

12-1-2018

Bridging Farmer and Researcher: Extension through the Eyes of Agents in Rural Pakistan Bridging Farmer and Researcher: Extension through the Eyes of Agents in Rural Pakistan

Sandra Heaney-Mustafa
University of Canberra ACT Australia

Francesco Sofo
University of Canberra ACT Australia

Mukaddas Afzal
University of Canberra ACT Australia

See next page for additional authors

Follow this and additional works at: <https://newprairiepress.org/jiaee>

Recommended Citation

Heaney-Mustafa, S., Sofo, F., Afzal, M., Anwar, Z., Fatima, B., & Hasan, F. u. (2018). Bridging Farmer and Researcher: Extension through the Eyes of Agents in Rural Pakistan. *Journal of International Agricultural and Extension Education*, 25(3), 111-124. DOI: <https://doi.org/10.5191/jiaee.2018.25308>

This Research Article is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in Journal of International Agricultural and Extension Education by an authorized administrator of New Prairie Press. For more information, please contact cads@k-state.edu.

Bridging Farmer and Researcher: Extension through the Eyes of Agents in Rural Pakistan

Abstract

Irrigation and efficient water usage by farmers remain key agricultural problems in Pakistan. Technological approaches to water management specifically irrigation management using cloud technology is a recent innovation currently being trialed in Pakistan through a project conducted by the authors and funded by the Australian Centre for International Research. The paper reports on the perceptions of rural agents in Pakistan involved in the scaling out of new technologies to improve irrigation practices of a large number of farmers. The methodology adopted the use of focus groups with water professionals and extension agents as this approach has been proven to be a key effective method to assist rural agents to gather current information on irrigation problems and the scaling out process. Eight focus groups were assembled with an average of ten participants in each group. The findings revealed the current practices, positive outcomes and challenges to conducting farmer education in Pakistan. The importance of this research is its potential to improving work practices of large numbers of farmers that continue to be highly challenging. The study gives fresh insights on how farmer education methods could be achieved in relation to improving water irrigation through new technological practices of a significantly increased number of farmers.

Keywords

Farmer Field Schools (FFS), adult education, extension, irrigation technology, scaling out

Authors

Sandra Heaney-Mustafa, Francesco Sofo, Mukaddas Afzal, Zubair Anwar, Bareerah Fatima, and Faizan ul Hasan

doi: 10.5191/jiaee.2018.25308

Bridging Farmer and Researcher: Extension through the Eyes of Agents in Rural Pakistan

Sandra Heaney-Mustafa

Francesco Sofo

Mukaddas Afzal

University of Canberra ACT Australia

Zubair Anwar

Social Sciences Research Institute (SSRI) Pakistan

Bareerah Fatima

Faizan ul Hasan

Pakistan Council for Research on Water Resources (PCRWR)

Abstract

Irrigation and efficient water usage by farmers remain key agricultural problems in Pakistan. Technological approaches to water management specifically irrigation management using cloud technology is a recent innovation currently being trialed in Pakistan through a project conducted by the authors and funded by the Australian Centre for International Research. The paper reports on the perceptions of rural agents in Pakistan involved in the scaling out of new technologies to improve irrigation practices of a large number of farmers. The methodology adopted the use of focus groups with water professionals and extension agents as this approach has been proven to be a key effective method to assist rural agents to gather current information on irrigation problems and the scaling out process. Eight focus groups were assembled with an average of ten participants in each group. The findings revealed the current practices, positive outcomes and challenges to conducting farmer education in Pakistan. The importance of this research is its potential to improving work practices of large numbers of farmers that continue to be highly challenging. The study gives fresh insights on how farmer education methods could be achieved in relation to improving water irrigation through new technological practices of a significantly increased number of farmers.

Keywords: Farmer Field Schools (FFS), adult education, extension, irrigation technology, scaling out

Introduction

Extension is used to describe a range of providers and practices that communicate information and new technologies to farmers and rural communities (Rivera & Sulaiman, 2011). Extension may comprise both public and private systems. Increasingly extension covers a wide range from agricultural production through value addition to securing markets and more broadly community development activities. A key extension challenge in Pakistan is how to scale out the effective application of new technologies over the vast irrigated areas. Irrigation is critical to Pakistan's food security, poverty reduction and economic development. Irrigation profitability in Pakistan is amongst the lowest in the world (Laghari, Vanham & Rauch, 2012). The use of both conventional irrigation methods and poor agronomic practices leads to overuse of water (Pakistan Agricultural Research Council, 2018). Farmers believe that using more water on their crops results in higher yields. Current irrigation practices are not producing the outputs across Pakistan that are required by farmers and by government.

