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-Editor

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Farmers' Experiences with Pluralistic Extension System in Promotion of Conservation Agriculture in Chinguluwe Epa of Salima District, Malawi

Mphatso Mary Magombo¹

Abstract

Malawi's current extension policy supports pluralism and advocates responsiveness to farmer demands. This article therefore investigates the experiences of male and female farmers in selected sections with pluralistic extension in promotion of conservation agriculture (CA). The key question addressed in this research is what changes has pluralistic extension system made in case of the farmers practicing conservation agriculture. Within a case study approach, four sections were purposively selected for in-depth qualitative analysis of available services and farmers' experiences. Focus group discussions were held separately with male and female farmers and key informants followed by semi-structured interviews with 150 farming households.

The findings have revealed that few farmers appreciate having access to a variety of sources of technical advice in conservation agriculture. However, most service providers continue to dominate and dictate what they offer such that most of the responses are not relevant to address farmers expressed needs. In addition, the study has revealed that poor coordination between service providers limits exploitation of potential synergies amongst actors. As a recommendation therefore, service providers can adapt their approach to engage farmers in discussion of their needs and work collaboratively to address them. At a system level, institutions that have a coordination function can play a more dynamic role in brokering interaction between providers and farmers to ensure coverage and responsiveness.

Keywords: Demand-driven, pluralistic extension, conservation agriculture, complementarity

Background

Investing in agriculture will foster economic growth and development and assist in attaining the aspirations of Malawians as stipulated in the country's Vision 2020.

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In Malawi, economic growth depends on agriculture such that 80 per cent of the productive labour force is employed in the agriculture sector (GoM, 2009; GoM, 2010a). It is also estimated that 70 per cent of Malawi's agricultural GDP comes from the smallholder sector (GoM, 2010a). Agriculture in Malawi is divided into estate and smallholder sectors. Masanjala (2006) added that smallholders are characterised by resource constraints although they are the main producers of food commodities and also complement the commercial sector in the production of high value crops for export.

However, recent shift towards adoption and the dwindling of government resources has made the practice of pluralistic extension service a realistic option for ensuring efficient and effective use of available resources for extension and sustainable development (Okorly *et al.*, 2010). This shift in thinking has influenced, and has been influenced by, shifts in policy towards supporting pluralistic provision of services which are more responsive to farmer demand (Garforth, 2011). According to the World Bank (2000), Pluralistic Extension Service (PES) is important because of the provision of complementary extension services that would reach and respond to diverse farmers' needs in different farming systems. Pluralistic extension recognizes the inherent diversity of farmers and farming systems and the need to address challenges in rural development with different services and approaches (Davis, 2008). Malawi Government therefore, decided to change its agricultural extension policy in 2000 to encompass pluralistic and demand driven services (GoM, 2002). This was designed to reform the extension system in order to make it more effective and efficient in responding to diverse farmer demands. Basically, the main objective was to promote the provision of decentralized, demand-driven services and encourage the participation of many service providers in agricultural extension so that farmers' demands are responded to and they have access to high-quality extension services (GoM, 2002).

Theoretical Framework

Demand-driven extension requires pluralism in service provision on the supply side. Pluralistic extension service means having various extension service providers in the provision and delivery of extension services in order to address farmers' diverse needs (Government of Malawi, 2002). Farmers can only exercise choice if there is a range of service providers to choose from since variety in services demanded is then matched with the existing variety of service providers all based on complementarity (Davis, 2008). Encouraging pluralism is a recurrent

feature of extension reform since 2000 (Rivera and Alex, 2004; Chipeta *et al.* 2008), for example in Uganda, Kenya and Malawi. In the case of Malawi, the main thrust of extension reform has been to promote pluralism and create institutions at the local level to enable farmer demands to be articulated and then met with a coordinated response. Also spelt out in the land resources conservation policy as a way of intensification is full involvement of the private sector, NGOs, Community Based Organizations (CBOs) and local communities as one way of complimenting government efforts to enhance continuity and cost-effectiveness of soil management programs (Government of Malawi, 2000). The objective for pluralistic response is for complementary extension services that would reach and respond to diverse farmers' needs in different farming systems since land degradation threatens future food production potential as well as export earnings (World Bank 2000 and Shiferaw and Holdenstein, 2000).

However, institutionalising farmer demand in extension reform has proved problematic. Several authors (Masangano and Mthinda, 2012; Jere, 2010; Rivera and Alex, 2004 and Hanyani-Mlambo, 2002) have raised the concern that PES presents a major challenge in coordination and collaboration among extension providers for unifying services and avoiding duplication and wastage of scarce resources. Interestingly, little empirical information is provided in the extension literature on how PES can be organized effectively so that stakeholders complement one another's efforts to avoid competition, duplication and conflicting messages. There is also interest among policy makers, service providers and academics in finding out whether PES has made any difference to farmers' access to complementary services in conservation agriculture. The purpose of this paper is therefore, to explore this question from the perspective of smallholder farmers of Salima district in Malawi. The paper also seeks to provide an understanding of key factors critical to ensuring an effective and sustainable complementary environment favourable for pluralistic response based on conservation agriculture. The research question addressed by this paper is whether PES in Malawi is in practice leading to farmers' experiencing more complementary services in conservation agriculture.

Agricultural Extension and Advisory Services in Malawi

Agricultural extension service has gone through many reforms for example; extension has been provided under different labels such as M'Chikumbi, Modified Training and Visit and Participatory Approach (Masangano and Mthinda, 2010). In particular, during the period of 1964-1980, Kabuye and Mhango (2006) noted that Ministry of Agriculture (MoA) adopted the conventional agriculture system

used in most developing countries. The conventional agriculture system relied most on the generation and transfer of technology by agricultural research stations without active participation of extension staff and farmers. In addition, the system was characterized by the emphasis on cash and export-oriented crops and a top-down communication process since it lacked participation in articulation of clients' demands (Kabuye and Mhango, 2006). As a result it did not achieve its intended objective of increasing productivity through transforming subsistence farming to commercial agriculture (Kabuye and Mhango, 2006); because it lacked a realistic planning process. Abesiga and Musali (2002) further reported that the system also failed because of its failure to reach farmers of all categories since it used more persuasive and educational individual approaches and methods which needed more man power, time and financial resources to be effective.

Later, the Block Extension System (BES) which is a modified training and visit extension system was introduced in 1981 in order to increase farmer coverage and reach out to marginalised groups which failed with the conventional system. The approach was also widely used in many Asian and African countries to improve agriculture (Anderson and Feder, 2003; Anderson and Feder, 2004; van den Ban, 2006). BES emphasized on group approach, scheduled field visits, systematic staff and farmer training and proper supervision of extension programmes. The area covered by each frontline extension worker was demarcated into eight subsections known as blocks which were visited at least once a fortnight (Kabuye and Mhango, 2005; Masangano and Mthinda, 2010). Reality revealed that T&V resulted in increased operational costs, denied extension officers creativity as they were expected to follow a fixed visitation schedule, left disadvantaged people such as women farmers unreached by extension and was considered not responsive to farmers' needs (Farrington 1995; Axinn 1997; Garforth 2005).

In addition to using top-down approaches that were heavily criticized by proponents of participatory and bottom-up approaches, this system failed to reach the required extension-to-farmer ratio so that it required recruitment of many extension staff. As a result the system became too expensive to sustain such that Malawi Government could not sustain the extension system on its own (Masangano and Mthinda, 2012). Masangano and Mthinda (2012) further reported that another problem with the system was its rigidity, in that it required fortnightly visitation schedules and fortnightly training sessions, as well as monthly research and extension workshops. These were in most cases not workable due to various unplanned activities such as funerals and other social events (Abesiga and Musali, 2002).

Disenchantment with T&V coincided with widespread moves towards more open democracy in sub-Saharan Africa in the 1990s. Provision of services began to reflect the new dispensation, as the need for involvement and participation in decision making platforms of people at grass roots level became increasingly recognised. Participatory approaches were therefore promoted in advisory services to address shortcomings of previous approaches. In Malawi, the decentralisation process of the public sector adopted in 1998 and pluralistic and demand driven agricultural extension services in 2000 (GoM, 2000) provided opportunities for improving provision of advisory services by allowing pluralism in service provision. The Malawi Government decided to change its agricultural extension policy in 2000 to encompass pluralistic and demand driven services (Malawi Government, 2000). This was designed to reform the extension system in order to make it more effective and efficient. Its aim was to promote the provision of decentralized, demand-driven services and encourage the participation of many service providers in agricultural extension so that farmers demand will be met and they will have access to high-quality extension services. Governance structures such as the Village Development Committee, Village Agriculture Committee, Area and District Stakeholder Panels were established to provide platforms for interaction among stakeholders in the process of demand articulation and responding, with a District Agricultural Executive Coordinating Committee responsible for overall coordination.

However, implementation of PES has met with mixed views among actors in Malawi. Studies by (Knorr and Gerster-Bentaya, 2007; Chinsinga, 2008; Masangano and Mthinda, 2010) acknowledge that diversity in sources and types of services provided is a result of availability of multiple players in agricultural advisory services. The authors have claimed that pluralism has also created competition amongst actors which has been manifested in coordination challenges. For example, Chinsinga's (2008) attempt to delineate functions of the public and private sectors in Thyolo and Dedza districts under a decentralized extension system reveals overlaps arising from inadequate policy articulation and enforcement by the public sector. However, these studies focussed on district and regional agriculture offices and did not articulate experiences of farmers from the village level perspective in Salima District. The present study was therefore undertaken to understand experiences of male and female farmers, in selected sections in Salima District, with pluralistic extension. The key question addressed in this research is what changes has pluralistic demand driven extension made from the farmers' perspective in terms of complementarity of efforts in conservation agriculture?

Research Methodology

This research article is based on a scholarly work conducted between 2012 and 2013 by the author. The article provides an in-depth understanding to an aspect of effectiveness of complementation of efforts in promotion of conservation agriculture among TLC, MLB and MoAIWD in Salima District. The research adopted the multi-stage (three stages) sampling procedure involving a combination of purposeful and systematic random sampling to have an in-depth understanding of the extent of complementation of efforts among service providers promoting soil and water conservation technologies.

The first two steps involved purposeful selection of Chinguluwe Extension Planning Areas, purposeful selection of the two sections from each EPA respectively which are Settlement Scheme and Kalambe Central. The selected sites are some of the areas where the Government of Malawi as well as Total Land Care (TLC) and Malawi Lake Basin (MLB) have intensive campaigns on soil and water conservation.

The third stage involved systematic random sampling of farmers from the list of sections under study ensuring that sections with a larger number of farmers receiving advice from TLC, MLB and Ministry of Agriculture, Irrigation and Water Development (MoAIWD) have a proportionally greater chance of being selected. To facilitate this final stage, lists of names of farming households in each section were obtained from the Agriculture Extension Development Officer (AEDO). The names of farming households were assigned numbers and using proportional probability sampling, random samples were drawn from each section using systematic random sampling to avoid bias such that every person on the list had an equal chance of being selected.

The data collection instruments in this study included semi-structured questionnaire, Focus Group Discussion, PRA and key informant interview checklists.

The sample frame was farming families who were living in Settlement Scheme and Kalambe Central where TLC, MLB and MoAIWD are promoting soil and water conservation practices. The sample size for the study was proportional to number of farm families living in Matenje North, Matenje Central, Settlement Scheme and Kalambe Central where TLC, MLB and MoAIWD are promoting SWCT. In total, the sample size was 75; consideration was made to ensure that a minimum of 30 should be allowed for each parameter where 19 per cent of the respondents were supposed to be female while 81 per cent were supposed to be male. This is because

in parametric analysis, any sample above 30 is statistically representative (Edriss, 2003). Distribution of the sample was proportional to the population.

Analysis of data was done using both descriptive and content analytical tools to avoid narrowing conclusions and findings of the study since both qualitative and quantitative methods were used to collect the data. Descriptive statistics was computed for categorical variable which involved calculation of frequencies and percentages to find farmers perception with PES in promoting CA in Chinguluwe EPAs of Salima District.

Results and Discussions

The results for the study are based on focus group discussions and interviews conducted with farming households from Chinguluwe EPA of Salima District, in particular, Kalambe Central, Settlement Scheme sections. In addition, data from key informant interviews, PRA and observations have also been presented to complement data from the household survey.

Extent of Complementarity of Efforts among Extension Service Providers

PES aims at complementary response among stakeholders so as to address diverse farmers' demands in a well coordinated manner. However, when the farmers were asked about the extent of complementarity of efforts to Soil and Water Conservation Technologies (SWCT) by TLC, MLB and Ministry of Agriculture, Irrigation and Water Development (MoAIWD), their responses varied as illustrated in Table 1. About 17 per cent said there is complementarity of efforts. According to the Focused Group Discussion (FGD) findings, complementation is done in terms of farm inputs such as agroforestry species, training and CA inputs such as herbicides which are provided on loan by TLC. About 39 per cent in Chinguluwe EPA said they experienced duplication of efforts. The best performing farmers during the FGD and interview revealed that they experienced duplication of efforts as well as competition among service providers. Highly duplicated by MoAIWD, TLC and MLB are farm inputs, trainings and demonstration plots and this happens to best performing farmers that is why competition and conflicting messages are evident.

