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Role of Institutional Innovations on Smallholder Agricultural Entrepreneurship in KwaZulu-Natal, South Africa

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ABSTRACT Smallholder farmers in South Africa are regarded as resource constrained and dogged by a wide range of challenges including weak or absence of vibrant support institutions at local level. However, smallholder farmers still fulfil numerous functions in the agricultural economy, which include food security and income generation. The main objective of the study was to explore the role of both formal and informal arrangements as forms of institutional innovations at smallholder farm level. It was found that, due to weak formal institutions, farmers in KwaZulu-Natal resort to self-regulated institutions to ensure timely access to farming services. Informal groupings are common among irrigators, which have become important means of accessing inputs such as seedlings, irrigation plots and machinery for land preparation as well as output markets. Farmers were selective and participated in some group activities and not in others; hence training farmers should focus on team building activities to ensure consistency and derive maximum benefits from collective action.

INTRODUCTION

Smallholder farming constitutes a significant part of the agricultural structure in developing countries and often serves as the engine of economic growth and livelihood improvement (Machethe and Van Rooyen 1983; Desmond and Salin 2012). Despite the importance of the sector, smallholder farmers in South Africa often face barriers to accessing resources, including land, water, credit, information, and inadequate property rights, and their markets are often constrained by high transaction costs (Machethe and Van Rooyen 1983; Sinyolo 2014). Such constraints may be regarded as the major driving forces behind the need for innovativeness at local level to ensure long-term sustainability of the farming business.

Innovations are defined as new ideas, objects, practices, customs, methods or devices used to perform certain tasks, and are normally generated in response to a certain created demand in an economy (Sunding and Zilberman 2001; Rogers 2003). For example, increasing population densities are reported by Sunding and Zilberman (2001) to have created the demand for the transition to more intensive farming systems globally, where innovations such as crop rotation and fertilisation were introduced. Most of the new ideas whose diffusion and adoption have been analysed extensively in the past are technological innovations, hence the words 'innovation' and 'technology' are often used interchangeably (Rogers 2003). Although agricultural innovations bring with them significant gains, the decision to adopt an innovation can be considered as an investment decision and may compel a farmer to change his or her investment options (Batz et al. 2003; Mafimisebi 2006). The innovation adoption rate can also be expected to be dependent on its cost and on whether farmers possess the required resources (Batz et al. 2003).

However, for an innovation to have an impact on the economic system, it needs to be compatible with the system and the institutional environment in which it is introduced (Rogers 2003; Rajalati et al. 2008). This entails a need to innovate in line with the institutional arrangements that may influence the adoption of other forms of technological changes, which can be referred to as institutional innovation. Tenywa et al. (2011) defined institutional innovations as changes made in redefining roles and responsibilities of different organisations or individuals to deliver more returns like improved productivity and efficiency. In this context, rules and guidelines governing interactions and social behaviour are regarded as institutions. In most developing countries, the need for vibrant institutional innovations by smallholder agribusi-

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ness entrepreneurs emanates from the fact that these entrepreneurs operate in poorly coordinated institutional environments. Bardhan (2000) noted that institutional impediments have a negative impact on smallholder farming; thus the removal of these barriers is the prime focus of institutional innovations. Institutional conditions that influence innovation include governance, infrastructure, availability of reliable input and output markets and supportive policies related to the promotion and adoption of innovations (Rajalati et al. 2008). Given that the enabling environment often influences how the actors in a sector can use their knowledge, such an environment is an important promoter of innovation capacity (World Bank 2006). Furthermore, Seline et al. (2015) emphasised the need to analyse how farmer characteristics and economic variables affect the innovation adoption process because these influence the farmers' decision making process. Some of the most important constraints may affect the patterns of adoption of new innovations, but on the other hand, the introduction of new technologies may affect the institutional structure and operation of agribusinesses (Sunding and Zilberman 2001).