Developing skills and capacity among farmers to manage and maintain irrigation is critical to Pakistan's continued economic growth and food security (Azad, Rasheed & Memon, 2003). Extension approaches to farming in Pakistan occur in two ways: the traditional top-down, expert-to-farmer approach; and the interactive Farmer Field School (FFS) approach. The FFS approach has had varying degrees of success. The scale-out to other farmers has been poor (Waddington et al., 2014) and irrigation management has not been a specific focus of either extension services or FFS. Ineffective irrigation practices dominate farming and produce deleterious outcomes for Pakistan's agricultural sector. These have a flow on effect in terms of exports and profitability and viability of

agriculture. The problem and its significance are variously understood and appreciated by agencies and intervention groups who endeavour to improve farming practices in Pakistan (Heaney-Mustafa, 2016).

The Government of Pakistan Ministry of Planning, Development and Reform has as a priority in its Vision 2025 access to an adequate supply of water for all (agriculture, industry and domestic) users. Second of the five goals to achieve this is to "invest in proven methods and technologies to minimize wastage, promote conservation and gain efficiencies through rationalization of pricing" (Ministry of Planning, Development & Reform, 2016, p.62). The Pakistan Agricultural Research Council (PARC) in its 2013-2018 Business Plan set water management at the highest priority for research in irrigated areas particularly for small farmers as the main beneficiaries. On-farm water management ranked ahead of food security and other agricultural matters for research. The practices for extension of technologies to farmers to encourage their adoption requires greater in-depth knowledge of the problems, the perceptions and knowledge of farmers about the effective use of irrigation technologies. Focus groups with water professionals and extension agents is the key method used to assist in gathering this current information.

Review of Literature

Traditional agricultural training practices in Pakistan can be traced to Pakistan's independence (1947). Detailed knowledge of practices can lead to irrigation practices. Such practices, now commonly known as 'agricultural extension', were designed to increase farmers' knowledge and skills to increase farm production through 'improved agricultural practices and rural life' (Mazher, Toheed, Khalid & Shawana, 2009, p.1). Such training practices were delivered through various programs,

including the Village-AID Program (1952-62) and from 1961 to 1978 the Traditional Agriculture Extension System (Mazher et al., 2009; Muhammad et al., 2014). Ultimately, these programs closed due to a myriad of issues but one outstanding inter-connecting issue was the top-down approach adopted within each program. Such top-down approaches often disengaged farmers and did not adequately address their individual needs. In 1978 the Training and Visit (T&V) Extension System was adopted and is still in operation in Pakistan today. In 1999 the program went through a major change to focus more on decision-making at the community level. The present agricultural extension system involves extension work through Extension Field Schools (EFS) but it is still recognized as a top-down system (Mazher et al., 2009; Muhammad et al., 2014).

Participatory Extension Approaches (PEA) emerged in agricultural training in the 1980s as a new way of undertaking extension in developing countries which have been effective in South and North Africa and Myanmar (Cho & Boland, 2002). PEA strengths include integration for community mobilization; equal partnerships between farmers, researchers and extension agents; strengthening farmers decision making; promoting the capacity of farmer to adopt and develop new strategies; encouraging smallholder farmers to learn through experimentation through “action learning”; and the recognition that communities are not homogenous and that equitable and sustainable development needs negotiation (Cho & Boland, 2002).

FFS designed as an innovative approach, were institutionalised in 2001. They promote discovery-based learning among farmers (Khisa, 2003). FFS are used to “transfer specialist knowledge and promote skills and empower farmers” (Waddington et al, 2014, p. 12). They use

experiential learning methods to build farmers' expertise (Pontius, Dilts & Bartlett, 2002). Farmers' capacity is built by practising various techniques themselves (Khatam, Sher & Ashraf, 2013) such as learning while doing (Muhammad et al., 2014).

FFS are “claimed to be cost effective, client oriented, group based and demand driven” (Bajwa, Ahmad & Tanvir, 2010, p. 260). Strengths of FFS include varied teaching methods such as participatory and capacity building methods, incorporating mixed methods such as group discussion, demonstration, lecture, critical and creative thinking activities and decision making exercises. FFS are used to “transfer specialist knowledge, promote skills and empower farmers” (Waddington et al., 2014, p. 12). They are a form of education that uses experiential learning methods to build farmers' expertise (Pontius et al., 2002). Farmers' capacity is built by practicing various techniques themselves (Khatam et al., 2013) and engaging in action learning (Muhammad et al., 2014).

Globally, FFS as an overarching learning system are recognised as successful. Various research studies have been conducted to analyze FFS strengths and weaknesses. Strengths may be the a result of their “discovery-based learning, promoting practical method of education and protecting environment and biodiversity” which has become a mantra (Khatam et al., 2010, p. 686). FFS combine local and scientific knowledge and aim to make farmers better decision makers (Khatam et al., 2010, p. 685). FFS play an important role in farmer capacity building and empowerment and do not rely on highly trained facilitators but on farmers' own discoveries and reflection (Braun & Duveskog, 2011). Despite such a successful learning system FFS have not adequately dealt with the intransigent problem of

scaling out of knowledge and expertise such as the expert use of information technology for farmers to improve irrigation practices.