In addition, 21 per cent in Chinguluwe EPA said there is competition among service providers. Further to that 23 per cent in Chinguluwe EPA experience conflicting messages. That is why (Rivera and Alex, 2004; Rivera and Qamar, 2003 and Hanyani-Mlambo, 2002) have raised the concern that PES presents a

major challenge in coordination and collaboration among both public and private extension providers for unifying services, and avoiding duplication and wastage of scarce resources.

Table 1. Extent of Complementarity of Efforts among Stakeholders

Chinguluwe EPA n=75		
Status	Frequency	Per cent
Complementation	13.0	17.3
Competition	16.0	21.3
Conflicting	17.0	22.7
Duplication	29.0	38.7
Total	75.0	100.0

Source: Household survey

The study findings align with the views of Qamar, (2000) that a major problem of decentralized extension systems in developing countries is their weak collaboration with farmer organizations, NGOs, and the private sector in service delivery. In Qamar's view, the absence of such coordination platform can lead to conflicting technical recommendations which can create confusion for farmers. World Bank (2000) therefore, emphasized on the need to have a coordination platform to ensure effective linkage and complementarity of efforts. According to Eicher (2004) the interactions provide opportunities for the organizations to build relationships and to understand each other's aims, roles, activities and capabilities. The presence of coordination platforms will ensure that the variety in services demanded are matched with the existing variety of service providers and in turn there will be regulation, all based on complementarity.

Farmers' Experience with PES

There were mixed views among respondents of the survey as well as the FGD on whether smallholder farmers' experience supports the assumption that access to multiple service providers leads to extension and advisory services that respond to farmers' demands in SWC. During FGD, farmers appreciated having access to a variety of sources of technical advice in soil and water conservation.

The perception of farmers on multiple service providers in promoting SWCT vary from very bad to good. As illustrated in Table 2, about 56 per cent of the respondents perceive PES in promoting SWCT as good, as they access complementary services. In addition, about 32 per cent perceive PES as very bad and 12 per cent in Chinguluwe EPA as somewhat good because of duplication of efforts, conflicting of interest among service providers and competition. Farmers during FGD expressed

concerns over poor coordination between providers which limits exploitation of potential synergies amongst actors leading to duplication, competition and conflict response. Farmers during the interview as well as during FGD also expressed their perception with the PES as outlined in Table 2. The findings of the study are partially different from the views expressed in the literature (Vannasou, 2006; Minoiu, 2003; Richardson, 2003 and World Bank, 2000) which suggest that multi-sector approach promotes increased and sustainable agricultural production.

Table 2. Farmers' Perception of PES

Chinguluwe EPA n=75		
Farmers' perception	Frequency	Per cent
Good	42.0	56.0
Somewhat good	9.0	12.0
Very bad	24.0	32.0
Total	75	100.0

Source: Household survey

Therefore, farmers were asked about challenges experienced with multiple extension service providers in promoting SWCT and the results are illustrated in Table 3. About 25 per cent of the respondents mentioned duplication of efforts because they have been accessing extension support to soil and water by TLC, MLB and MoAIWD. That is why Birner *et al.* (2006) believe that the governance structures create enabling conditions for the emergence of advisory services and coordinate the roles of the public and private sector and civil society in financing and providing advisory services. About 15 per cent said competition among service providers, because despite accessing extension services from MoAIWD, TLC has been giving allowances to them for bicycle maintenance. During FGD it was found that demonstration fields for MoAIWD are also fields where TLC and MLB mount their demonstrations. Therefore, because of different techniques in SWC, the result was conflicting messages to host farmers. That is about 16 per cent in Chinguluwe EPA said conflicting, which is evident in conservation agriculture and permanent planting pits. The FGD revealed that TLC advise farmers to plant three maize seeds per planting pit while MoAIWD advise them to plant four maize seeds. In addition, FGD indicated that TLC advises farmers to apply any plant mulch as residue for mulching while MoAIWD advises farmers to use maize stovers.

Added to that is technical capacity which was mentioned by 7 per cent of the respondents. The FGD and key informant revealed that TLC and MLB do not have

staff on the ground. They utilize government staff and hence most responses are not timely. Further to that, there are variations in the CA and permanent planting are implemented due to knowledge gap and this in turn leads to confusion for farmers. The study findings are in agreement with (Munthali, 2003) that little or no collaboration can lead to conflicting interests which result in confusing farmers. Hence there is a need to have a platform for stakeholder interaction for the provision of extension services that reflects the needs, values and realities of stakeholders (Chambers, 1997 and Pretty, 1995).

In terms of PES in promoting SWCT, about 17 per cent of the respondents said that the responses are not relevant. That is why farmers also rated PES as somewhat good and bad because during FDG it was revealed that most service providers continue to dominate and dictate what they will offer because they implement their core objectives such that most SWCT are implemented without responding to farmers' demands.

The study results on untimely response are in line with what Anderson and Feder (2004) found, that NGOs are not accountable to farmers but their donor agencies while Klerkx *et al.* (2010) observed that stakeholders operate as disjointed elements rather than a synergistic system. That is why when Eicher (2004) noted that the problems are related to coverage; poor coordination; inadequate public funding; and insufficient appropriate and relevant technologies, there was a proposal to have coordination platforms.

Table 3. Problems faced with Multiple Service Providers

Chinguluwe EPA n=75		
Problem	Frequency	Per cent
No challenges experienced	15.0	20.0
Competition	11.0	14.7
Conflicting messages	12.0	16.0
Duplication of efforts	19.0	25.3
Response not relevant	13.0	17.3
Technical capacity	5.0	6.7
Total	75.0	100.0

Source: Household survey

Conclusion

Pluralistic extension system has come to stay and presents a rich and complex picture that cannot be described as completely demand driven or responsive. Based on the article, therefore, complementation of efforts are evident through training, farm inputs and demonstrations. However, although farmers appreciate having a variety of technical advice and enterprise specific technologies in promoting CA, poor coordination between stakeholders due to non formal coordination structures limits exploitation of potential pluralism synergies among actors. Due to poor coordination, stakeholders operate independently and fail to address farmers' needs in a diversified manner leading to competition, duplication of efforts and conflicting messages.

Added to that, service providers are dictating and dominating what they want and leaving farmers at the receiving end such that continuity of interventions is affected due to inability of actors to empower farmers to take ownership from the onset of activities. In addition, service providers provide farmers what is in line with their policy objectives and strategies such that some of the responses are not timely and also not relevant to farmers' needs since they are not demand driven. Furthermore, complementation of efforts among service providers, is challenged by competition and duplication of efforts because stakeholders under study work with farmers who are committed. CA messages and technology packages are given to farmers from TLC, MLB and MoAIWD depending on the organization objectives and strategies which is leading to confusion at the expense of farmers.

Recommendations

The study recommends strengthening horizontal communication and coordination between actors to complement the provision of material inputs because this will encourage interaction and address conflicts that arise from differences in goals. The horizontal coordination forums are at different levels like Area Stakeholder Panels and District Agriculture Extension Coordinating Committees. In addition, with the introduction of multiple extension service system in promoting CA, MoAFS should strengthen coordination among the players in the system through the established structures of District Agriculture Extension Services System (DAESS). This is a platform where different sectors can meet and interact to build mutually beneficial relationships and to understand each others' aims, roles, activities and capabilities. This will assist in promoting the efficient use of human and financial resources thereby avoiding conflicting of interest and competition thereby promoting complementation of efforts.

With the coming of a demand-driven extension policy and having noted the top-down approach of some extension organizations, it is recommended that community empowerment be one of primary focus in promoting soil and water conservation technologies. As per the participatory approaches, the key principle is, farmers should be given a chance to participate in all stages of the extension programming of soil and water conservation so that the extension service responds to their needs and priorities. This will also assist in promoting catchment conservation.

The study suggests that service providers should facilitate articulation of demands by farmers so that the actors create an environment for change to flourish through enabling farmers to build their capacity on how and what to demand. In addition, considering that most civil society organizations do not have staff at the grass roots level and therefore rely on the government extension workers, it is recommended that these organizations increase their investments in human resources at the lower levels, that is, employ more field extension staff so as to bring their services closer to the communities and reduce the burden on public extension workers. In addition, they should increase investment in government extension workers who operate with minimal resources. Finally, the study recommends harmonization of conservation agriculture technology packages which entail synchronization of CA from the various stakeholders to address critical bottlenecks to agricultural productivity along the value chain. This will assist in reducing conflicting messages and will assist in providing pluralistic and complementary response to farmers' demands.

The study therefore concludes that efficiency of decentralized extension in Malawi can be enhanced with policy intervention to respond to farmers' needs and provision of funding for multi-stakeholder learning platforms that will encourage interaction and coordination of innovation system actors. In addition, there is also need to strengthen the role of local government bodies as intermediaries in decentralized extension so that actors are accountable for their actions.

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Gender Perspective in Determinants of Market Supply of Tomato Using Multiple Linear Regression Models

Almaz Giziew¹

Abstract

A clear understanding of the determinant factors of market supply in gender perspective helps policymakers. Knowing the determinants among male-headed and female-headed farmers means knowing where to focus to boost production and to improve volume supply. The estimated volume of production of tomato was about 2777.5 tons and 2759 tons of tomatoes were sold in Dugda District, Ethiopia in 2016. Sampled respondents indicated that 99.33 per cent of tomato produced was marketed and the remaining was accounted for by spoilage, seed and home consumption. Out of the total tomato marketed, 79.9 per cent and 20.1 per cent of tomato was marketed by male-headed and female-headed household heads. The multiple linear regression model results indicate that distance from the nearest market center, tomato farming experience, quantity of tomato produced, ownership of water pump, extension service, and social participation played a significant role in tomato quantity supply to the market among female-headed household heads. Family labour and quantity of tomato produced played a significant role in tomato quantity supply to the market among male-headed household heads. Therefore, policy makers should take into account determinants of quantity supplied to the market by female-headed and male-headed farmers separately for taking up appropriate interventions.

Key words: Determinants, Female-headed, Male-headed, Market supply, Tomato, Vegetables

Introduction

Agriculture is the mainstay of the Ethiopian economy. This particular sector determines the growth of all other sectors. It is the most important sector of the national economy and the main source of livelihood for 79.3 per cent of the population (FAO, 2015). Moreover, it accounts for nearly 46 per cent of the GDP and supplies 70 per cent of the raw material requirements of local industries. It also serves as the main source of food and generates 90 per cent of the foreign exchange earnings (ATA, 2016).

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In both developing and developed countries, vegetables are principal cash crops for both commercial and small-scale farmers. They also contribute to the attainment of *Millennium Development Goal* (MDG) - 1 (poverty reduction) by helping farmers to increase their productivity, and MDG 3 (women empowerment) since almost half of smallholder beneficiaries are female-headed households (Africa Progress Panel, 2010).

According to EHDA (2011) Ethiopia's vegetable exports have been increasing over the years. Hence, the Government of Ethiopia has highlighted further commercializing of the vegetables in its policy. It also uses the production of vegetables as a means to attain food security and economic growth to achieve the continuing goal of reaching "middle-income" country by 2025. Moreover, vegetables have high potential for the contribution to poverty reduction, hunger alleviation, income generation and even in the attainment of Millennium Development Goals (MDGs) which ensures sustainable development in the agricultural sector. Tomatoes are major vegetable products that are exported as cash crops and are important crops in the context of development of Ethiopian agricultural economy (EHDA, 2015).

In support of stimulating growth, economic development, food security and alleviating poverty, the analysis of marketing of tomato in gender perspective plays an important role in an ongoing or future development plan. In spite of the policy options provided by the Ethiopian government, there is very little empirical evidence on the female-headed and male-headed farmers' tomato marketing system to design appropriate policies for its improvement of tomato marketing in the study area. It is, therefore, significant to identify factors that determine market supply of tomato in male-headed and female-headed farmers. Knowing the determinants of male-headed and female-headed farmers means knowing where to focus to boost production and to improve volumes of supply. To date, considerable work has been conducted in Ethiopia on factors affecting market supply of vegetables and other agricultural commodities by households (Abay, 2007; Almaz, 2012; Ayelech, 2011; Adugna, 2009; Bosen, 2008; Kindie, 2007; Rehima, 2007). Nevertheless, none of these studies has focused on factors affecting female-headed and male-headed farmers' market supply of tomato in Dugda district, East Shewa, Ethiopia. Hence, this study was conceived so that it helps to formulate appropriate policies to improve the livelihood of female-headed and male-headed farmers; to design appropriate policies for the improvement of tomato marketing and to empower women farmers.

Hypotheses

1. There is a positive relationship between socio-economic variables and quantity of agricultural commodity supplied to the market
2. There is a positive relationship between psychological variables and Quantity supplied to the market

Data and Methodology

The study was conducted in Dugda district, Ethiopia. Multistage sampling technique was used to draw the sampling units of the study. Formal survey was conducted with tomato producers. At the first stage, Dugda district was selected purposively due to extensive coverage and production of tomatoes in the district: Melkasa and Adami Tulu Agricultural Research Centres have released improved tomato varieties particularly for the study district and improved agricultural inputs utilization as well as conducting wide demonstrations on tomato cultivation in Dugda district. Tomatoes were selected as the most important crop to be considered for the purpose of this study due to the fact that it is a high-value commodity and mainly produced in Dugda district and in Ethiopia as a whole. Tomatoes are major vegetable products that are exported as cash crops. In 2015/2016 production season, out of the total area of the district *i.e.* 95,945 ha, the total cultivated land was 55,828 ha of which 11,289 ha were covered by tomatoes implying that relatively it covered a large area compared to other vegetables (BoARD, 2015).