Although research has been conducted on the adoption of mostly quantitatively measurable technologies in agriculture, limited studies have been carried out to understand how the smallholder farming businesses adapt institutionally to improve their performance. It is against this background that this research report attempts to identify these factors and, depending on the nature of their impact, proposals are made on how these aspects can be addressed (if negative influence) or enhanced (if positive influence) in an attempt to improve the adoption of a particular innovation. Furthermore, the research on which the paper is based explored the impact of both formal and informal institutional innovations on the performance and sustenance of smallholder agribusiness enterprises. The research applied rapid rural appraisals (RRAs) among smallholder irrigation farmers in KwaZulu-Natal, a province of South Africa, where both qualitative and quantitative data was collected and analysed.

Theoretical Underpinning

The primary function of an institution is to coordinate human exchanges towards a pattern of economic organisation (Coase 1960). However, as institutions coordinate activities towards a pattern of economic organisation, various agribusiness researchers contend that exchange relationships are organised not only through contracts, as prescribed by agency theory, but also through vertical integration and social networks (Boehlje 1999; Loader and Hobbs 1999). Such organisation tends to be influenced by market concentration, asset specificity, small number situations, property rights, and trust (Desmond and Salin 2012). In the study on which this paper is based a smallholder farmer is therefore defined as an agri-business enterprise in which the pattern of economic organisation is influenced mostly by social networks. As such, smallholder farmers as agribusiness entrepreneurs are subject to institutional factors such as market power, asset specificity, property rights, and trust, which influence the coordination of their production and marketing activities. While such a definition may appear to be similar to 'mainstream' definitions of agribusiness, the various forms of institutional innovations that have had an impact on such interdependences still require further exploration. Based on the theory of new institutional economics, externalities are an important characteristic of innovation. For instance, when looking at technological innovations, property rights have a tendency to internalise externalities thereby accruing the benefits to the innovator, which provides more incentives for further innovation (Desmond and Salin 2012). However, this is different from institutional forms of innovation where the commercialisation option of the innovation was often not feasible. The main challenge of innovation adaptions was the transactions costs, and when such costs were perceived to be high, institutions become important (Williamsom 2000). Societies developed informal institutions, such as culture, norms, trust and kinship, as well as formal institutions, to reduce the negative effects of transactions costs (Williamsom 2000). Both formal and informal institutions had an influence on the innovation process and its adoption thereof. For instance, Varsakelis (2001) analysed panel data from developing and industrialised countries and found national culture to be a determinant factor affecting the intensity of adoption of research and development initiatives. In comparing countries with similar culture and norms (Waguespack and Birnir 2005), found the stability of the in-

stitutional environment to be an important factor explaining the propensity to patent an innovation.

METHODOLOGY

Study Site

This paper is based on a bigger research study investigating smallholder water utilisation in food value chains, funded by the Water Research Commission (WRC) of South Africa (Project number K5/1879//4), which was conducted in the Mooi River Irrigation Scheme (MRIS) in Msinga Local Municipality from 2011 to 2014. The government-supported community irrigation scheme which consisted of 15 blocks that run along the Mooi River. The irrigation scheme was under a furrow irrigation system where water was diverted from the Mooi River along a concrete-lined canal to supply downstream crop fields through gravity. The canal either feeds directly into the fields or into overnight balancing dams for storage. Balancing dams act as temporary reservoirs and help to ensure continuous supply of water to all irrigation water users in the scheme. Currently, the scheme relies on government support for major irrigation repairs and tractors for land preparations. The MRIS is serviced by a gravel road that runs along the scheme. This is an important feature to improve movement of agricultural inputs to the scheme as well as the produce from the scheme to the market. A total of 824 farmers participate in the scheme, which covers 604 hectares. The operational arrangement is such that crop production and marketing of produce is done individually. There is an overall scheme committee, made up of representatives from all the committees of the 15 blocks.