Braun, Jiggins, Röling, van den Berg and Snijders (2005, p.25) argue that FFSs are “best suited for problems and opportunities requiring site-specific decisions or management practices and for issues that entail articulation of changes in behaviour within the farm enterprise, household and community or among institutions at varying scales of interaction and situations that can be improved only through development of locally dependent knowledge” .

Khatam et al. (2010, p. 688) argued differently: “many of the strengths were dealt with inappropriately, so they should be reconsidered for improvement of the approach. Prominent weaknesses of the system included the heavy expenses on the implementation of FFS which can be minimized by utilizing the services of locally trained farmers as facilitators”. Research in Punjab showed that group discussion and lectures and literature were cited as the best methods for capacity building and dissemination of information among farmers but that these were used to an average extent. Exhibitions, signboards and slogans were ineffective and time consuming (Bajwa et al., 2010).

Khatam et al. (2010) asserted that FFS is a time consuming process; farmers are required to take large periods of time out of the farming life to attend the school. They concluded that the FFS have much strength but the curriculum and other weaknesses “require proper attention of the facilitators to make FFS more effective” (p. 688). The FFS approach is no doubt a worthy approach but it is not without its problems such as the lack of capacity to scale out learning. The various educational concepts surrounding FFS are echoed in the principles of community development as noted by Ife

(2013, p.170) “If people are to participate in decision making they can be expected to do so only if they are well informed about the issues at stake and the likely consequences of particular decisions. ...informed decisions require ...education in its broadest sense, including consciousness raising”.

Davis (2006) findings on FFS suggest that many of the problems inherent in the approach are not being addressed, even though the approach is being aggressively promoted by donors, governments, and non-governmental organizations. Davis concludes that what is needed is not a “one size fits all” approach to FFS but local solutions for local problems. A study in Punjab reports “FFS prove highly beneficial to the farming community due to its capacity building functions” (Butt, Gao & Hussan, 2015 p. 1164). Analysis of previous FFS in Nepal have shown that over 50 percent had a high rate of adoption (Bhattarai & GC, 2015).

Scaling out or scaling up is a key issue of this paper. In Africa, FFS did not appear to have impact at the broader national level. This reflects the economics of scaling out—mobilizing adequate human and financial resources to replicate the approach at the national level. Farmer-to-farmer dissemination is a key issue in scaling up, that is farmers from the schools diffusing knowledge and technologies to their neighbours. Some studies show that effective farmer-to-farmer dissemination is not taking place (Feder, Murgai & Quizon, 2004; Tripp, Wijeratnee & Piyadasa, 2005). Farmers may be gaining skills and knowledge, but they are not sharing them with their neighbours.

The results of studies on empowerment of farmers are mixed. Participation is another key issue worthy of further exploration as the past research of FFS tends to ignore this important aspect. Do FFS encourage and achieve

inclusiveness and how can this be improved? Training and Visit (T&V) and FFS approaches are donor driven and may not encourage empowerment. FFS focus on sufficient monitoring and evaluation or ex-ante and ex-post assessment to recommend ways to improve empowerment and leadership by Pakistan farmers. FFS tend to have formulaic weekly gatherings during cropping season for experiencing and exploring problems and solutions that did not produce empowerment or yield improvements. They are not simply designed to achieve increased yield. Nor should they be used only to empower and mobilise farmers but to achieve traction and results. Research is lacking that reports on the nuances of FFS that render it effective or not for various goals pursued. It is believed that participatory research can reveal what works when, where, how, and why and how to scale out the approach, if this is warranted.

Scaling out fundamentally concerns social empowerment to use existing human energy and to create new attitudes and approaches including successful new efforts to reduce poverty (Taylor, Taylor & Taylor, 2012). Requiring people to change without consequences for failure seldom achieves much. Instead, support systems are needed that help people change. Components of required support (Taylor et al., 2012) include getting innovators to lead, educating about benefits, building from success, highlighting incentives, and at times applying disincentives through peer pressure or raising difficulties for those who do not comply. Taylor et al. (2012) found that disincentives when applied by a partnership tend to be much stronger than when applied by a control-oriented outside body such as government or an NGO. For example, the community groups in the village of Palin in Northeast India, for whom money is scarce, fine members who miss a training session or

they fine members who serve unboiled water to another family's child. Using incentives and disincentives just once is usually insufficient; behavior change needs repetition to take effect. This is something that communities can implement (Taylor et al., 2012).