Dugda district has 37 kebeles² out of which 17 kebeles are major growers of tomato. In the second stage, eight kebeles in the district were selected randomly. The sampling frame of this study was freshly prepared in consultation with Development Agents of the selected kebeles and it was to include the producers of tomato in the kebeles of Dugda district. In the third stage of the sampling procedure, respective sampling frame was stratified as male-headed and female-headed households. Finally, the number of respondents were determined by using probability proportional to size sampling procedure. A total of 46 female-headed and 123 male-headed households were selected using simple random sampling method. Then the predetermined size of the sample farmers from each kebele was randomly selected using systematic random sampling technique. To determine the required sample size, this study used a simplified formula developed by Yamane (1967) at 95 per cent confidence level and 10 per cent non-response rate. A pilot

²Under Ethiopian government structure, “kebele” is the smallest administrative unit below district and consists of a number of villages (*i.e.* it is a collection of villages). It is part of a district.

survey was carried out on 20 non-sampled respondents on tomato farmers to check suitability of interview schedule to socioeconomic and cultural setups. Interviews were conducted from November 2015 to February 2016 using structured interview schedule, by trained interviewers.

The analysis was done with the help of descriptive and econometric tools using Stata SE-version, window-12 software. Data analysis was done to derive descriptive statistics (such as percentage and mean comparison), Univariate analysis such as t-test, chi-square to describe differences between male-headed and female-headed farmers and multiple linear regression econometric model was used to identify determinants of tomato quantity supplied. Different studies employed different models in order to identify the factors that determine market supply (Rehima, 2007; Kindie, 2006; Bosena, 2008; Abay, 2007; Adugna 2009; Ayelech, 2011; Almaz, 2012). The commonly used ones are the well-known multiple linear regression model.

Among the different variables that would explain market supply, the most important variables, according to the reviewed literature, include family labour, educational level, extension service, ownership of water pump, production level, irrigable land holding, distance to market, achievement motivation, level of aspiration, participation in non-farm activities, experience, utilization of credit, participation in social organization and market information which were found to be important determinants (Gizachew, 2006; Abay, 2007; Kindei, 2007; Rehima, 2007; Bosena, 2008; Ayelech, 2011; and Almaz, 2012).

Following Green (2003), the multiple linear regression model is specified as

$$Y_i = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14})$$

Where Y_i = quantity of tomato supplied to market

X_1 = Education level of HHH (Head of Household); X_2 = Family labour; X_3 = Utilization of Credit; X_4 = Quantity of production; X_5 = Extension contact; X_6 = Access to market information; X_7 = Distance to the nearest markets; X_8 = Experience in tomato farming; X_9 = Irrigable land in tomato; X_{10} = Achievement motivation; X_{11} = Level of Aspiration; X_{12} = Participation in social organization; X_{13} = Participation in non-farm activities; X_{14} = Ownership of water pump.

Econometric model specification of supply function in matrix notation is the following.

$$Y_i = \alpha_i + \beta_i X_i + U_i$$

Where:

Y_i = tomato supplied to the market

β = a vector of estimated coefficient of the explanatory variables

X = a vector of explanatory variables

U_i = disturbance term

Before running the model all the hypothesized explanatory variables are checked for the existence of multi-collinearity and heteroscedasticity. There are two measures that are often suggested to test the existence of multi-collinearity. Namely: VIF (variance inflation factor), Contingency coefficients.

In order to identify factors influencing tomato marketable supply both continuous and discrete variables were hypothesized based on economic theories and the findings of different empirical studies. The dependent and exogenous variables, their definitions, symbols and hypothesized signs are shown in Table 1.

Table 1. Symbol, Definition and Hypothesized sign of Variables

Sl. No.	Definition	Symbol	Type of variable	Hypothesized sign (influence on dependent variable)
1	Tomato quantity supplied (2016) in quintals	QUANS	Continuous	Dependent
2	Education level of household head (1=illiterate, 2=read & write, 3=primary cycle, 4=secondary cycle, 5= tertiary cycle, 6=preparatory, 7=higher)	EDUCA	Discreet	(+)
3	Family Labor (man equivalent).	LABOR	Continuous	(-)
4	Farm experience of household (years).	EXPER	Continuous	(+)
5	Utilization of credit (1=if yes; 0=otherwise)	UTLCR	Dummy	(+)
6	Farmers' participation in social organization in score.	PRTSC	Continuous	(+)
7	Participation in income generating non-farm activities (1=Yes, 0=No)	OFFRM	Dummy	(+)
8	Distance of the respondents' house from input and output market (km).	DSTNT	Continuous	(-)
9	Actors getting extension service (1=yes; 0=no)	EXSINC	Dummy	(+)
10	Awareness of price information (1=Yes, 0=No)	MRTINF	Dummy	(+)
11	Ownership of water pump	H ₂ OPU	Dummy	(+)
12	Irrigable landholding of the respondents in hectare	IRRGL	Continuous	(+)
13	Quantity produced in quintal	PRODU	Continuous	(+)

14	Achievement motivation (1=low, 2=medium, 3=high)	ACHIV	Discrete	(+)
15	The level of aspiration (1=low, 2=medium, 3=high)	LEVEL	Discrete	(+)

Results and Discussions

The estimated volume of production of tomato was about 2777.5 tons and 2759 tons of tomato were sold (only for sample farmers studied). Sampled respondents indicated that 99.33 per cent of tomato produced was marketed and the remaining percentage of total production was accounted for by spoilage, seed and home consumption. Out of the total tomato marketed, 79.9 per cent and 20.1 per cent of tomato was marketed by male and female headed household heads, respectively. The average production of tomato for FHH¹ and MHH² was about 120.97 and 180.58 quintals, respectively, which is statistically significant at 1 per cent probability level ($t=2.66$). MHH have on the average about 2.83 man-equivalent of family labour while FHH had 2.11 man-equivalents. The average total land sizes under tomato were about 0.54 and 0.32 ha for MHH and FHH, respectively. MHH have on the average about 16 years of tomato farming experience while FHH have 5 years of experience, which was significant at 1 per cent probability level ($t=8.57$). This indicates that MHH had higher tomato farming experience compared to FHH (Table 2). The analysis of field data shows that there is significant difference between FHH and MHH producers in participation in different social organizations ($t=9.39^{***}$). The average age of male household heads was 38.32 years compared to 40.22 years for female heads. This difference was not statistically significant. Although not significant statistically ($t=0.58$), female-headed households have travelled shortest distance from the nearest market (6.86 km) than the male-headed households (7.34 km).

Table 2. Socio-demographic Characteristics of Tomato Producers

Lists of Variables	FHH (N=46)	MHH (N=123)	All cases (N= 169)	t-value
Age of the respondent (yrs)	40.22	38.32	38.83	-1.13
Family labor (no./hh)	2.11	2.83	2.63	2.78***
Distance (km)	6.86	7.34	7.21	0.74
Experience in tomato farming (yrs)	4.96	15.89	12.91	8.57***
Total land holding (ha)	0.90	2.51	2.07	4.68***
Total land covered by tomato (ha)	.3157	.5372	.7567	3.43***
Production of tomato (q)	120.97	180.58	164.35	2.66***
Sold tomato (q)	120.30	179.31	163.25	2.65***
Participation in social org. (no.)	3.65	6.96	6.06	9.39***

Source: Own survey (2016) ***=Significant at 1% probability level, respectively.

¹Female-headed households.

²Male-headed households.

About 89.1 per cent of FHH and 78.9 per cent of MHH had visits from extension agents during the last production season. Majority of the FHHs (89.1%) did not take credit compared to their MHH counterparts. Regarding ownership of water pump, 52.2 per cent and 21.1 per cent of FHH and MHH respondents had water pump, respectively. In the case of market information, 23.9 per cent of FHH and 6.5 per cent of MHH respondents had got market information. This shows that FHH has more access to market information and ownership of water pump as compared to MHH in the area. The Chi-square statistics is evidence for the presence of statistical difference between the two groups at less than 1 per cent significance level. The chi-square test also indicates that there is a significant difference regarding participation in non-farm activities at 5 per cent significant level ($\chi^2=5.07$) between the two groups. Eighty-nine per cent and seventy-nine per cent of FHH and MHH respondents had extension contact (Table 3). There is no significant difference between the two groups in contact with extension agent.

Table 3. Socio-economic characteristics of Tomato Producers

Lists of Variables		FHH (N=46)	MHH (N=123)	All cases (N=169)	χ^2 -value
Extension	Yes	89.1%	78.9%	81.7	2.36
	No	10.9%	21.1%	18.3	
Credit	Yes	10.9%	30.1%	24.9	6.62***
	No	89.1%	69.9%	75.1	
Water pump	Yes	52.2%	21.1%	29.6	15.48***
	No	47.8%	78.9%	70.4	
Market information	Yes	23.9%	6.5%	11.2	10.17***
	No	76.1%	93.5%	88.8	
Non-farm	Yes	39.1%	58.5%	53.3	5.07**
	No	60.9%	41.5%	46.7	

Source: Own survey (2016) ***, *=Significant at 1% and 10% probability level, respectively.

The result of this study indicated that, level of aspiration is a strong desire or an ambition to achieve something. FHH respondents were put under three categories of level of aspiration. Based on this, 23.9 per cent, 15.2 per cent and 60.9 per cent had low, medium and high level of aspiration, respectively. MHH were rated as low (52.0%), medium (22.8%) and high (25.2%) level of aspiration. Achievement motivation was defined as the need in an individual to perform different roles with some degree of excellence. As presented in Table 4, the MHH respondents were put under three categories of achievement motivation. Based on this, 35.8 per cent were under low achievement motivation, 21.1 per cent under medium achievement motivation and 43.1 per cent were identified as high achievement

motivated categories. This indicates the existence of difference between them with respect to level of aspiration and achievement motivation, which is significantly different at 1 per cent and 10 per cent probability level, respectively. The findings of this study concur with the study done by Derby (2007).

Table 4. Psychological Characteristics of Tomato Producers

Lists of Variables		FHH (N=46)	MHH (N=123)	All cases (N=169)	χ^2 -value
ACHVE	Low	54.3%	35.8%	40.8	4.78*
	Medium	15.2%	21.1%	19.5	
	High	30.4%	43.1%	39.6	
LEVEL	Low	23.9%	52.0%	44.4	19.09***
	Medium	15.2%	22.8%	20.7	
	High	60.9%	25.2%	34.9	

Source: Own survey (2016) ***=Significant at 1% probability level, respectively.

As indicated in Table 5, the majority (41.3%) of FHH are illiterate while only 2.4 per cent of MHH are illiterate. The Chi-square statistics is evidence of presence of statistical difference between the two groups ($\chi^2=60.97$, $p=0.000$). This is in agreement with most studies (Derby, 2007).

Table 5. Educational Level of the Sampled Tomato Producers

Education of HHH	FHH (N=46)	MHH (N=123)	All cases (N=169)	χ^2 -value
Illiterate	41.3%	2.4%	13.0	60.97***
Read & write	30.4%	13.0%	17.8	
Primary cycle	15.2%	31.7%	27.2	
Secondary cycle	10.9%	34.1%	27.8	
Tertiary cycle	2.2%	13.0%	10.1	
Preparatory	0	2.4%	1.8	
Higher	0	3.3%	2.4	

Source: Own survey (2016) ***=Significant at 1% probability level, respectively.

The estimates of the multiple linear regression models for male and female headed households are presented in Table 6. All the market supply functions were found to be significant as evidenced by significant F-value at 1% level of probability (Table 6), implying the null hypothesis stating that all the coefficients of explanatory variables are zero is rejected. The adjusted coefficients of multiple determinations indicate that the variation in tomato quantity sold per quintal associated with the factors of market supply specified in the models was 99 per cent, in MHH, FHH and pooled data set.

Table 6. Determinants of Tomato Quantity supplied to the Market

Variables	Pooled (N=169)		MHH (N=123)		FHH (N=46)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
EDUCA	0.046	0.8	0.090	1.12	0.059	0.83
LABOR	-0.130	-2.62***	-0.119	-1.94*	0.135	1.33
DSTNT	-0.031	-1.22	-0.015	-0.51	-0.099	-2.03**
EXPER	0.002	0.28	0.010	0.91	0.141	3.32***
IRRGL	-0.205	-0.97	-0.196	-0.87	-0.251	-0.83
PRODU	0.997	612.55***	0.997	587.08***	0.997	621.99***
EXSINC	0.134	0.47	0.125	0.37	0.650	2.11**
UTLCR	0.117	0.67	0.114	0.6	0.191	0.67
H2OPU	0.224	1.46	0.086	0.35	0.384	2.1**
MRTINF	0.095	0.54	0.297	0.95	0.081	0.48
OFFRM	-0.029	-0.17	0.005	0.03	0.064	0.31
PRTSC	0.0034	0.09	0.035	0.8	0.211	1.81*
ACHIV	0.032	0.41	0.049	0.42	0.187	1.41
LEVEL	0.116	1.44	0.037	0.34	0.084	1.06
Constant	-0.522	-1.42	-1.146	-1.71	-2.760	-2.79
Adjusted R ²		99%		99%		99%

Source: Model Output, ***, **, and *significance at 1%, 5%, and 10%, respectively.