Sampling and Data Collection Methods

The aim of the study was to investigate the forms of institutional innovations among smallholder entrepreneurs in the MRIS. The research used RRA techniques to collect and analyse data. According to Chambers (1992), RRA involves comprehensive data collection by an outside team of researchers to gain valuable knowledge about the community. As such, RRA is relatively extractive, where data is collected for analysis and further decision on steps towards a particular community-based research activity (Van den Ban and Hawkins 1992). During the course of this study, three categories of RRA were used to describe the farmers' innovation systems, namely discussion tools, observational tools and visual tools. Two discussion tools were used during the study, namely focus group and key informant interviews. Checklists were used to guide discussions between the interviewer and the interviewees. Participant observation was also a part of the primary data collection process. Certain activities of participants and non-participants of the irrigation scheme could be established through direct observations. These include visible use of resources such as land and water. Multi-stage sampling was adopted to take into account the players in the local institutional setting and the diversity of the respondents, which include farmers, committee members, traditional leaders and government employees. Table 1 presents a summary of the respon-

Table 1: Mooi river irrigation scheme sample overview

Target groups	*Number of interviews*	*Composition/ Description*	*Number of participants*	*Data collection tool*
Scheme Committee	1	Scheme chairperson	1	Key informant interview
Block Committees	3	1: Blocks 14 and 15	7	Focus group discussions
		2: Blocks 7, 8 and 9	6	
		3: Blocks 1, 2, 3 and 4	9	
Extension Officers	Multiple	1: For Blocks 14 and15	1	
		2: For Blocks 1-13	3	Key informant interview
Village Headmen/	1	All traditional headmen	5	
(Traditional Authority)		in the area (Induna)		
		Chief headman (Nduna mkulu)	1	Focus group discussion Key informant interview
Total			33	

dents based on specific categories and the data collection tools employed per each category.

The blocks were stratified to ensure that the whole scheme was covered sufficiently. The first group comprised committees for Blocks 1, 2, 3 and 4, which were located on the upper section of the scheme. The second group comprised middle blocks, namely Blocks 7, 8 and 9. The third group was constituted by committee members for Blocks 14 and 15, located at the tail section of the scheme. The analysis of data was based on these groupings as well. The other factor that was considered during the grouping process was the fact that some committees overlap across blocks: for example blocks 14 and 15 are represented by one committee, while blocks 7, 8, 9 and 10 have one chairperson who works with committee members selected from the respective blocks.

Statistical Data Analysis

Qualitative data analysis as well as descriptive statistics was used to quantify data; hence, frequency counts and percentages supported by graphical presentations were included in the report. Major aspects of the smallholder farming business from production to marketing were identified. These included labour, credit, information access, water, land, training and institutional support. Farmers were then asked to rank the importance of these factors as constraints to their agribusiness enterprises. The most dominant aspects were then selected and further explored to identify the nature of institutional innovations that were adopted to improve the performance of the farming enterprises.

RESULTS AND DISCUSSION

Contextualising Factors Affecting Irrigation Farming in Mooi River Irrigation Scheme

A variety of studies aimed at establishing factors underlying adoption of various agricultural innovations and technologies have been conducted in the past. As such, there is an extensive body of literature on the economic theory of innovation adoption. Factors that have been found to significantly affect adoption include government policies, economic factors, and institutional factors, attitudes of targeted adopters, household factors and attributes of the technological innovation itself.

During the focus group discussions, an effort was made to understand farmers' perceptions on production-related variables. Direct and indirect impacts of variables on farmers' output