Purpose & Objectives

The purpose of this study was to explore the levels of knowledge, understanding and appreciation held by government and non-government agents and extension personnel who are private teachers, independent of organizational attachments work with farmers in Pakistan. More specifically, the key objective was to identify the reported effectiveness of the agents' approaches. The focus groups discussions also sought to identify the development needs of the agents to mount an ongoing education program to improve their effectiveness with farmers. Three key questions we posed:

1. What were agents' levels of knowledge of irrigation improvement and water usage?
2. Which strategies did agents perceive as effective and mostly use?
3. What are the implications for further developing agents?

Methods

The study was part of an Australian Government initiative to improve irrigation practices in Pakistan. This part of the study was preliminary work conducted to assist in the co-development of an education strategy that would be used effectively by agents working with farmers to improve water usage across Pakistan. Focus Groups interviews were conducted in Karachi and Lahore and all participants were reimbursed for their travel expenses. Participants were not paid to participate and did so on a voluntary basis. However, all participants

were reimbursed for their travel expenses. They were provided with an information leaflet explaining the purpose and process and required to give written informed consent.

Focus groups are effective because they stimulate discussion and argument to points of agreement. They produce detailed information about strongly held ideas, perceptions, opinions and feelings. They tend to provide broad range information on a topic and are economical compared to individual case studies and surveys. The advantages of focus groups in this context were that responses were *spoken, open-ended, relatively broad, and qualitative* (Rubin & Babbie, 2008). In this sense focus groups would give researchers a greater appreciation of the practices surrounding the problem. Group member discussions stimulated new thoughts. Although the challenge of focus groups to score importance of ideas arose, the intensity of conversations revealed the passion of commitment around perceptions and practices.

The method used of conducting the focus groups involved trained leaders who individually guide a small group in focused discussion. Our methods have been built through our experience of what appears to be successful that reflect our views and relevant processes for analyzing qualitative data. These methods are supported by Berg & Lune (2012). Opinions are sought on a designated topic as well as suggestions for future action. Discussions are planned and set in a relaxed environment so that people are encouraged to freely talk and express their opinions. As these groups were in a cross-cultural context, group members were encouraged to use the language with which they were most comfortable.

The recorded data were transcribed and in some cases translated; notes taken were cross referenced and a coding system

devised to analyze the collected data. From the codes and the noted repetitions of those codes, within and across different focus groups, emerging patterns and themes were identified. This analysis allowed conclusions to be drawn and shared with participants and other stakeholders so that future actions could be planned.

The following broad questions served the purpose of initiating discussion to answer the three key questions we posed. But as is the nature of focus groups, the questions led to several other areas. The main deviation being around question 4 where challenges of actually working with the farmers in their fields broadened out to a discussion regarding challenges for farmers and those who work with them on issues at a field level and also at an infrastructural and policy level. This is explored more fully below.

1. What extension activities or practices do you currently employ when working with farmers?
2. What do you consider are your strengths to work with farmers?
3. What positive outcomes have you had from the extension activities in which you have been involved?
4. What have been the main challenges for you when working with farmers and how have you overcome or managed these challenges?
5. What opportunities do you see for enhancing the work you do with farmers in the future?

Participants

Eight focus groups were conducted with participants who were assured anonymity in order to encourage open discussions. Each was designated a number FG101, FG304 and so on. Participants were representative of the three provinces

Balochistan, Punjab and Sindh. They were grouped according to their current roles or organisational associations. In all, 80 participants from Punjab, Balochistan and Sindh participated in an allocated discussion group of 6-12 participants from Pakistan Council for Research on Water Resources (PCRWR), Society of Facilitators and Trainers (SOFT), Agricultural Departments (Balochistan and Sindh), Balochistan Rural Support Program (BRSP), Rural Development Foundation (RDF), Kissan Welfare Association (KWA) Punjab South Asian Conservation Agriculture Network (SACAN), Agricultural Service Providers (ASPs) from SACAN, On Farm Water Management (OFWM), Agriculture Extension and research department, Fruit and Vegetable Department (Punjab), World Wildlife Fund (WWF), Irrigation Department, Environmental Protection Agency (EPA), NESPAK, OFWM, PCRWR, Centre of Excellence in Water Resources Engineering, University of Engineering and Technology and MM Pakistan Ltd from Punjab.

Results

The level of knowledge of irrigation improvement and water usage held by the various agents was intimately entwined with the strategies currently employed. Thus the first and second key questions posed are considered together. Through the discussion it emerged that extension agents have little knowledge of water and irrigation as will be shown. Prior to answering the three research questions the critical state of the water situation was highlighted by one participant "This is not rhetoric, it is bitter reality (in Balochistan) ... water is not only a challenge ... it has now crossed the frontier of threat for human survival even without agriculture" (FG103).