As hypothesized, the regression coefficient of tomato production variable was positively related with quantity supplied (marketing) in the market and significantly at 1% probability level in both FHH and MHH. The result shows that a one quintal increase in the tomato production causes a 0.99 quintal increase in the amount of marketed supply among both male and female household heads. Total tomato production influenced the amount of marketed supply of tomato positively showing that farmers who produce more also sell more, which is consistent with the general expectation. This is in line with Abay (2007); Adugna (2009) and Ayelech (2011); who illustrated that an increase of tomato, papaya and avocado production by farming households has augmented marketable supply of the commodities significantly. Experience showed positive effect on tomato quantity sold with significance level at 1%. Thus, the result implied that, as FHH farmer's experience increased by one year, tomato supplied to the market increased by 14×10^{-2} quintals. This is in line with Abay (2007) and Ayelech (2011).

As expected, family labour had a significant and negative impact on tomato quantity sold of MHH. A one per cent increase in the amount of family labour resulted in 0.12 per cent decrease in tomato quantity sold in MHH, keeping other factors constant. This is well supported by Almaz (2012) who indicated that family labour have had significant negative effect on quantity of marketed potato and leafy vegetables.

Similarly as hypothesized, distance to the nearest market is negatively related to quantity of tomato sold by FHH. The results show that distance to the nearest market significantly and negatively affected marketable surplus at 5 per cent level. An increase in one kilometer indicated a decrease in the quantity supplied by 9.9×10^{-2} quintals in FHH. As expected, extension contact influenced marketed supply of tomato positively. On an average, if a FHH tomato producer gets extension contact the amount of tomato supplied to the market increases by 65×10^{-2} quintals. This suggests that access to extension service avails information regarding technology which improves production that affects the marketable surplus. On an average, if a female tomato producer had a water pump, the amount of tomato supplied to the market increased by 38×10^{-2} quintal. This suggests that ownership of water pump improves production status and thereby the level of sales that determines the marketable surplus. As hypothesized, participation of the household heads in social organization positively affected quantity supplied in FHH. An increase in membership in social organization resulted in 21×10^{-2} quintals increase in tomato quantity sold in FHH, keeping other factors constant.

Conclusion and Policy Implications

The study identified factors of tomato volume supply in male and female-headed households in Dugda district, Ethiopia. The data used in this study were collected from 123 male headed households and 46 female headed households randomly selected from eight kebeles of the district. Independent t-test was used to test the differences between MHH and FHH in terms of continuous variables and χ^2 -test for discrete variables. Moreover, multiple linear regression models were estimated to identify determinants of tomato volume supply in MHH and FHH.

The survey result indicates that male headed households had higher tomato farming experience, larger total land holding, higher family labour, better participation in social organization, higher production of tomato and more quintals of tomato sold in the market compared to FHH. The findings of this study also revealed that male headed households were found to have relatively higher achievement motivation, better educational level, better participated in non-farm activities and used more

credit than female headed households. The t-test and the chi-square test results confirmed that female headed households are found to have relatively had water pump, higher level of aspiration and better market information compared to their male counterparts.

The multiple linear regression model results indicate that distance from the nearest market center, tomato farming experience, quantity of tomato produced, ownership of water pump, extension service and social participation played a significant role in tomato quantity supply to the market among female headed household heads. Family labour and quantity of tomato produced played a significant role in tomato quantity supply to the market among male headed household heads.

The results of this study will benefit policy makers and implementers in indicating the area advantage for what should be done to improve tomato production and marketing. Therefore, policy makers should take into account determinants of quantity supplied to the market by female and male headed farmers.

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Agricultural Transition within the ASAL Rural-Urban Continuum in Kenya: a case study of Kajiado County

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Abstract

Diversification into intensive livestock and crop production systems is replacing pastoral way of life in peri-urban Kajiado County due to declining land holding sizes. This study assessed the transition in two ways: (1) the causes of declining land size, areas of agricultural transition and the main influences (2) the benefits and challenges due to the transition. Data was obtained from cross section surveys, focus group discussions and key informant interviews. The study found out that size of the land owned and origin of household whether indigenous or immigrant influenced livestock and crop production system practised. Intensification in livestock production systems that aim to achieve higher returns from declining land sizes like various types of improved breeds and methods of husbandry have been adopted, whereby 90 per cent of the indigenous and all immigrants have improved livestock breeds. Livestock alien to the area like, fish, pigs and poultry and other emerging ones like ostriches have been adopted. Currently 69.1 per cent of indigenous pastoralists practice crop production to ensure food security while the immigrants practise commercial horticulture under irrigation in greenhouses and along rivers. Competition for resources has culminated into conflicts, degradation and low resilience from natural shocks. The continuous adoption and diversification of agricultural systems including the adoption of alternative income-generating activities needs to be guided through capacity building to enhance and ensure ecosystem sustainability given the fragile nature of the arid and semi-arid area that serves as a wildlife corridor.

Key words: Peri-urban pastoralism, intensification technologies, Indigenous and immigrant households

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Introduction

Peri-urban areas are the transitional zones between rural and urban landscapes that experience constant population change and disturbance of traditional social, environmental and economic characteristics. Stockwell *et al.*, (2013) reckon as a result, sustainable community development initiatives are complicated in these fragmented and often contested landscapes. Kajiado County is predominantly arid and semi-arid (Jaetzold *et al.*, 2011). It is endowed with good natural resources like wildlife (borders Nairobi national park and Amboseli game reserve), rivers, pastures, stones and limestone for quarrying, good soils and sceneries. Pastoralism of the semi-nomadic, transhumant variety has been the land use of choice for hundreds of years in the region. However, Kenya has experienced rapid changes in land policies that have transformed former pastoral communal lands into group ranches, individual ranches and private holdings. This is the prevailing situation in Kajiado North. These changes in land tenure systems have led to an emergence of several land-use systems which include rain-fed and irrigated crop agriculture, permanent settlement, quarrying and tented camping sites within private ranches (ECA, 2012; Nyamasyo & Kihima, 2014). According to Berakhi, *et al.*, (2015) in East Africa, the spatial pattern of land use change for the past 30 years has been characterized by increasingly intensively managed landscape. This land loss to agriculture, parks, as well as immigration and land subdivision, are some of the factors causing land fragmentation and loss of pastoral mobility (ECA, 2009). Peri-urban Kajiado North area is experiencing increased fragmentation (Rutten, 2008; Nkedianye *et al.*, 2009) as result of an influx of immigrants and property developers due to the proximity to Nairobi City. This has resulted in increased fencing in the area which in turn adversely affects livestock and wildlife mobility, to access range resources hence compounding the risks of drought in arid areas (ECA, 2009).

Changes in agricultural technology towards helping farmers cope with changes in the environment like climate change and variability, declining land holding sizes and fertility have been adopted in many arid areas in Sub-Saharan Africa (UNDP, 2012). At the same time the Boserupian theory of intensification (Boserup, 1965) due to population growth seems to apply in Kajiado North due the sprawled nature of the study area.

This study was undertaken with the following objectives, (1) to describe the livestock and crop production systems adopted due to declining land sizes (2) to describe the challenges experienced with production systems adopted and food security.

Study setting

The study was carried out in Kajiado North Sub-County of Kajiado County of Kenya. The study area covers 1631.18 KM² and lies between 36° 37'E to 37°8'E, and 1°23'S to 1°49'S. The area receives a bimodal regime of rainfall, short rains in October-December and long rains in March-May. The annual average rainfall is between 300 and 1300mm, but it is mostly unevenly distributed and unreliable. Temperature varies between 13 °C and 25 °C throughout the year. The Sub-County is largely semi-arid thus suited for ranching activities and early maturing crop varieties. The soils are too stony to retain moisture and the rainfall amounts only support crop production if distributed well (Jaetzold *et al.*, 2011). The Maasai form the predominant indigenous pastoral households undergoing transition while the Kikuyus, Kambas, Kisiis are the immigrants who have introduced intensification agricultural production systems to the area.

Materials and Methods

Quantitative data collection

A cross-sectional study design was used to measure the variables at a single time. A pre-tested questionnaire comprising of open ended and closed questions was administered to households. The household was the sampling unit. A sample size of 420 respondents was randomly drawn from the study area for household interviews. Households selected included both immigrant and indigenous populations.

Qualitative data collection

Qualitative data was collected by way of Focus Group Discussion (FGD) and Key Informant Interviews (KII) conducted through use of question guides developed and refined during pre-testing. Sampling of informants was done purposively to include community members who had the desired characteristics.

Data Analyses

Comparative descriptive statistical analyses were done with respect to origin and physical location of respondents. Using content and thematic analysis (Vaismoradi *et al.*, 2013), the qualitative data were coded and logically organized into a matrix of related issues following the steps outlined by, (Lacey, 2007; Saldana, (2009), The emerging themes described trends in agricultural production systems, challenges and coping strategies adopted to ensure food security in the community for the period 1980-2010.

Results and Discussion

In the analysis, physical location was categorized to; urban which refers to sub-locations within 1-4 km radius from a town or commercial setups, rural at least 5 km from urban set-ups and urban/rural sub-locations that stretch from the urban to the rural. Figure 1 gives the breakdown as to how the questionnaire was administered with respect to physical location.

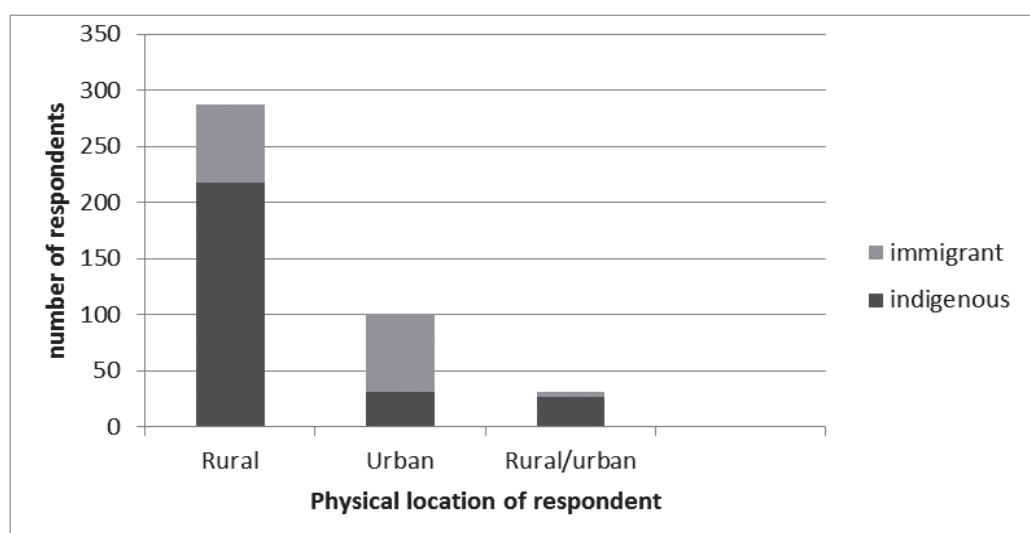


Figure 1: Distribution of sampled households by physical local and origin in the survey

The urban areas had few households doing farming as compared to the rural areas.

Causes of Declining Land Size

The survey revealed that fragmentation was the leading cause of declining land size followed by degradation. The survey results of the average land size owned by each ethnic group with respect to each physical location is given in Table 1.

Table 1. Ethnic Group and Acres owned in each Location Type

Physical location	Ethnic group/average acres owned									
	Indigenous		Immigrants							
	Maasai		Kikuyu		Kisii		Kamba		Others	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Urban	188	58.99	5.5	1.65	0.4	0.06	0.25	0	4.3	1.35
Urban/rural	145	45.97	41.6	13.6	0.1	0	-		-	-
Rural	185	57.67	12	3.83	0.9	0.22	0.35	0	17.1	5.594

The indigenous own on the average 145-188 acres of land with spread range from 5 to 400 acres while the immigrants own from less than one acre to about eighty acres. Considering the pastoral nature of the area these sizes are not adequate to support family livelihood from pastoralism alone hence the need to diversify to other income generating activities. The results are consistent with those of Nkedianye *et al.*, (2009) on fragmentation of Kajiado whereby the current holding sizes are not adequate for pastoralism way of life.

KII from Kitengela and Ongata Rongai Division revealed that some indigenous people sell their land and use the proceeds to buy larger pieces far from the urban areas where they hire workers to herd livestock. Alternatively, they use the proceeds to construct a commercial building which ensures that the household has guaranteed income for their needs. The practice started from around the year 2000 and proportional piling placed adoption at 5 per cent. With the appreciation of land value more indigenous people are getting influenced by their peers to follow suit.