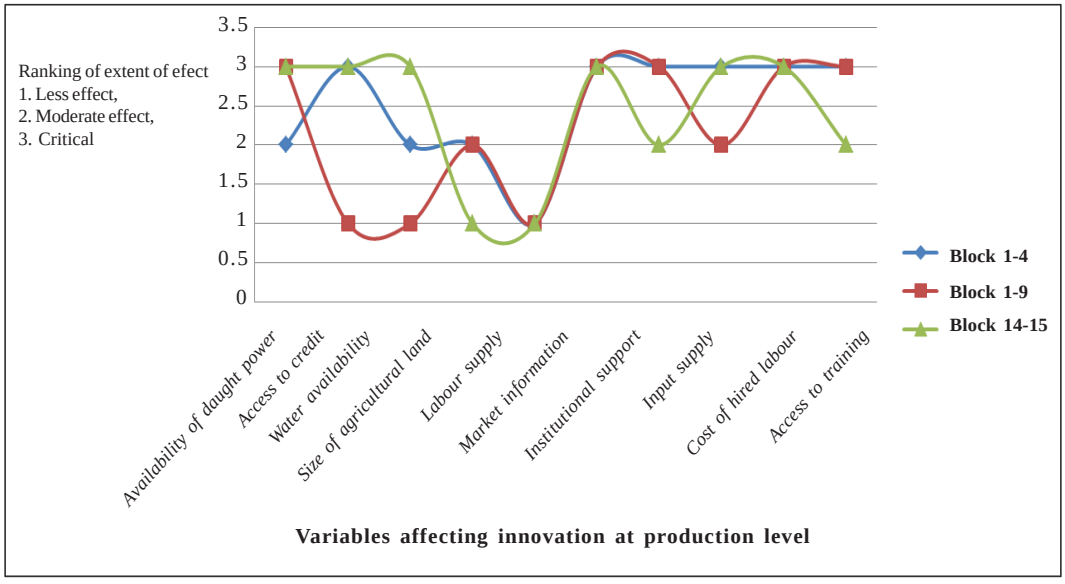

Fig. 1. Factors affecting production at Mooi River Irrigation Scheme

in MRIS were summarised. Ranking of variables was done on a scale of 1 (no effect), 2 (moderate effect) and 3 (critical effect) and the findings are graphically presented in Figure 1.

The results show that farmers in the MRIS face challenges of finance to pay for hired labour and they regard this as a critical aspect affecting crop production. Figure 1 indicates that labour is not in short supply in the area, but payment of the workers poses a real production challenge. Lack of market information such as prices and quantity demanded is another drawback in the MRIS. Farmers indicated that without adequate knowledge of what the market wants they end up neglecting some crops or reducing their hectarage to minimise risks and losses if they fail to secure a market after production. Water access is generally not a critical limiting factor for Blocks 1-13, but it is cited as the major factor affecting crop production in Blocks 14 and 15. The latter blocks are at the tail end of the canal, hence leakages and non-compliance to irrigation programmes relating to water allocation by farmers on the upper part of the canal deprives the tail-end blocks of water.

Innovation on Access to Crop Production Skills (Human Capital) in Mooi River Irrigation Scheme

Farmers' goals can only be met if the available agricultural resources such as land, water, machinery and finances are utilised efficiently. This calls for a certain level of skills endowment among the labour force. An assessment was done of how farmers access some skills deemed important in enhancing production, resource utilisation and innovativeness. Farmers who attended focus group discussions were asked to give an overview of the approximate numbers of farmers who had received formal training and acquired certain agricultural skills such as pest and disease identification, pest and disease control, chemical application, irrigation scheduling, and irrigation maintenance. Due to the unavailability of records, focus group participants ranked the variables as 1= not received training, 2= few received training and 3= most farmers received training. The main purpose of this exercise was to establish the role of innovativeness in production, where farmers were perceived to have limited access to formal training institutions. Results of skills rankings are presented in Figure 2.