The main themes emerging from question 1 largely confirmed the current

literature (Siraj, 2010) that traditional methods of training and visiting, mass demonstrations, seminars, and lectures are for the most part employed by those working within provincial government Irrigation and /or Agricultural departments. Research is brought into the field through demonstrations: "I am the bridge between the researcher and the farmer" (FG304). A top-down training approach was used, albeit sometimes creative such as the use of theatre to demonstrate new technologies. Mass media such as mobile phones and pamphlets were widely used.

Non-government organizations, such as SOFT, BRSP and RDF used the more holistic approaches of FFS, broad community consultation, problem identification and consultative problem-solving. "Insect zoos," "seeing is believing" and "learn by doing" were encouraged by these organizations to engage farmers in their learning. "... the main theme is to switch over farmers from traditional cropping methods to a proven method ... in this way they can see the mechanism ... they will go to a method where there is more profit ... but changing culture will take time" (FG202). A highlight of these organizations is their working with farmers throughout the whole cropping season on a regular basis, visiting them and problem solving with them at least fortnightly. They also maintain contact with the farmer in the next season to provide support and information as needed. Respondents noted that the Fruit and Vegetable Department within Punjab Agriculture extension and Research Department were working with farmers in a manner similar to FFS. However, the departments visit the farmer only three times during the season and their remit is only working in the field with farmers around a predetermined curriculum and as such could be described as a "pseudo FFS" methodology.

Agriculture Service Providers (ASP) trained by the South Asian Conservation Agriculture Network (SACAN) work with farmers as providers of new technologies such as Laser Land Levelling (LLL) and teach them about the benefits of new techniques. The ASP consists mainly of a local farmer who has used the technology on his land so that farmers have the benefit of seeing how it might be effective. Of the eight groups, SOFT and BRSP were the only ones who work specifically with women. SOFT works with Women Open Schools (WOS) on topics of income generation skills including kitchen gardening and engaged in programs related to the safe use of pesticides. BRSP have similar programs and women are involved in the whole of community decision-making processes. Agreement among all participants across the range of groups was that the most effective teaching comes about using demonstration plots. When farmers "see" that the new technology increases profitability they "believe" and are more willing to adopt the new technology.

The information from question 2 indicated that relationship building and nurturing, active associations and educating capacity were the three key themes emerging when participants were asked to consider their strengths in working with farmers. Relationships with individual farmers, their families and communities that build trust, honesty and loyalty were paramount. These relationships were built through knowing the local language and culture. As one participant in Sindh commented "I use the T&V methods to transfer technology ... I have a language problem I only speak Urdu" (FG306). He felt his language limitations precluded him from a closer relationship with the farmers. Working with local associations and farmer groups was also regarded as a strength as it allowed a broader reach as well as a more

holistic approach to be taken. One participant referred to it as a "farmer for farmer" (FG603) approach. This built confidence among the farmers that extension agents and facilitators were concerned for them as villagers, not just individual farmers.

The knowledge base and education level of those working with farmers was also seen as a strength, although when discussing challenges this was at times undermined as farmers doubted motivations of those giving them information and not knowing from whom they were getting correct information. With particular reference to water several participants commented that while they have "expert knowledge ... it is poor in water" (FG306). Passion, compassion, trust, honesty, loyalty were the most frequently used words by participants when asked about their strengths. Simple things such as 'dressing like the farmer', 'having local knowledge' and 'respecting the farmers' knowledge and skills' were echoed in all groups by participants of both genders and all disciplines.

Several anecdotal stories of small successes were offered to illustrate success relating to changes in farmer practice resulting in higher yields for example: a switch from growing soya beans for which there were limited market opportunities to growing vegetables; using raised beds for bananas improved production and reduced water use; use of direct seeding reduced seed usage from 40kg by broadcast method to 15kg. Use of tunnels for vegetable production has increased from 360 to 45,000 acres over the past decade. With respect to water management practice, there were several anecdotes of the effectiveness of LLL, bund constructions, and watercourse lining. A spin-off effect of bund construction and watercourse lining included the reduction of unemployment of landless labourers. One participant commented

“farmer to farmer success stories lead to sustainability” (FG504). So, stories from the field show that farmers can and do adopt or adapt new ideas and technologies but the research indicates adoption remains poor on the larger scale (Knowler & Bradshaw, 2007; Pender, 2008; Sheikh, Rehman & Yates, 2003).