Hiring of grazing land outside the division is a common practise adopted by some households to mitigate lack of pastures. Proportional piling during interviews from all four divisions revealed that, 20-30 per cent of the indigenous farmers hire farms where they graze during periods of adversity, meanwhile 50-70 per cent of immigrants who do commercial dairy production hire land for fodder production either in or outside Kajiado North district. These results show that mitigation measures must be put in place to sustain livestock production as land sizes for grazing decline. Livestock spreading was adopted by the indigenous in Kajiado North to mitigate adverse weather conditions; this involves the division of the herd into smaller numbers and driving each of them to a relative or friend where they are looked after together with the host's herd. In so doing, they expect to reduce the risk by keeping their wealth in different baskets while increasing chances of survival of at least some of them if the rains fail. The areas that were common for spreading were Northern Tanzania, Mashuru, Namanga and Magadi.

The size of land owned and origin of respondent influences livestock production system adopted. The survey revealed that nomadic system is practised by 65.9 per cent for cows, goats 63.8 per cent and sheep 67.3 per cent. With regard to land size owned, nomadism was practised by about 95 per cent of those with large sizes (>140 acres) of land with no fences mainly located in the rural areas, while those with less than 20 acres have fenced the land and use mixed methods. In the rural/urban to urban areas livestock production is practised in a transitory manner, 7 per

cent do pure nomadism for cows and 8 per cent for sheep while others have their land divided into paddocks for efficient utilization of pastures with little or no trespass. Tethering of livestock is practiced by few farmers 3.5 per cent, while zero grazing of cows is practiced by 6.5 per cent of the immigrants in urban areas. The results demonstrate that as land size decreases, there is a transition from extensive to intensive livestock production systems. The range of livestock production systems are in line with those described by (IUCN, 2010; Otieno, 2013) which takes into consideration the land holding sizes and prevailing climatic conditions.

Fragmentation has led to increased incidences of interaction leading to resource use conflict among livestock, wildlife and residents as indicated by 35 per cent of the survey respondents. A KII said there was rampant “Human-wildlife conflict in Kitengela area bordering the Nairobi National park and the wildlife corridor, as residents’ experience livestock loss to the big cats. FGDs revealed varied types of conflicts in all divisions in the study area; Conflict from trespassing neighbours’ animals (goats, cows, sheep and chicken) is widespread. The population of goats has declined over the years due their ability to trespass and in fact KII revealed that they were considered as enemies of development. According to KII from Sholinke, livestock predation and crop destruction has increased over the years whereby monkeys and baboons from the national park have turned into pests that attack chicken, taking chicks and eggs hence affecting production. Putting scare crows, embracing firm fencing and security enhancement have been adopted in mitigation. The results demonstrate that declining land sizes and encroachment to wildlife corridor have lead to stiff competition for resources resulting into conflict. As per our findings this human wildlife conflict losses erode the farmers’ diversification economic benefits as confirmed in similar studies in Kenya (Waweru & Oleleboo, 2013; Hariohay & Roskaft, 2015).

Inability to cope with natural shocks was ranked second by the household heads who identified drought, disease and drought mitigation expenses as the main challenges that sometimes lead to livestock loss. This is compounded by the declining land holding sizes that produce inadequate pastures and encroachment on dry season grazing areas. The results are consistent with previous findings by, Nkedianye *et al.*, (2011) that associated the loss to competition for land resources between livestock, wildlife and human development activities. Interviews revealed that incidence of diseases had increased even though use of veterinary medicine was at 64 per cent. This was attributed to congestion and decreased mobility which is in line with findings of Ogutu *et al.*, (2014). Our findings revealed that there

were mobility constraints due to fences and this is consistent with those of Orindi *et al.*, (2009) and Nkedianye *et al.*, (2011) who attributed fences to high population density. Our findings revealed that as the Maasai become more sedentary doing agro-pastoralism with fences, they tend to develop and maintain few, close ties in sharing resources especially water and pastures. The communal way of sharing resources is declining over the years as confirmed from earlier studies (Nkedianye *et al.*, 2009) this is compounded by trespass and human wildlife conflicts.

The current status of land was considered degraded by 34 per cent of the respondents which they attributed to increased human activities like cultivation, waste disposal, erosion due to livestock traction to common watering points and introduction of invasive species, un-rehabilitated stone and gypsum quarrying mines. The results are also consistent with previous findings by, Maitima *et al.*, (2010) and AU-IBAR (2012), where environmental degradation is a major issue in intensifying systems especially ASAL lands with low productivity potential, poor soils and poor physical characteristics which are aggravated by increasing human and livestock populations as is the case in Kajiado North.

Field observations identified pasture degradation due to overgrazing and encroachment by invasive species (*Opuntia* and *Ipomoea*) leading to existence of poor quality pastures in the rural locations of Kajiado North. These results are consistent with those of Kidake, *et al.*, (2015) about *Ipomoea* species invasion in Southern Kajiado. In three rural sub-locations, households had abandoned their homesteads due to the invasion by the thorny and prickly *Opuntia* species. The two weeds affect pasture quality and quantity since they are not palatable. Pavanello & Levine (2011) argue that pastures quality goes beyond the species composition and the presence of palatable or poisonous plants and amounts to pasture degradation as observed in the field.

Uncontrolled extraction of natural resources namely; water abstraction, forest products, quarrying and mining have degraded the environment. KI Interviews revealed that infrastructure provision like electricity and lack of strict adherence to borehole drilling guidelines had resulted in drilling within close proximity. This lead to drying of many shallow wells. These findings are in line with those of Rutten & Mwangi (2012). Both genders are affected by the lack of adequate water for domestic use and agricultural production activities. Uncontrolled stone quarrying activities in Noompopong area of Oloosirkon location and excavation of limestone by the cement manufacturing factories at Ilipolasat area had resulted

in a lot of land degradation. Meanwhile no crop or livestock production activities can take place in these areas as a lot of inert waste is left behind which can remain bare sometimes for up to ten years hence contributing to a decrease in browsing and grazing areas.

Transitions in Livestock Production

Several farmers had done herd improvement changes over the years and results are presented in Figure 2.

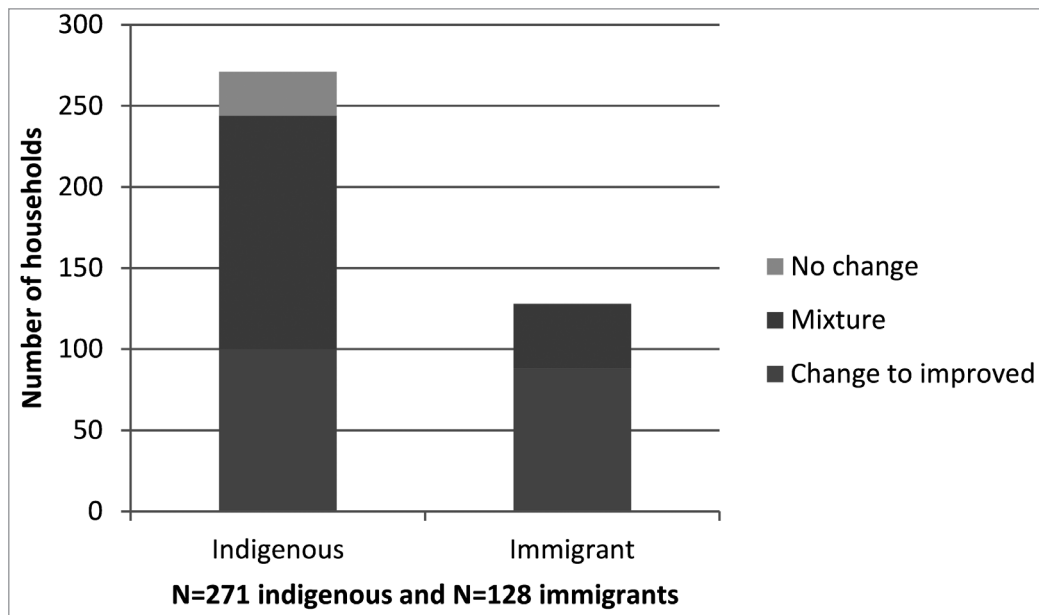


Figure 2: Livestock improvement changes with respect to origin

Transitions were in herd improvement and production systems to improve productivity from the declining land holding sizes; in addition there was an emergence of non-conventional livestock. The survey results indicate that most immigrants keep improved cattle (69%) while 31 per cent keep a mixture of breeds. Cross breeding is an adaptation to harsh climatic changes, at the same time achieve higher yields per unit area. FGD interviews revealed that majority of the indigenous farmers used to keep 100 per cent indigenous animals in the 1980s but currently 36 per cent keep improved breeds, 53 per cent keep mixed breeds and only 10 per cent keep pure indigenous livestock. This shows the transition to livestock that have higher returns to support household livelihoods as land size declines. In addition to dairy, poultry and pigs were kept on commercial basis by 5 per cent of urban immigrant farmers. FGD and KII interviews revealed that

improved livestock breeds with high returns per unit area are now kept by both the indigenous and immigrants. Sahiwal and Simmental dual purpose cows were introduced in 1986 for breeding in collaboration with Kenya Agricultural and Livestock Research Organization (KARLO) Naivasha to provide better yields of both meat and milk as opposed to boran. “Sahiwal skin colour is referred to as “rangi ya pesa” (meaning the colour of money when it comes to household herds). This implies that whoever has the Sahiwal herd has breeds of high value compared to others. These results are consistent with research attributes identified by Ilatsia *et al.*, (2011) in Kenya and Zafar *et al.*, (2008) in Pakistan the origin of Sahiwal breed of cattle. Before 1986, most farmers had the red Maasai sheep after which the residents adopted dorpers. A breeding centre for dorpers was established at Maasai technical Institute in 1985 which made accessibility easy. Naivasha shoats breeding centre was an alternative source for quality dorpers for farmers. Interviews revealed that the dorper sheep is well adapted to climate, requires less herding labour, provides milk when cows migrate and gains weight fast thus yields better market returns. These results are consistent with those of Audho *et al.*, (2015) and Nyangito *et al.*, (2009).

Despite these changes climate variability leads to inadequate pastures due to drought. Livestock migration, controlled breeding in addition to buying hay and water are the coping strategies adopted. Herders control breeding of shoats through use of plastic barrier (*‘echoniolmeregeshi’*) fixed on males to hinder mounting to avoid bearing of young ones during the dry periods. These results are consistent with those of IOM on migration of livestock due to drought (Liljestrand, 2012; IOM, 2010). During the drought when cows have migrated they use acacia seeds to feed goats. This enhances household food security. In Oloyaingilani Female FGD the respondents revealed that they shake the yellow acacia trees to drop the seed pods which are rich in nutrients to be used as feed. The goats get water once or twice in a week. This is adequate for them to be able to get enough milk for the family. The family sometimes feeds once a day during times of scarcity. These results are consistent with recommendations on the nutritive capacities of acacia by Dubey (2007). In general, the findings reveal a transition from extensive way of animal production to intensive ways of production that ensure high returns from declining land holding sizes through adoption of better yielding breeds and diversification.

Adoption of Commercial Exotic Breeds by Immigrants

The survey revealed that immigrants in the urban sub-locations were doing well with intensive livestock keep systems whereby they have ventured into exotic dairy cows, broilers, layers, pigs and fishing farming in earthen ponds. In the rural/urban to urban areas livestock production is practised in a transitory manner, few about 7 per cent do pure transhumant nomadism for cows and 8 per cent for sheep while others have their land divided into paddocks for efficient utilisation of pastures with little or no trespass. Tethering of livestock is practiced by few farmers (3.5 per cent), while cows' zero grazing is practised by immigrants in urban areas at 6.5 per cent. Accumulative total of 19.2 per cent immigrants practise zero grazing system for all livestock as opposed to indigenous who do only 4% per cent total. These results are similar to those of Munyasi *et al.*, 2012 on non-traditional land use practices in Oloitokitok sub-county of Kajiado. Field observation and key informant interviews revealed that; most immigrants practice livestock production systems suitable under factors in consideration; (a) *security*; when they keep indigenous cows, they get stolen hence they keep dairy under zero grazing to cushion themselves, (b) *target market*; the immigrants carry out production with a particular market target especially dairy cows, broilers, layers, pigs and fish, therefore to get good returns they practice intensification. These results are consistent with those of IUCN, 2010 on intensification of peri-urban areas in Africa. The exotic breeds adopted make it easy for the households to house them in relevant structures, hence easy to achieve the desired security, at the same time the urban dwellers create a market niche for their products as opposed to the indigenous population.

Emerging Livestock

Kitengela division has a farm/picnic resort that rears ostriches, a venture that the indigenous never thought was possible, meanwhile fish ponds are sited near water sources like boreholes and rivers. Currently there is one certified breeder in Kisaju area of Isinya who supplies fingerlings to farmers. The farmers consist of both indigenous and immigrants who benefited from the economic stimulus project of the Ministry of Fisheries from 2009. Contrary to what had been reported earlier on improved agricultural activities by Homewood *et al.*, (2012) fish and wildlife rearing especially quails and ostriches are new income generating ventures. The demand for these products by the urban dwellers leads to increased adoption by both the immigrants and indigenous as alternative

sources of income generating activities. The ventures also require less space as compared to pastoralism hence making them more suitable in the case of prevailing declining land holding sizes.