Results revealed that the farmers had no formal training in irrigation scheduling and irrigation maintenance (Fig. 2). Farmers actually regarded these as very critical skills that were lacking among them. Follow-up discussions to establish how farmers access such skills revealed that most farmers use knowledge gained over years of farming. Despite not having formal training in irrigation scheduling, most farmers use

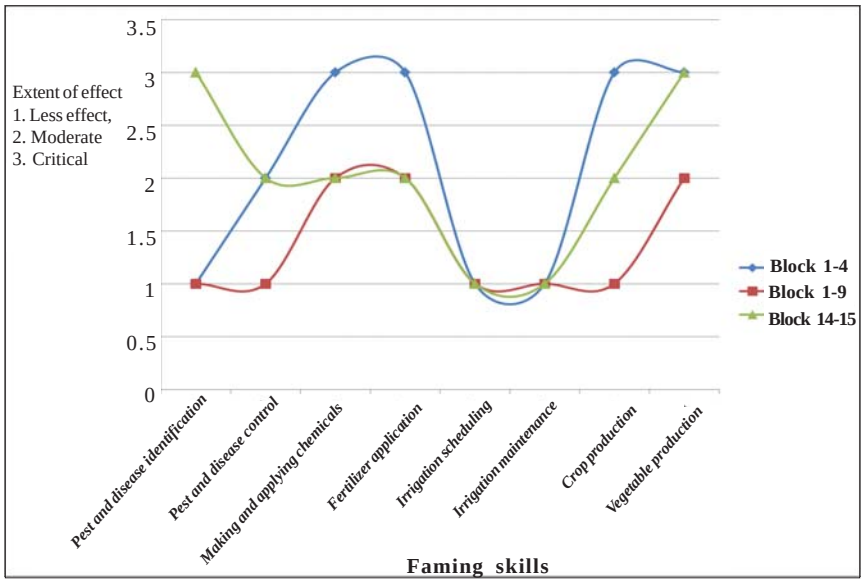

Fig. 2. Access to farming skills by farmers at Mooi River irrigation scheme

the 'feel and appearance method', which is one of several irrigation scheduling methods used in integrated water management. It is a way of monitoring soil moisture to determine when to irrigate and how much water to apply. The feel and appearance of soil varies with texture and moisture content, and soil moisture conditions can be estimated, with experience, to an accuracy of about 5 percent (Gomo et al. 2014).

Farmers revealed that they also acquire skills through seeking guidance from neighbours, friends or relatives who know specific tasks such as fertiliser application and disease control. The role of social networks and kinships was therefore identified as key to knowledge sharing among entrepreneurs. Some farmers also gain critical information from input suppliers; for example, suppliers of agrochemicals guide farmers on application rates of chemicals as well as pest and disease control. With reference to pest and disease identification and control, farmers describe the characteristics and nature of damage to salespersons or shop attendance, who would recommend a chemical to control the described pest or disease. Information about certain diseases and ways to control them was also shared among farmers in the field. When one farmer uses a certain chemical to control a certain disease with success, she or he would recommend the chemical to others. Although these strategies help farmers cope with their daily challenges amid report of limited contact time between farmers in MRIS and the local government extension officials, the hidden costs of accessing the information may be high. A critical analysis of how farmers apply their indigenous knowledge on rather scientific challenges might expose them to risks associated with wrong diagnosis of diseases, hence wrong prescription of agrochemicals.

Institutional Innovations to Address Problems of Geographical Location

Literature on innovation emphasises the role of geographical location as a factor influencing the adoption of agricultural innovations. The issue of geographical location in the agricultural sector may also be important when promoting technologies that may only thrive in selected agro-ecological zones (Hintze et al. 2003). Adesina and Zinnah (1993) argued that producers located further away from either sources of input supplies or produce markets are likely to adopt technologies later. Farmers in MRIS have shown innovativeness in terms of input acquisition. Collective action was well adapted as a form of informal institutional innovations in MRIS. Farmers form informal groups based on trust and mutual understanding to acquire agricultural inputs. It is common for three to five farmers to put money together and assign one farmer from the group to procure inputs for the group from nearby towns like Tugela Ferry (30 km), Greytown (30 km) and Pietermaritzburg (175 km). Farmers acknowledge that the strategy reduces transport cost and serves on time. Blocks 14 and 15 are registered as a cooperative. Although production was done individually, collective action was also done during the procurement of certain inputs like cabbage seedlings. Due to bulk buying, input suppliers for cabbage seedlings deliver the seedlings to the cooperative chairperson, thereby cutting transport cost for the farmers. This practice is consistent with the prescripts of transactional cost economics, where actors work together to lower the cost of doing business, lest they compromise the profitability of the enterprise. However, the main challenge observed during the research was lack of consistence by the producers in terms of sticking to particular production schedules and the inability of the entrepreneurs/farmers to widen the scope of collective procurement into other activities along the value chain. Furthermore, the process is voluntary; hence the cost of those that are willing to participate would rise if other participants decide not to be part of the process. This phenomenon exposes the weakness of using informal institutions to address business problems, where written contracts could have improved compliance and performance of the group, albeit at an even higher cost to enforce the contracts.