In considering the third research question, the implications for further developing agents, challenges faced and opportunities available were discussed. Challenges related to change and trust were identified as key but essentially the challenges lay outside the farmers’ fields. There was agreement in all focus groups that farmers are willing to change and increasingly it is the farmers who approached the various Government departments seeking help. The key challenge identified was the inability to make change when confronted with impediments. Other key challenges identified in all focus groups included poverty, market access and storage, loss of farmer trust, infrastructure/institutional level issues, lack of relevance of research to farmers’ problems and “hand out” mentality of farmers. Farmers do not see the value in increasing production if they cannot get their product to market and get a reasonable price or if they do not have storage facilities to hold the surplus until the price is right. Across all groups, the notion of trust was raised with several commenting that farmers do not know whom to trust. Different groups give them conflicting information and there is a perception that the various agents have a vested interest. “When the FFS man comes to the farmer he thinks the FFS guys are doing it in their own vested interest ... takes time to build trust” (FG204). Participants reported farmers as saying: “this guy was just born yesterday and he is telling us what to do” (FG505).

Small and medium farmers largely lacked the means to adopt new technologies due to poverty, lack of financial resources, no ownership of the land, dependence on landlord’s decisions and inability to obtain low or no interest loans. Participants in all groups also commented on farmer attributes which limit uptake of technologies as being related to low education levels of farmers, rigid attitudes – “they don’t shift easily” (FG502). The reliance of farmers on participation incentives was raised by several groups and the notion of the “hand out” mentality is still common among many. The relevance of research was highlighted in all groups as was the poor linkage between research and extension. “Research is not farmer-driven ... it is researcher driven” (FG103). Farmers did not regard the research as being directed to their in-the-field problems; the high technology equipment did not address their needs or was too complex for them to operate. At the Institutional level many factors impacted on farmers’ learning and subsequent adoption of technologies. Issues of policy and poor governance around fair and equitable water distribution was either lacking or being poorly implemented. A siloed approach was limiting a holistic manner to address issues. As one water engineer agent commented when others spoke of the whole of value chain approach to address issues: “...we are scientists and engineers we can only talk to farmers about technologies” (FG701). A lack of resources leads to poor quality extension services. An example was cited of having a vehicle but “no tyres for it” (FG204) and so unable to go to the field to do the extension training. Numerous other examples were cited such as inadequate budgets in extension services and lack of support and training for extension officers. The general feeling was that extension agents lacked knowledge, particularly regarding water management and hence

often gave poor information to farmers which further compounded the lack of trust highlighted above. These matters impacted on and eroded the trust of the farmers in researchers, extension agents and engineers to provide them with relevant, suitable, manageable and effective technologies. Rebuilding trust was common across all groups and all participants. All groups agreed on the importance of taking a more holistic approach with a focus on problem-solving of the "real issues" identified by farmers.

Adopting new attitudes was considered a requirement for taking a whole of community approach to build village level capacity involving women and youth and encouraging farmers to work in groups such as WUAs, Village and Union Councils, Kissan Welfare groups and the like: "... until and unless farmers as groups are organized we cannot get results from any projects ... groups should be focusing on water or production, then service can be supplied to them regarding markets and other things" (FG405). There were also perceived opportunities and a need to tap into existing indigenous knowledge and communication networks: "...need to explore naturally existing community based/indigenous organization for technology dissemination through it" (FG803). Untapped opportunities existed to work more with women for example in nursery and seedling raising, silage making and animal health: "Women respond better than men!" (FG503). There were additional opportunities to encourage youth engagement through entrepreneurship, use of young graduates in teaching farmers most recent technologies.

Addressing infrastructural and institutional issues was raised as an untapped opportunity for agents to enhance their own knowledge base and to acquire more resources and support for extension

agents: "without mobility and support, we cannot do anything" (FG202). Other opportunities were cited to enhance relations within and between government and non-government sectors: "... more investment in civil society organizations ... more work should be done by them as they have expertise and proven outcomes" (FG403). More needed to be done to encourage better use of Information Communication Technologies especially as android adoption was becoming more common with farmers.

Conclusions, Recommendations & Implications

The study described one attempt to appreciate more deeply the perceptions of agents who educate increasing numbers of farmers to move forward more productively and creatively with water usage practices through improved technologically related irrigation behaviours. Overall the research clarified that there was limited knowledge among external agents as irrigation had not been a specific focus among them. Farmers understood that irrigation occurs either from a canal or from tube wells. When supplied via a canal then farmers rely heavily on the cycle with the knowledge of when water will flow into the canal for their use. This has led to an inefficient practice of flooding their fields which led to further deleterious effects of nutrients leaching from their farms. If irrigation depends on tube wells then extraction from the wells depletes the aquifers and produces high content salt in the water making the water less than optimally useful.