Transition to Crop Production

Most crop producers are immigrants as 92.4 per cent participate while only 69.1 per cent of the indigenous do crop production. Majority of indigenous crop producers reside in the rural sub-locations while the immigrants are mainly located in the rural and urban areas. The rural- urban locations had the least number of crop producers. Proportional piling results during FGDs revealed that most of the immigrants 90 per cent originate from high potential areas and are used to crop production; with the introduction of simple green houses in 2009 and availability of borehole water, they ventured into commercial horticulture production with the aim of targeting Nairobi and nearby urban centres for the market. This is what is greatly contributing to the observed transition to crop production. In addition, the immigrants who own small acreage 1-10 do mixed commercial farming whereby they keep dairy animals, pigs, fish ponds, rabbits, poultry in addition to green houses and open field irrigation. Even though the yields from crop production are not assured due to the marginal nature of the area, the residues from crop failure are used to supplement livestock feeding among the mixed farmers.

Qualitative interviews revealed that agro-pastoralism is on the increase whereby more indigenous people do crop production because it supplements livestock feeding under livestock intensification production system through crop residues and products of crop failures. Others felt that “crop production by indigenous was adopted due to influence from immigrants who made them realise that with little effort one can achieve good yield from previous livestock pens”. The indigenous site the cultivated plot below the cow sheds in a gently sloping area. During the rainy season erosion of manure fertilizes the field with little effort resulting in high yields. Our findings are in agreement with those of Nyangito, Musimba, & Nyariki, (2009) and Reid, *et al.*, (2008), that demonstrated pastoral households use crop agriculture to support pastoralism, by reducing the need for the family to sell livestock to buy grains during dry periods.

Crop Production Intensification Technologies

Intensification technologies observed were; greenhouses, irrigation, use of improved seeds, fertilizer and crop protection chemicals. The survey revealed

that use of improved seeds had been adopted by 76 per cent of the producers, 41 per cent use fertilizer, 28 per cent use crop protection chemicals and 21 per cent had a sustainable source of irrigation water. These results are consistent with studies by Nicol, *et al.*, 2015, whereby they found out that rain fed and irrigated crop production had increased in the East African pastoral areas. Irrigation in greenhouses was practised by 33 per cent of the producers while 23 per cent did open field irrigation. All producers engaged in rain fed crop production to some extent. Participants in KII identified emerging new technologies like greenhouses and drip irrigation to have introduced farming ventures that were not seen in the area before 1990. Basic greenhouse structures emerged as a new technology for adoption from 2009 for horticultural production, a technology disseminated by the Extension Officers whose adoption was enhanced by water availability from boreholes and shallow wells.

In a bid to ensure food security and nutrition some Non-Governmental Organizations (NGO) like, Farajaratia team-up with the government to augment household food supplies through supply and establishment of kitchen garden irrigation kits. Further, Lynn (2009) argues that despite the risk of crop failure in this semi-arid ecosystem, cultivation is an important component of contemporary pastoral livelihoods, boosting food production, maintaining livestock herds, and buffering household vulnerability which was confirmed by qualitative interviews. Changes in social, economic and cultural norms due to interaction between the indigenous and immigrants are causing a shift in food production and consumption habits in Kajiado North. A similar scenario has been witnessed in Tanzania pastoral areas, (Lynn, 2009; McCabe *et al.*, 2010; Sangeda & Malole, 2014) where pastoralists adopted crop production due to changing cultural and social norms to be food secure. Crop failures due to climate variability and inadequate crop production skills were impacting negatively on food security. Research by, Nkedianye *et al.*, (2009) showed that diversification into cropping appeared to be quite a shaky option, with many households not getting a harvest even in a year considered to be a 'good rainfall year.' In semi-arid Ethiopia, Desta & Coppock (2004) report, decline in household per capita cattle holdings and population pressure led to diversification to crop production to achieve food security even though there were high chances of crop failure which relates to the situation in Kajiado North as per our findings. One positive finding from interviews is that crop failure products complement livestock fodder.

The survey established that the simple green house technology was adopted mainly by immigrants for horticultural crop production but many failed due to several reasons as shown in figure 3.

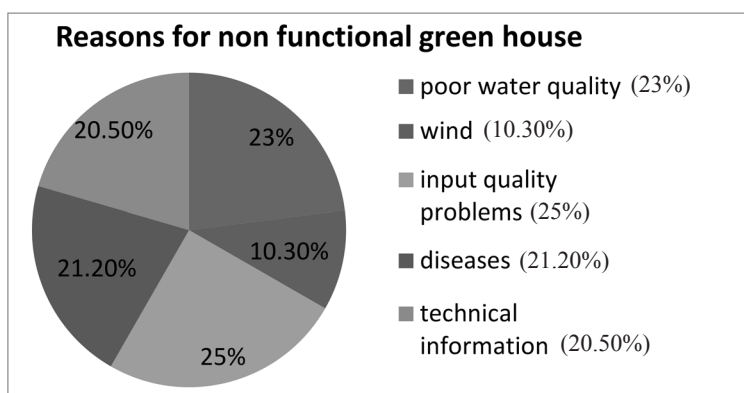


Figure 3. Reasons for failed Greenhouse Project

The area being a rangeland has no wind breaks; hence 10.3 per cent of the greenhouses were blown off by strong winds. Planting of trees and putting up soil conservation structures at relevant areas had been adopted in mitigation after capacity building by the Extension Officers. Boreholes were the main source of water used in drip irrigation by small scale farmers even though it was saline in many cases and leading to decreased yield in subsequent seasons. Aggressive marketing agents who promise a lot but are unavailable as revealed by FGDs in Ongata Rongai and Kitengela; “Some companies dealing with supply and construction of greenhouse promise training and extension services, but these are not normally forth coming leading to crop failure”. Use of old and unsanitary greenhouse papers from flower farms which are not effective and sometimes come with diseases was a common cause of crop failure due to lack of adequate information. Planting of wrong crops in greenhouses e.g. onions and spinach which take up to three-six months with low returns in comparison to inputs/what alternative crops can give from green houses. Poor planning in planting of horticultural crops; harvesting season falls during the glut period in the Country hence farmers do not gain much. These show that good agricultural practices are not followed with regard to greenhouse farming manual guidelines according to De Gannes *et al.* (2014).

Large scale Commercial Greenhouse

The terrain of Kajiado is quite flat, hence a number of commercial greenhouse firms have been established due to the fact that the distance to the Jomo Kenyatta International Airport is only 70 Km away. In total there were six firms covering

approximately 1000 acres, one farm the largest covering 650 acres was doing flowers and herbs for export. Such big greenhouses contribute to decline in pastoral land in addition to limiting accessibility to range resources due to fences. Nevertheless, they create job opportunities for the immigrants and increase the economic activities in the area through increased demand for food that many farmers have transitioned to produce.

Policy Implications and Conclusion

Despite the important role pastoralism plays in supporting livelihoods in range environment of Kajiado, its capacity to adapt to change is facing many challenges due to declining land sizes in addition to those posed by land use/cover change. Decline in land for pastoral livestock production due to fragmentation, population increase and degradation has led to diversification into intensive livestock and crop production in addition to alternative income generating activities. The result is competition for resources and decreased resilience from weather shocks in the fragile semi-arid Kajiado North, as factors like animal diseases, water scarcity, livestock/wildlife conflicts and trespass increase. The indigenous Maasais have adopted crop production to be food secure. However, there is need to build their capacity on areas of planning and crop husbandry to avoid crop failures.

The current state of resource competition is likely to continue and there are gaps in land use planning and capacity of livelihood production activities in agriculture and other sectors. Therefore, there is need for all stakeholders to target increasing capacities in areas of resources utilization that ensures ecosystem sustainability with regard to ASAL areas. Although the results of this study are specific to Kajiado County in Kenya, the approach and findings could be applicable to other peri-urban arid and semi-arid areas in the region.

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Stage-Wise Use of Mass Media in Adoption of BRRI Dhan28 by Farmers of Munshiganj District in Bangladesh

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Abstract

Mass Media Channels (MMCs) play a significant role in technology diffusion. A major part of technology diffusion is innovation-decision, which consists of some stages. Researchers of transfer of technology have so far conducted studies only on effectiveness of MMCs. Use of MMCs at different stages of innovation-decision process was not focused in-depth. The researchers of the present study undertook research highlighting the objectives of determining and describing the stage-wise use of mass media by the farmers in adoption of BRRI dhan28 and exploring the relationship between stage-wise use of MMCs and their selected characteristics. Data were collected from 90 farmers of five villages of Gazaria Upazila under Munshiganj district of Bangladesh, by using a structured interview schedule. The results demonstrated that 95.5 per cent of the respondent farmers had low to medium use of MMCs, 83.30 per cent had medium to high use, 71.10 per cent had low use, 62.20 per cent had medium and 72.20 per cent had low use of MMCs at knowledge, persuasion, decision, implementation and confirmation stages of innovation-decision process, respectively. Television was found to be highly used in every stage of innovation-decision process followed by radio, leaflet, poster and newspaper. The findings also revealed that age, family size, farm size and annual income of the farmers had significant positive relationship with their use of MMCs at different stages of innovation-decision process. On the other hand, education, organizational participation, cosmopolitaness, innovativeness, attitude towards innovation and problems in using innovation had significant negative relationship. Conclusion could be drawn that in transfer of technology, diffusion agencies should have a clear understanding about 'preferences of stage-wise use of mass media channels of farmers at various stages of innovation-decision process emphasizing on socio-economic characteristics.'

Key words: Use of mass media, innovation-knowledge stage, persuasion stage, decision stage, implementation stage, confirmation stage.

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Introduction

A number of agricultural research organizations have their involvement in technology generation in Bangladesh. Among them the Bangladesh Rice Research Institute (BRRI) is the dominant one. Research institutes develop technologies for the farmers - the ultimate users; unless they use them properly the objectives of technology generation will go in vain. So, the technologies developed by the research institutes must be diffused among the ultimate users. Diffusion of innovation is deployed through innovation-decision process (IDP) which consists of five stages. Rogers (1983) defined IDP as “the process through which an individual (or a decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.” Research institutes seek diffusion agencies to take their technologies to the door step of farmers. Diffusion agencies receive technology through the collaboration system and seek the client system to diffuse it. In simple words it can be said that research institutes develop technologies, diffusion agencies diffuse them among the farmers for their use.

In the extension system of Bangladesh, Department of Agricultural Extension (DAE) organizes the communication system through which farmers gain knowledge about the use of technologies and gradually decide to adopt and implement it in the field. DAE has the mandate to disseminate the technological information among the farmers at the right time, that is, right technology at the right time to the right farmers in the right ways. DAE reaches the client system with technological information through MMCs and interpersonal channels (IPCs). Roy *et al.* (2006) in their study found that MMCs were medium to highly effective among 85 per cent of the farmers in adoption of rice production technology. Anisuzzaman (2003) showed that among the MMCs radio plays a vital role in communicating information. The next important media were progressive farmers, television, and result demonstration for adoption of all the practices of rice production technologies. Nuruzzaman (2003) demonstrated that television had been used more by the farmers in receiving information than any other media like radio, folk song, agricultural fair, poster, newspaper and leaflet or bulletin. In most of the cases the effectiveness of extension educational programs depends to a large extent on the proper selection and use of MMCs which show better results in creating awareness and increasing knowledge and adoption among the audience of low knowledge, attitude and practice levels (Adhikarya, 1994). In 1994, Schramm

in his study entitled 'Mass Media and National Development' points out why radio and television should be particularly useful in rural development programs. According to him, it covers a great distance and leaps all kinds of natural barriers; it is swift in reaching a listener/viewer. It is the cheapest of the major media in terms of production and reception can also be inexpensive. Mass media provides necessary information for the farmers to help them change their way of cultivation from traditional to modern. Increase of per unit production of any crop cannot be attained without a sound communication system. MMCs, namely, radio, television, magazine, newspaper, leaflet, booklet, publication and poster play an important role especially in the awareness and interest stages of IDP (Kashem and Jones, 1995). Messages through mass media can motivate, stimulate, induce and change the basic attitudes of the people across cultural and age levels.

The stage-wise use of MMCs in adoption is very important. Awareness is the first step of knowledge development. Research institutes are constantly developing technologies and MMCs are constantly spreading knowledge among the farmers. But there is no sufficient empirical research to show the extent of stage-wise use of mass media in adoption of technologies. In view of the foregoing discussion, the framework of this study stems from 'mass communication media' which is of great concern to national policy makers. Through MMCs any message can be diffused within a very short time. From the research point of view it is not possible to involve all the media in a single study for all the technologies. This research is confined to a few media, namely, radio, television, newspaper, poster, leaflet and one technology that is BRRI dhan28 developed by BRRI. It is one of the most popular as well as widely diffused Boro rice varieties in Bangladesh released in 1994. Thus, the purpose of the study is to have answers to the following research questions:

1. What are the characteristics of rice farmers who adopted BRRI dhan28?
2. To what extent MMCs are used at different stages in adoption of BRRI dhan28?
3. What are the preferences of mass media at each stage of innovation-decision process?
4. What relationship exists between the selected characteristics of the farmers and stage-wise use of mass media in adoption of BRRI dhan28 technology?