Institutional Innovations and Information Flows

Breschi and Malerba (2001) highlighted that a key feature of successful high-technological innovation was related to the high-level and thick network of knowledge sharing. This was supported by close interactions among members and institutions building trust and informal relations. Although data collected in MRIS revealed strong information-sharing networks, community meetings were the most common means

through which information was disseminated. There was still a gap in terms of adopting information communication technology to improve information flow. Based on a sample from the farmer database, the majority of farmers in MRIS own or have access to mobile cell phones (>80%). Farmers currently used this service to call for meetings and extension officers also utilise this facility to make appointments with some farmers and community leaders, yet the same facility was not being fully utilised to improve the entrepreneurial capabilities of farmers. An opportunity to improve information flow through institutionalising the mobile telephone system was therefore identified. For instance, farmers can coordinate themselves through the block and scheme committees to buy bulk messages (SMS) from mobile network providers, and use a central communication person like a secretary of a committee to get the latest market information. The potential source of information could be the nearest municipal fresh produce market in the area. Such information may include price information, contact details of potential buyers of specific products and even information on what commodity is in demand. The person responsible for sending information will therefore be in contact with the traders in designated towns, who will supply up-to-date information. Such improved information-sharing platforms can improve production planning, marketing and bargaining power of smallholder farmers if they are well institutionalised.

Institutional Innovations for Improving Markets of Irrigated Crops

Marketing of agricultural produce provides the much-needed contribution of smallholder farming to the mainstream economy and allows for cash injection into the local community. It appears that more than 90 percent of the farmers in MRIS market their produce, either formally or informally, mostly to raise funds to buy inputs for the following crop. Yet, farmers in the MRIS do not have proper access to markets for their produce. Access to cash crop markets, from the rural producer's point of view, is hindered by many factors, including policies with regard to financing.

Group discussions with block committee members revealed that farmers utilise different suppliers located in neighbouring towns (Tugela Ferry, Greytown and Pietermaritzburg) for tradable inputs. Major retail suppliers of crop inputs for MRIS farmers are Sunshine Seedlings, TopCrop and Pannar Seeds. Although scheme members farm individually, an aspect of collective action was practised during input procurement, which was based on mutual trust among farmers. A group of farmers can gather their finances and assign one farmer to travel to a town of their choice to buy agreed quantities of inputs for everyone in the group. This is a cost-saving measure used by farmers. Farmers in Blocks 14 and 15 of MRIS also practise collective farming in procuring cabbage seedlings from nurseries. Each farmer who intended to plant cabbages orders his or her seedlings through the block committee that in turn communicated with nurseries for supply on agreed dates.

Farmers in Blocks 1, 2, 3 and 4 highlighted the lack of trust among members and the fear of being sabotaged by fellow members as the major reason for individual procurement of inputs. Some farmers are not committed to farming and are not consistent with their production schedules, hence collective behaviour with specific farmers can happen once or twice within a given year; thereafter it becomes difficult as farmers differ in terms of crops grown and timing of planting operations. This is a challenge because a committed farmer always has to look for new farming partners every season.

