technological approaches such as low external input, sustainable agricultural approaches, organic agriculture and biotechnology. It is essential to raise yield potentials, increase tolerance to stresses such as drought and salinity, frost, augmenting the end-use values of agricultural commodities or enhancing strategic transport of commodities [46] particularly in semi-arid and tropical regions of western and northern China and Mongolia and the cold mountain climate region of the Himalayas [34]. Further, there is the need for the use of irrigation, widespread adoption of higher yielding seed varieties as well as increased use of chemical inputs particularly inorganic fertilizer.

Improving access to farmer support services may require that agricultural services institutions are transformed to provide good quality services to small-scale farmers [7]. However, improving the performance of agricultural service institutions may only address one of the prime movers of small-scale agricultural development and is thus not a sufficient condition for getting small-scale agriculture moving. Other prime movers may include human capital, new technology, rural capital formation and a favourable economic policy environment including the political will and financial backing to move the programme forward.

In spite of the above indicated findings, the paper fails to explore whether agricultural extension officers and services may play a more supportive role during drought periods, considering the fact that Thorndale experiences mild drought almost every year and severe drought every three and half years as indicated earlier.

CONCLUSION AND RECOMMENDATIONS

The paper focused on agricultural extension service delivery, noting that many smallholder farmers in Thorndale do not have access to agricultural extension service, which may have an adverse effect on their productivity and livelihoods. The majority of the respondents are farmers, some of whom are served by public sector extension officers. This may be due to various reasons ranging from the legacy of neglect and

under/disservice of the old apartheid system, which to a large extent may have been perpetuated by the post-apartheid system; the officers not spending adequate time with farmers among others. In connection with this, Rivera and Gustafson [45] have concluded that public sector extension alone will be unable to attend to the entire demand for extension services by the world's farmers. However, majority of the farmers have no contacts with such officers while a minority did. It is concluded that the delivery of agricultural extension services for small-scale farmers has major flaws, which must be urgently addressed if small-scale agriculture is to be revitalised in Thorndale. Farmers in Thorndale and other semi-arid areas including those in agro-ecological zones where poor small-scale farmers lack adequate access to and benefit from extension services could derive more knowledge from learning from extension officers in a more innovative and participative manner.

It is recommended that extension services should be improved upon to ensure that the required technological advice and information can actually be made relevant, available and accessible to farmers on the ground. Extension services should be made more demand-driven and client focused. They should be more pluralist, flexible and responsive to the changing socio-economic environments, particularly in the rural sector including marginalised agro-ecological zones, and ensure the provisioning of services to small-scale and resource-poor farmers. In addition, extension officers should spend more time in the field with farmers.

The usage of participatory approaches [8] and particularly study groups could be undertaken as an aid to gaining explicit and implicit knowledge and information [13], as a means of generating and acquiring knowledge, in addition to acting as a forum in which farmers will be able to exchange experiences on how to deal with issues related to the complex environment with which they are confronted. Institutional support such as the provision of extension and support services and agricultural trade fairs may also boost the production of marketable surpluses, even in the midst of drought or famine. Finally, capacity development and logistical assistance should be strengthened towards improving the current extension services to the rural communities.

Table 1: Households Engagement in Agricultural Productivity (% in parentheses)

| Categorisation | Gender | | Total |
|--|----------|-----------|-----------|
| | Male | Female | |
| Farmers | 9 (26.5) | 24 (70.6) | 33 (97.1) |
| - Small-scale farmers | 8 (24.2) | 24 (72.7) | 32 (97) |
| - Commercial farmers | 1 (3) | 0 (00) | 1 (3) |
| Non-farmers | 1 (2.9) | 0 (00) | 1 (2.9) |
| <i>Farmer</i> | | | |
| Crop producers | 1 (3) | 8 (24.2) | 9 (27.2) |
| Combination of crop and Livestock producers | 8 (24.2) | 16 (48.5) | 24 (72.7) |

Source: Computed from field survey, 2005

Table 2: Extension information obtained by farmers from extension officers (% in parentheses)

| Categorisation | Frequency |
|--|-----------|
| Farming practices | 11 (20.4) |
| Nursery making | 5 (9.3) |
| Planting | 9 (16.7) |
| Crop spacing | 12 (22.2) |
| Application of fertilizer & herbicides | 10 (18.5) |
| Medication application for livestock | 7 (13) |

Source: Computed from field survey, 2005, multiple responses recorded

Chi-square (X^2) = $(f_o - f_e)^2 / f_e$, $X^2 = 33.8$, $Df = 2$ at 0.10 level of significance, $N = 6$ Cramer's $V = X^2 / N(K-1)$ $V = 1$, where K is either number of rows or the number of columns, whichever is smaller. It is difficult to ascertain the strength of such associations based on the chi-square (X^2) statistic due to the inherent limitations of this technique. However, with the application of the Cramer's V statistical test, the results suggest some clues with regards to the strengths of such an association. To guard against the interpretation of the Cramer's V test results, [25] notes that although there is no direct interpretation of any particular value of V between 0 (no association) and 1 (perfect association), anything below 0.1 is considered very weak. Following this observation as a guide, the Cramer's V test result (1) in Table 2 was considered as very strong at least for the sample population studied.

Table 3: Farmers' Perception about the Quality of Extension Service Delivery in Thorndale (% in parentheses)

| Perceptions | Gender | | Total |
|---|----------|----------|----------|
| | Male | Female | |
| Complaints about quality of extension service | 0 (00) | 3 (23.1) | 3 (23.1) |
| More extension visits required | 1 (7.7) | 0 (00) | 1 (7.7) |
| Spend more time with individual farmers | 1 (7.7) | 0 (00) | 1 (7.7) |
| Unfulfilled promises | 0 (00) | 1 (7.7) | 1 (7.7) |
| Useful assistance and advice | 3 (23.1) | 4 (30.8) | 7 (53.9) |

Source: Computed from field survey, 2005

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