Second, agents emphasized farmers' love of discovery learning. It was difficult for agents to follow this method as access to farmers was extraordinarily difficult requiring traversing rough terrain over large areas. Third, FFS continued to be popular due to a more interactive and fluid approach

rather than adopting the extension agent system. The hierarchical nature of all extension services where researchers work with extension agents who work with field agents who work with farmers was obviously entrenched and resistant to innovation. The fourth salient feature to emerge from the focus groups is the paucity of resources, outdated knowledge and lack of self-development. The development need occurs across the hierarchy of personnel and the hierarchical teaching system. Interaction and dynamic learning was lacking across the hierarchies which slows communication and action and suffocates creativity and innovation. In several groups both those from government departments and private enterprise and non-government agencies, there was a strong sentiment that extension work should be handed over to civil society organizations not only because they had the expertise and proven outcomes as cited above but more importantly because they had the trust and confidence of the farmers.

Key insights emerging from the study can be encapsulated in the words of two of the participants. Firstly, from an agent in a non-government organization who worked with farmers daily in their fields, "Empowered communities will lead to reduced government expenditure ... less management of minor matters" (FG406). Second, the idea came from one government water engineer who also worked daily in the field with farmers: "we have two ears and one tongue only - go to the farmer to listen ... this will boost trust ... and lead to root of problem" (FG103). Both of these comments reflect the ancient wisdom of the Chinese philosopher Lao Tzu who said "go to the people, live with the people, work with the people and when you leave they will say we have done it by ourselves" – an empowered and trusting community. Field agents recognize their mission at a deeper level beyond the provision of skills and

knowledge. The work of agents is a sacred level of 'empowering' the community and reflects on the obligation to expand their own knowledge, strategies, skills and development.

A key limitation of the research was the small sample of convenience and this may not have been representative of the entire country of Pakistan. Further, this study delved into one perspective only: that of the agents where there was almost unanimous agreement and so there was no opportunity for contesting the observations and conclusions of the agents.

Further research could explore how extension agents are trained on water irrigation and water management especially using new technology. The way extension agents learn and deliver their services is still largely not appreciated and the quality and effectiveness of the training materials on the approaches used have not been evaluated.

References

- Azad, A., Rasheed, M. A., & Memon, Y. (2003). *Pakistan: Sindh water resources management – Issues and options*. Food and Agriculture Organization of the United Nations, Investment Centre Division (Occasional Paper No. 15). Retrieved from <http://www.fao.org/tempref/docrep/fao/008/af105e/AF105e00.pdf>
- Bajwa, M. S., Ahmad, M., & Tanvir A. (2010). An analysis of effectiveness of extension methods used in farmer's field school approach for agricultural extension work in Punjab, Pakistan. *Journal of Agricultural Research*, 48(2), 259-265.
- Berg, B. & Lune, H. (2012). *Qualitative research methods for the social sciences* (8th ed.). Boston: Pearson Education.

- Bhattarai, A., & Y.D., GC. (2015). Effectiveness of Farmer Field School (FFS) program in adoption of IPM technology in Chitwan District, Nepal. *Agriculture Development Journal*, 11, 64-74. Retrieved from http://www.dat.gov.np/journalfile/Effectiveness%20of%20Farmer%20Field%20School_1449039738.pdf
- Braun, A., & Duveskog, D. (2011). *The farmer field school approach – History, global assessment and success stories*. Retrieved from <https://www.ifad.org/documents/10180/f70367e9-0d1a-431d-89f1-b369e6886e12>
- Braun, A. R., Jiggins, J., Röling, N., van den Berg, H., & Snijders, P. (2005). *A global survey and review of farmer field school experiences*. Retrieved from https://www.researchgate.net/publication/228343459_A_Global_Survey_and_Review_of_Farmer_Field_School_Experiences
- Butt, T. M., Gao, Q., & Hussan, M. Z. (2015). An analysis of the effectiveness of farmer field school (FFS) approach in sustainable rural livelihood: The experience of Punjab- Pakistan. *Agricultural Sciences*, 6(10), 1164-1175.
- Cho, K. M., & Boland, H. (2002). *Participatory learning for agricultural extension and future development in Myanmar*. Retrieved from <http://www.tropentag.de/2002/abstracts/full/302.pdf>.
- Davis, K. (2006). Farmer field schools: A boon or bust for extension in Africa?. *Journal of International Agricultural and Extension Education*, 13(1), 91-97.
- Denzin, N. & Lincoln, Y. (2000). *Handbook of qualitative research* (2nd ed.). Thousand Oaks: Sage Publications.
- Feder, G., Murgai, R., & Quizon, J. B. (2004). The acquisition and diffusion of knowledge: The case of pest management training in farmer field schools, Indonesia. *Journal of Agricultural Economics*, 55(2), 221-243.
- Government of Pakistan. (2016) *Pakistan 2025 One Nation – One Vision* (Ministry of Planning, Development and Reform). Retrieved from <https://fics.seecs.edu.pk/Vision/Vision-2025/Pakistan-Vision-2025.pdf>
- Heaney-Mustafa, S. (2016). *Developing approaches to enhance farmer water management skills in Balochistan, Punjab and Sindh in Pakistan* (Project Proposal). Australian Centre for International Agricultural Research, Australia.
- Ife, J. (2013). *Community development in an uncertain world: Vision, analysis & practice*. Sydney, Australia: Cambridge University Press.
- Khatam, A., Sher, M., & Ashraf, I. (2013). Role of farmer field schools in enhancing skills of farming community in Khyber Pakhtunkhwa, Pakistan. *Pakistan Journal of Agricultural Research*, 26(1), 59-64.
- Khatam, A., Sher, M., Chaudhry, K. M., Mann, A. A., Haq, I. U., Khan, Z. U., Idrees, M., & Amin, H. (2010). Strengths and weaknesses of farmers' field schools approach as perceived by farmers. *Sarhad Journal of Agriculture*, 26(4), 685-688.
- Khisa, S. G. (2003). Overview of farmer field schools approach in Kenya. In K. R. Sones, D. Duveskog & B. Minjauw (Eds.), *Farmer Field Schools: The Kenyan experience* (pp.