The agricultural output market in MRIS is dominated by informal participants such as hawkers and roadside traders. Focus group discussions with block committee members revealed that no formal communication structures existed between farmers and buyers. Farmers with ready produce must employ their own initiative to ensure that their crops were sold timeously and to avoid infield losses. As such, farmers relied on personal contacts and relations with previous buyers (mainly hawkers) whom they called either to come and buy or to spread the word about the availability of specific fresh produce in the scheme.

The MRIS is serviced by a gravel road that runs along the entire 20 km stretch of the scheme, linking Muden to the R33 road, which goes to Tugela Ferry and Greytown. Though the scheme can be regarded as highly accessible, it is not visible from the R33 provincial road. Consequently, the scheme needs greater publicity and advertising to improve its client base, especially along the nearby highways (R33 and R74).

A key informant interview with one commercial farmer about the general trends of agricultural commodity markets around the Msinga Local Municipality revealed that markets are generally flooded. It appears that most vegetable producers within and around MRIS target the Greytown market for the produce. However, due to excess supply of cabbages and tomatoes, the market is failing to absorb all the produce from farmers. This situation has had a negative effect on production and the resource-constrained smallholder farmers at the MRIS were the worst hit. Commercial farmers have developed market links with buyers from as far as Durban and Verulam to ensure that their produce was sold in time. Most of these linkages were based on personal relationships with the wholesale owners who were mostly Indians. Some commercial farmers actually enter into contracts to grow and supply specific products to the wholesales. The key informant could not reveal details of this market, which seemed secretive in the way the trading takes place between the farmer and the buyers. It appears that the use of these hidden markets, which are beyond the reach of most smallholder farmers, puts commercial farmers at an advantage in terms of controlling the market.

Institutional Innovations and Resource Access

Given the uneven distribution of water along the canal, a pertinent question arises: what are the coping strategies for water users in Blocks 13, 14 and 15 with erratic water supplies? The above question has a direct impact on farmer productivity at the MRIS. As such, the KZN Department of Agriculture has supported the scheme by installing a pump to supplement irrigation water in critically water-stressed blocks of the scheme. These are Blocks 13, 14 and 15. Focus group discussions with block committee members tried to establish farmers' opinion on water-related variables. The direct and indirect impact of variables on farmers' access to water resources in MRIS was analysed. Ranking of variables was done on a scale of 1 (no effect), 2 (moderate effect) and 3 (critical effect) and findings are graphically presented in Figure 3.

Results of the study indicated that leakages along the conveyance structures greatly affected all water users in the MRIS (Fig. 3). This was the single variable where all blocks (1-15) concur that it really affects water availability for crop production. Block committee members cited cracked canals and debris in the canal as the major causes of leakages. Whilst leakages were visible along the entire canal from Block 1 to 15,