Methodology

Gazaria Upazila of Munshiganj District of Bangladesh was purposely selected as the area of the study. Gazaria Upazila has 8 unions, out of which Imampur union was selected purposively. Imampur union has 16 villages; out of these five villages were selected randomly. These five villages constituted the locale of the study. The researcher with the help of local leaders and concerned Sub Assistant Agricultural Officer prepared an updated list of all the BRRI dhan28 growers from the study villages. The total numbers of farm families in these villages was 900, which constituted the population of the study. The sample size was determined by following Moral (2011) formula, where 10 per cent margin of error was considered. Thus, the sample size became 90. The entire process of data collection took about a month - from August 25 to September 25, 2015. The methodology followed for measuring the dependent and independent variables are described below.

Measurement of Independent Variables

The selected characteristics of the Boro rice farmers such as i) age, ii) education, iii) family size, iv) organizational participation, v) innovativeness, vi) cosmopolitaness, vii) farm size, viii) annual income, ix) attitude towards BRRI dhan28 and x) problems in using BRRI dhan28 were the independent variables. Age of the respondents was determined by the number of years from their birth to the time of data collection. Education of a respondent was measured in terms of classes passed by him in the formal education system. Family size of a respondent was determined in terms of total number of members of each respondent family. Organizational participation score of a respondent was measured by considering the nature and duration of involvement in different organizations. Cosmopolitaness of a respondent was measured by computing cosmopolitaness score on the basis of place and frequency of his visits to external / outside of his own social system. Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of the social system (Rogers, 1995). Innovativeness of a respondent was measured on the basis of adoption of six improved agricultural technologies by the respondents. Farm size was estimated in terms of full benefit to the respondent. Income of a respondent was measured by assigning one score for one thousand taka. Attitude towards BRRI dhan28 of a respondent referred to his feeling, belief and action tendency towards BRRI dhan28. Likert-type scale was used to determine the attitude towards BRRI dhan28. The extent of problems faced by the farmers in adoption of BRRI dhan28 was measured in relation to different aspects of the problems.

Measurement of Dependent Variables

Adoption or innovation-decision process comprised five stages viz., a) knowledge stage, b) persuasion stage, c) decision stage, d) implementation stage and e) confirmation stage (Rogers, 1983). Use of mass media at each stage was the dependent variable of the study. To measure the use of MMCs at each stage, five mass media, namely, radio, television, newspaper, poster and leaflet were selected and a five point (0-4) rating scale was used. Numerical values assigned to the scale were 4, 3, 2, 1 and 0 for high, medium, low, very low use and no use of mass media, respectively.

Five mass media channels were used for different purposes at each stage. The purposes of use of MMCs and their possible range of scores for an individual at each stage are summarized below.

Stage	Purposes of use of mass media	Number of mass media channels	Rating scale	Possible range of scores
Knowledge stage	Existence of knowledge about BRRI dhan28	5	0-4	0-60
	Operational knowledge of BRRI dhan28	5	0-4	
	Beneficial knowledge of BRRI dhan28	5	0-4	
Persuasion stage	Creation of interest toward BRRI dhan28	5	0-4	0-40
	Evaluation of BRRI dhan28	5	0-4	
Decision stage	Trial of BRRI dhan28	5	0-4	0-20
Implementation stage	Full use of BRRI dhan28	5	0-4	0-40
	Solving operational problems	5	0-4	
Confirmation stage	Adoption	Continuance	5	0-4
		Discontinuance	5	0-4
	Rejection	Replacement	5	0-4
		Later adoption	5	0-4

Thus, the MMCs use scores of a respondent could range at knowledge stage from 0 to 60, at persuasion stage from 0 to 40, at decision stage from 0 to 20, at implementation stage from 0 to 40 and at confirmation stage from 0-80. Zero (0) indicates no use and highest score indicates high use of mass media.

To compare the preferences of use of MMCs at each stage, Media Use Index (MUI) for each mass media for each stage was also calculated. A total of 90 respondents

gave their opinion on a five point (0-4) rating scale. Thus, the media use index of a particular media at knowledge stage could range from 0 to 1080 {90 respondents $\times$ 3 purposes $\times$ (0-4) rating scale}, at persuasion stage from 0 to 720 {90 respondents $\times$ 2 purposes $\times$ (0-4) rating scale}, at decision stage from 0 to 360 {90 respondents $\times$ 1 purpose $\times$ (0-4) rating scale}, at implementation stage from 0 to 720 {90 respondents $\times$ 2 purposes $\times$ (0-4) rating scale} and at confirmation stage from 0 to 1440 {90 respondents $\times$ 4 purposes $\times$ (0-4) rating scale}.

Results and Discussion

Selected Characteristics of the Farmers

Farmers use and finally adopt those modern technologies which are suitable for their own socio-economic setup and agro-economic settings. Moreover, farmers' individual characteristics and personal make-up play a vital role in adopting agricultural practices in the overall technology transfer process. A particular technology might prove beneficial or suitable for a farmer but s/he may not be in a position to accept it due to her/his unfavorable attitude and situational factors. The individual characteristics of the farmers may greatly vary and have a great impact on the use of MMCs, particularly radio, television and printed material. The salient features of individual characteristics of the farmers are shown in Table 1.

Table 1 indicates that an overwhelming majority (88.90 per cent) of the respondents were young to middle aged except a few (11.10 per cent) who were old. Among the respondents 90 per cent had primary to above secondary level education, far above the national average. A large proportion (93.30 per cent) of the respondents belonged to medium and small family categories. That means education and population control were emphatically accomplished. The highest proportion (92.30 per cent) of the farmers had small to medium farm size. Similarly, most (87.80 per cent) of the farmers per cent had low to medium annual income whereas only 12.20 per cent farmers had high annual income. More than three-fourths (77.70 per cent) of the respondents had low to medium organizational participation. An overwhelming majority (84.40 per cent) of the respondents belonged to medium to high cosmopolite category while only 15.60 per cent had low cosmopolite habit. Almost three- fourths (74.50 per cent) of the respondents had low to medium innovativeness while only 25.60 per cent of them had high innovativeness. More than four-fifths (81.10 per cent) of the farmers in the study area formed low to moderate favorable attitude towards BRRI dhan28 while only 18.90 per cent of them had high favorable attitude. Almost all (94.40 per cent) of the respondents faced low to medium problem in using BRRI dhan28 while only 5.60 per cent faced high problem.

Table 1. Salient Features of Individual Characteristics of Farmers

Characteristic	Range		Respondents			Mean	SD
	Observed	Possible	Category	Number	Per cent		
Age	25-60	-	Young (up to 35 yrs)	29	32.2	41.01	8.91
			Middle (36-50 yrs)	51	56.7		
			Old (51 and above)	10	11.1		
Education	0-12	-	No education (0)	9	10	6.51	3.95
			Primary education (1-5)	29	32.2		
			Secondary education (6-10)	27	30		
			Above secondary (11-16)	25	27.8		
Family size	2-14	-	Small (2-4)	44	48.9	5.00	2.29
			Medium (5-7)	40	44.4		
			Large (Above 7)	6	6.7		
Farm size	0.14-2.27		Marginal (Up to 0.2ha)	3	3.3	0.81	0.48
			Small (0.21-1 ha)	60	66.7		
			Medium (1.01-2.05 ha)	23	25.6		
			Large (>2.05 ha)	4	4.4		
Annual income	32.50-255		Low income (up to 75)	34	37.8	91.65	47.95
			Medium income (75-150)	45	50		
			High income (more than 150)	11	12.2		
Organizational participation	0-20	-	No participation (0)	19	21.1	5.26	3.77
			Low participation (up to 6)	40	44.4		
			Medium participation (7-12)	30	33.3		
			High participation (Above 12)	1	1.1		
Cosmopolite-ness	4-20	0-27	Low (<7)	14	15.60	9.5	3.67
			Medium (7-13)	66	73.30		
			High (>13)	10	11.10		
Innovative-ness	2-22	0-24	Low innovativeness (2-8)	32	35.6	11.78	5.00
			Medium innovativeness (9-15)	35	38.9		
			High innovativeness (Above 15)	23	25.6		
Attitude towards BRRi dhan28	17-37	10-50	Low favorable (17-23)	34	37.8	25.78	6.00
			Moderate favorable (24-30)	39	43.3		
			Highly favorable (31-37)	17	18.9		
Problems in using BRRi dhan28	3-15	0-27	Low severity (3-6)	36	40	6.42	2.60
			Medium severity (7-10)	49	54.4		
			High severity (>11)	5	5.6		

Therefore, it can be concluded that as there were no severe problems in BRRI dhan28 cultivation farmers' attitude toward it should be more positive.

Stage-wise Use of Mass Media in Adoption of BRRI dhan28

Stage-wise use of MMCs in adoption of BRRI dhan28 was the main focus of this study. The use of mass media for each respondent for each stage was calculated. Based on their mass media use scores respondents were categorized stage-wise as given below.

Table 2. Stage-wise Use of MMCs in Adoption of BRRI dhan28

Stage	Range		Respondents			Mean	SD
	Observed	Possible	Category	Number	Per cent		
Knowledge stage	4-32	0-60	Low use (4-13)	15	16.70	19.53	5.81
			Medium use (14-23)	55	61.10		
			High use (24-32)	20	22.20		
Persuasion stage	2-24	0-40	Low use (2-9)	30	33.30	11.17	4.16
			Medium use (10-17)	56	62.20		
			High use (18-25)	4	4.50		
Decision stage	2-18	0-20	Low use (2-7)	64	71.10	11.17	4.16
			Medium use (8-13)	22	24.50		
			High use (14-19)	4	4.40		
Implementation stage	1-21	0-40	Low use (1-7)	22	24.50	10.23	4.27
			Medium use (8-14)	56	62.20		
			High use (15-21)	12	13.30		
Confirmation stage	1-27	0-80	Low use (1-9)	65	72.20	8.48	5.18
			Medium use (10-18)	22	24.50		
			High use (19-27)	3	3.30		

Table 2 reveals that an overwhelming majority (83.3 per cent) of the farmers had medium to high use of mass media at knowledge stage. This is in line with the general observation that mass media has the best capacity to increase the knowledge about an innovation. On the other hand, from persuasion stage to confirmation stage, use of mass media among farmers had gradually decreased. At persuasion stage, individuals start to evaluate an innovation's attributes which requires use of interpersonal communication media. At decision stage innovation adoption relies upon many sources to make innovation-decision. At this stage they themselves give trial of the innovation on a small scale or watch the trial given by innovators and early adopters and result demonstrations supervised by extension workers. They also watch the results of technology through television. At implementation

stage farmers need operational and problem solving information. Confirmation stage is a complete stage where adopters of the innovation can either continue the innovation or discontinue it. Discontinuance can occur by replacement. Finally, later adoption can occur with rejection at decision stage. Normally, the high and medium users of mass media channels are supposed to be the early majority and low users are the late majority. The early majority uses the mass media channels at confirmation stage more than the late majority which depends upon the early majority to confirm the innovation-decision. These are the reasons behind the decreasing use of mass media at later stages of innovation-decision process.

Preferences of Use of Mass Media at Different Stages in Adoption of BRRI dhan28

To compare the preferences of use of mass media at each stage in adoption of BRRI dhan28, Media Use Index (MUI) for each stage was computed. The MUI of a particular media could range at knowledge stage from 0 to 1080, at persuasion stage from 0 to 720, at decision stage from 0 to 360, at implementation stage from 0 to 720 and at confirmation stage from 0 to 1440. The five mass media channels used at different stages in adoption of BRRI dhan28 have been arranged in rank order in Table 3 on the basis of their respective MUI.

Table 3. Rank Order of Mass Media Used by Farmers at Five Stages

Mass media	Knowledge stage		Persuasion stage		Decision stage		Implementation stage		Confirmation stage	
	Score (MUI)	Rank order	Score (MUI)	Rank order	Score (MUI)	Rank order	Score (MUI)	Rank order	Score (MUI)	Rank order
Television	897	1	534	1	289	1	454	1	373	1
Radio	563	2	346	2	198	2	273	2	215	2
Leaflet	157	3	86	3	43	3	72	3	54	3
Poster	119	4	66	4	30	4	66	4	48	4
Newspaper	64	5	38	5	16	5	25	5	35	5

Rank order of mass media channels in Table 3 reveals the preferences of use of MMCs by the respondents of this study. Clearly it is evident that in adoption of BRRI dhan28 most of the respondents preferred television, which secured first position, across five stages of innovation-decision process. It was followed by radio (2), leaflet (3), poster (4) and newspaper (5). Television's success in adopting BRRI dhan28 lies in its unique combination of sight, sound and motion. People spend more time with it than any other medium, averaging over six hours per

home per day (Carpenter, 1983). In Bangladesh almost every channel broadcasts agricultural programs with different names. These programs have been proved to be very popular among the rural people due to their audio-visual characteristics, from which the illiterate farmers gain educational benefit (Bhuiyan *et al.*, 2014).

Relationships between Independent and Dependent Variables

The purpose of this section is to examine the relationship of each of the independent variables with each of the dependent variables. Pearson's product-moment correlation co-efficient 'r' was computed to determine the relationship between two concerned variables as shown in Table 4.