- 3-10). Nairobi, Kenya: International Livestock Research Institute.
- Knowler, D., & Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: A review and synthesis of recent research. *Food Policy*, 32(1), 25-48.
- Laghari, A. N., Vanham, D., & Rauch, W. (2012). The Indus Basin in the framework of current and future water resources management. *Hydrology Earth & System Sciences*, 16, 1063-1083.
- Mazher, A., Toheed, E. L., Khalid, M. A., & Shawana, S. (2009). Agricultural extension programmes in Punjab, Pakistan. *Pakistan Journal of Life and Social Sciences*, 7(1), 1-10.
- Muhammad, A., Xia, L. C., Jia, L., Ghazanfar, S., Mehmood, Y., Ishaq, M. N., & Saud, S. (2014). Effectiveness comparison between the farmers field school and the training & visit approaches of agricultural extension in two districts of Pakistan. *American-Eurasian Journal of Agriculture & Environmental Science*, 14(1), 33-39. doi:10.5829/idosi.aejaes.2014.14.01.12280
- Pakistan Agricultural Research Council, (2018). *Climate, Energy & Water Research Institute (CEWRI): Agricultural water management program*. Retrieved from <http://www.parc.gov.pk/index.php/en/caewri-rshprog/caewri-awmp>
- Pender, J. (2008). *Agricultural technology choices for poor farmers in less-favoured areas of South and East Asia*. International Fund for Agricultural Development (Occasional Paper 5).
- Pontius, J., Dilts, R., & Bartlett, A. (2002). *Ten years of IPM training in Asia – From farmer field school to community IPM*. Bangkok, Thailand: Food and Agriculture Organization of the United Nations.
- Rivera, W. M. & Sulaiman, V. R. (2011). Extension: Object of reform, engine for innovation. *Outlook on Agriculture*, 38(3), 267-273.
- Rubin, A., & Babbie, E. R. (2008). *Research methods for Social Work* (6th ed.). Belmont, CA: Thompson Brooks/Cole.
- Sheikh, A. D., Rehman, T., & Yates, C. M. (2003). Logit models for identifying the factors that influence the uptake of new 'no-tillage' technologies by farmers in the rice-wheat and the cotton-wheat farming systems of Pakistan's Punjab. *Agricultural Systems*, 75, 9-95.
- Siraj, M. (2010). *A model for ICT based services for agriculture extension in Pakistan*. Retrieved from <https://assets.publishing.service.gov.uk/media/57a08acded915d3cfd000950/60818-extensionmodel-Pakistan.pdf>
- Taylor, D. C., Taylor, C. E., & Taylor, J. O. (2012). *Empowerment on an unstable planet: From seeds of human energy to a scale of global change*. New York: Oxford University Press.
- Taylor-Ide, D. C., & Taylor, C. E. (2002). *Just and lasting change: When communities own their futures*. Baltimore, MD: Hopkins Press.
- Tripp, R., Wijeratne, M., & Piyadasa, V. H. (2005). What should we expect from farmer field schools? A Sri Lanka case study. *World Development*, 33(10), 1705-1720.
- Waddington, H., Snilstveit, B., Hombrados, J., Vojtkova, M., Phillips, D., Davies, P., & White, H. (2014). Farmer field schools for improving farming practices and farmer

outcomes: A systematic review.
Campbell Systematic Reviews, 10.
doi: 10.4073/csr.2014.6

Washer, P. (2007). Revisiting key skills: A practical framework for higher education. *Quality in Higher Education*, 13(1), 57-67. doi: 10.1080/13538320701272755