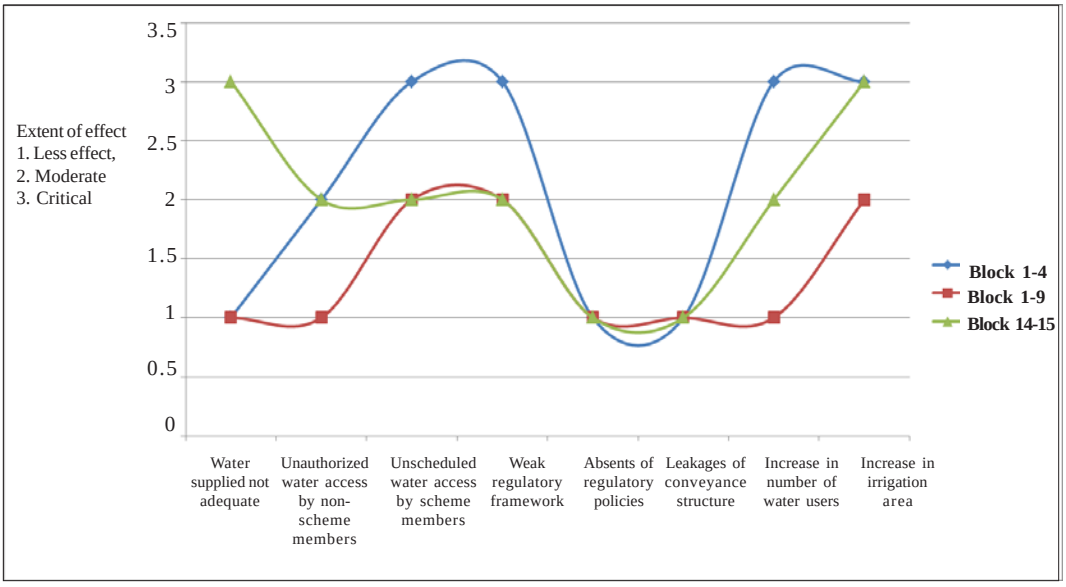

Fig. 3. Perceived effects of water-related factors on irrigated agriculture at MRIS

tail-end blocks (14 and 15) were the worst affected by this problem. Farmers in Blocks 14 and 15 through their cooperative had started making financial contributions of R20 per month per farmer towards pump maintenance. This can be regarded as a powerful innovation given that farmers are not guaranteed of any pump maintenance budget from the government; hence the need for such innovativeness to ensure continued supply of water from the pump. Such initiative dispels the notion of donor syndrome that has always been associated with smallholder farmers in developing countries. It is important to note that although farmers in Blocks 14 and 15 were contributing finances towards repairs and maintenance of the pump, irrigators often made very small contributions towards maintenance of the leaks along the 20.8 km main conveyance canal except through cleaning labour. There is therefore a need for a strong institutional drive through local leadership structures to motivate farmers to participate in canal maintenance.

Delayed access to tractors negatively affects the timing of their planting operations. Some farmers also utilise animal draught power for tilling their land. This is normally done in cases where tractors are not easily available, when money for tractor hire is not available and when fields are too wet to be accessed by tractors. However, focus group discussions indicated that livestock owners charge the same rates as tractors for tilling the standard beds in the MRIS. Therefore there is no cost-saving incentive for using animal power over tractors besides convenience in cases where the latter is not easily accessible, or where the plot holder has his or her own livestock for use without hiring.

CONCLUSION

The study adopted a case study approach with a focus on MRIS. Based on the qualitative data analytical techniques, the research on which the paper is based attempted to provide some insights into the institutional innovations in MRIS. The study identified local innovation systems and revealed the role of informal groups to improve production and marketing of agricultural produce. More specifically by adapting collective action, farmers improve information sharing and reduce transport cost during input procurement. Since institutional innovation among smallholders is more of a group effort, which are reliant on networks, the study could not establish any institutional innovation that directly benefited individual farmers. The findings suggest the need to focus on collection action at smallholder level for a greater positive impact of innovative behaviour. Building capacity among smallholder entrepreneurs through training on how to improve performance through collective engagement is important.

RECOMMENDATIONS

Evidence has shown that information sharing is common among farmers; it is therefore recommended that, targeted training be contacted at community level, to all farmers from both formal and informal groups, to ensure that local initiatives can benefit a wider community. For instance skills on scientific based approaches to irrigation scheduling was low among irrigators, hence a need to focus the training on such a skill. This is anticipated to have a multiplier effect, which can be linked to increased water use productivity, high yields and more marketable surplus by farmers. Taking into cognisance the fact that smallholder farmers in the study area do not plan about their production plans as a collective, during the harvesting period, local markets are often flooded with one commodity. More emphasis should be put on collective planning of what and when to produce crops. This can be achieved by establish commodity groups which coordinate the production of specific crops at each given time. It therefore becomes the responsibility of the commodity group coordinators with support from member to rationalise production patterns in the scheme. Such specialise group might also improve the bargaining power of the farmers as well as improving access to institutional support, like from the local department of agriculture.

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