Table 4. Co-efficient of Correlation between Each of The Selected Characteristics of Farmers with Their Use of Mass Media at Different Stages

Independent variable	Correlation co-efficient (r) with use of mass media at				
	Knowledge stage	Persuasion stage	Decision stage	Implementation stage	Confirmation stage
Age	0.385**	0.199 ^{NS}	0.107 ^{NS}	0.355**	0.075 ^{NS}
Education	-0.310**	-0.116 ^{NS}	-0.099 ^{NS}	-0.222**	-0.191 ^{NS}
Family size	0.226*	-0.123 ^{NS}	0.066 ^{NS}	0.261*	-0.009 ^{NS}
Farm size	0.462**	0.294**	0.335**	0.281**	0.474**
Annual income	0.112 ^{NS}	0.049 ^{NS}	0.327**	0.139 ^{NS}	0.255*
Organizational participation	-0.189 ^{NS}	-0.116 ^{NS}	0.041 ^{NS}	-0.116 ^{NS}	-0.232*
Cosmopolitaness	0.197 ^{NS}	0.015 ^{NS}	0.046 ^{NS}	0.082 ^{NS}	0.209*
Innovativeness	-0.052 ^{NS}	-0.202 ^{NS}	-0.017 ^{NS}	-0.279**	-0.068 ^{NS}
Attitude towards BRRI dhan28	-0.627**	-0.340**	-0.373**	-0.476**	-0.339**
Problems in using BRRI dhan28	-0.583**	-0.333**	-0.475**	-0.600**	-0.367**

*NS Non Significant, **Significant at 0.01 level of probability, * Significant at 0.05 level of probability*

Relationship between Selected Characteristics of Farmers and Use of MMCs at Knowledge Stage

Table 4 indicates that out of 10 selected characteristics of the respondents only three, namely, age, family size and farm size of the farmers had significant positive relationship with their use of mass media at knowledge stage. The possible reason would be that with increase of age, family and farm size of the farmers their access to awareness and knowledge through MMCs had increased. On the other hand, education and attitude towards BRRI dhan28 and problems in using it had significant negative relationship with use of mass media at knowledge stage which

indicated that with increase in education and attitude towards BRRI dhan28, the farmers' use of MMCs at knowledge stage decreased. This might be due to the fact that with increase of education and attitude towards BRRI dhan28 the farmers' desire to get knowledge and operational knowledge had increased which needed more use of interpersonal communication channels than MMCs.

Relationship between Selected Characteristics of Farmers and Use of MMCs at Persuasion Stage

Out of 10 selected characteristics of the respondents only one, namely, farm size had significant positive relationship. A possible reason would be large farm size had induced and facilitated the individuals to seek innovation-evaluation information through use of MMCs at persuasion stage. Attitude towards BRRI dhan28 and problems in using it had significant negative relationship with mass media used by the farmers at persuasion stage. This indicated that with increasing form of attitude towards BRRI dhan28 and problems in using it farmers' use of MMCs at persuasion stage had decreased. This might be due to the fact that farmers' information needs through MMCs had reduced, because in the meantime they became more experienced and gathered lot of information through IPCs to confirm their evaluation about the innovation.

Relationship between Selected Characteristics of Farmers and Use of MMCs at Decision Stage

The findings show that out of 10 selected characteristics of the respondents only two, namely, farm size and annual income had significant positive relationship. A possible reason would be that large farm size and higher annual income created a favorable situation for trial of innovations which further enhanced the use of mass media at decision stage. Attitude towards BRRI dhan28 and problems in using it had significant negative relationship with mass media used by the farmers at decision stage. This indicated that with increasing form of attitude towards BRRI dhan28 and problems in using it farmers' use of MMCs at decision stage had decreased. This might be due to the fact that farmers' desire to achieve practical knowledge had increased which required more use of IPCs than mass media.

Relationship between Selected Characteristics of Farmers and Use of MMCs at Implementation Stage

As per the findings, out of 10 selected characteristics of the respondents only three, namely, age, family size and farm size had significant positive relationship. A possible reason would be old age, large family and farm size had facilitated

greater access to mass media at implementation stage. Education, innovativeness and attitude towards BRRI dhan28 and problems in using it had significant negative relationship with mass media used by the farmers at implementation stage. This indicated that with increase of education, innovativeness and attitude towards BRRI dhan28 and problems in using it farmers' use of MMCs at implementation stage decreased. This might be due to the fact that they had already become more experienced and gathered lot of information regarding innovation at this stage. Another reason could be that they needed operational information through IPCs rather than mass media channels.

Relationship between Selected Characteristics of Farmers and Use of MMCs at Confirmation Stage

Out of 10 selected characteristics of the respondents only two, namely, family size and farm size had significant positive relationship. A possible reason would be that large family and farm size had enhanced the continuation of use of MMCs at confirmation stage. Organizational participation, cosmopoliteness, attitude towards BRRI dhan28 and problems in using it had significant negative relationship with MMCs used by the farmers at confirmation stage. This indicated that with increase of organizational participation, cosmopoliteness, attitude towards BRRI dhan28 and problems in using it farmers' use of MMCs at confirmation stage decreased. This might be due to the fact that the farmers had become more experienced and gathered lot of information covering all aspects of innovation from IPCs like extension agents, early adopters, neighbours, *etc.*

Conclusion

The findings of the present study reveal that use of MMCs by the farmers was found comparatively higher at early stages of the innovation-decision process than later stages. Farmers preferred television most at all five stages of innovation decision process and it was followed by radio (2), leaflet (3), poster (4) and newspaper (5). Besides, some of the socio-economic characteristics of the farmers had their influence on the use of mass media in every stage of the innovation-decision process. With increase of age, family size, farm size and annual income of the farmers their use of MMCs at different stages of innovation-decision increased. On the other hand, with increase of education, organizational participation, cosmopoliteness, innovativeness, attitude towards innovation and problems in using innovation of the farmers their use of mass media at different stages of innovation-decision decreased.

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Coping Strategy during Farm Distress: a Case Study of Cattle Breed Improvement Program in Andhra Pradesh

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Abstract

The income of the farmers can be improved if other enterprises are taken up by the farmer along with crop husbandry in an integrated manner, as they provide supplementary income to the farmers. This article aims to showcase the importance of the dairy enterprise, through breed improvement interventions, in increasing the farmers' income by taking a case study of the Cattle Breed Improvement Program of JK Trust. An evaluation of the Cattle Breed Improvement Program (CBIP) was carried out with the help of primary data collected from 240 farmer beneficiaries from 20 villages in four districts. It was observed that the program created awareness among farmers towards the benefits of an improved breed over non-descript cattle. The availability of doorstep services could be seen as a model initiative carried out by J.K. Trust. Increase in employment in terms of man days and increased income of the farmers due to breed improvement interventions are noteworthy.

The study suggests that in the event of crop failure, the income of the farmers could be protected by other enterprises such as dairy and more so with the breed improvement interventions. There is an urgent need to spread the National Project for Cattle and Buffalo Breeding (NPCBB) breed improvement program in areas which are not covered to address the farm distress.

Key words: cattle breed, dairy enterprise, coping strategy, farm distress

Introduction

India has been facing the problem of farm distress for many years owing to the large dependence of farmers on the cultivation of crops alone. However, policy makers have advocated that the income of the farmers can be improved if other enterprises are taken by the farmer along with crop husbandry in an integrated manner as they would provide supplementary income to the farmers in the event of crop failure.

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This article depicts the importance of the dairy enterprise through breed improvement interventions in increasing the farmers' income through an evaluation study of the Cattle Breed Improvement Program of JK Trust carried out by the National Institute of Agricultural Extension Management (MANAGE).

In India genetic improvement of cattle has been sought as a means to bring about improvement in milk yield in cattle. Genetic improvement is a long-term activity requiring sustained efforts. The Government of India has initiated a major program, "National Project for Cattle and Buffalo Breeding" (NPCBB) from October 2000. The Cattle Breed Improvement Program (CBIP) is a flagship program of J. K Trust's Gram Vikas Yojana³ which was implemented as a part of NCPBB. The main objective of this program is to upgrade/crossbreed the local indigenous low milk yielding cows and buffaloes by breeding through Artificial Insemination (AI) with the use of high pedigree frozen semen of indigenous/ exotic breeds.

Modalities of Implementing CBIP

One Integrated Livestock Development (ILD) centre covers approximately 8-10 villages falling within an area of 5 - 8 Kms from its location. The number of centers established depends on the size of the block. One program operator, called 'Gopal' is posted at each of these centers. The program operator is trained by qualified Veterinarians, for four months, to carry out Artificial Insemination in cows/ buffaloes and other allied veterinary services like better livestock management practices. The program operator is provided with a motorcycle to perform AI and provide other minor veterinary services at the doorstep of the farmers. To ensure the success of this program, mass castration camps are organized in all the villages to castrate the local stray bulls in order to avoid indiscriminate breeding of the local variety. The work of these program operators is supervised and monitored by trained supervisors called Rural Development Officers (RDO). One RDO monitors the work of around 10 ILD centers. Qualified veterinarians are appointed to provide technical support and supervision to the CBIP. Meetings of farmers from various villages are conducted through these centers on a regular basis to enlighten them about the advantages of upgrading and crossbreeding.

This paper aims at impact assessment of the Project "Cattle Breed Improvement Program" implemented by J.K Trust Gram Vikas Yojana in the state of Andhra Pradesh. The specific objectives are as follows:

³Gram Vikas Yojana is an intervention project carried out by JK Trust in Andhra Pradesh. MANAGE has conducted an evaluation study for JK Trust interventions in cattle breed improvement program.

1. To measure the extent of increase in improved cattle and buffalo breeds (change in herd composition) in the project area due to CBIP interventions.
2. To measure the extent of penetration of AI services in cows and buffalos to the door step of the farmers in the project area.
3. To measure the awareness of farmers with respect to AI services provided by J.K. Trust.
4. To evaluate the quality of services (viz. AI, first aid veterinary services, vaccination, de-worming, de-ticking, castration of scrub bulls, fodder development, extension meetings etc.) provided under CBIP
5. To measure the extent of improvement in Livestock management and knowledge up gradation with respect to nutrition, diseases management and milk production among farmers due to CBIP Interventions.
6. To measure the impact of CBIP on Income of households and living standards.
7. To measure the impact of CBIP on employment generation.
8. To measure the sustainability of the project interventions.

The article is written with focus on those interventions of CBIP which have bearing on income and employment of the farmers.

Methodology

To measure the CBIP interventions, both primary and secondary data were collected. Multiple level structured and unstructured schedules were designed for collecting the primary data pertaining to the beneficiaries. Information was also collected through focused group discussions, interviews with Gopals. The data for the present study was collected from the first week of June to mid July, 2012.

Sample Design

Out of eight districts, where the program was implemented, four districts were selected purposively covering all the regions. The districts selected were Adilabad, Kadapa, Prakasam and Medak. From these districts, 20 villages were chosen at random and again from these 20 villages, 240 farmer beneficiaries were selected at the rate of 12 farmers per village. Data was collected from 20 Gopals. Twenty focused group discussions were held in selected villages for collecting information pertaining to the beneficiaries.

Evaluation, Results and Discussion

Socio economic Profile of Sample Respondents

The majority of farmers who were part of the study belonged to general category (67.5%) and OBC (23.8%). The average family size was found to be 5 with a minimum of 3 members to maximum 14 members. The average age of the farmer was found to be 44 with a range between 19 and 65 years. Sixty nine per cent of the farmers were found to be literate. The highest literacy rate was observed in Medak and Prakasam districts and the least in Adilabad. Only 8.4 per cent farmers were graduates and above (Tables 1 & 2).

The study reveals that 87.6 per cent of farmers who were surveyed, have livestock as a secondary source of their earnings. The average sample land holding size was estimated at 4.25 acres for all the sample beneficiaries. The land holding size is approximately five, three, five and four acres in Adilabad, Kadapa, Medak and Prakasam respectively.

Table 1. Social Profile of the Sample Respondents

District	Social Group				Total	Avg Family size	Avg Age	Literacy (%)
	Gen	OBC	SC	ST				
Adilabad	34 (40.5)	31 (36.9)	15 (17.9)	4 (4.8)	84 (100)	5	42	55
Kadapa	49 (81.7)	10 (16.7)	1 (1.7)	0	60 (100.0)	5	47	70
Medak	22 (61.1)	13 (36.1)	1 (2.8)	0	36 (100.0)	5	43	83
Prakasam	57 (95.0)	3 (5.0)	0	0	60 (100.0)	4	45	80
	162	57	17	4	240	5	44	69
Grand Total	(67.5)	(23.8)	(7.1)	(1.7)	(100.0)			

Figures in parentheses are percentages

Table 2. Educational Qualifications in the Sample Districts of Andhra Pradesh

Educational Qualification	Number	Percentage
Not Literate	74	34.1
Functional Literacy	12	5.0
Primary Education	21	8.8
Upper Primary Education	41	17.2
High School	47	19.7
Intermediate	23	9.7
Graduate	15	6.3
Graduate & Above	5	2.1
Total	238	100

Evaluation of CBIP Interventions

The majority of the sample farmers have received AI services from CBIP since the last three years. In Medak and Prakasam, though the utilization was very low in the beginning, within three years of the interventions, it picked up pace i.e. the majority of the farmers started availing CBIP services. The awareness levels of CBIP interventions through Gopal were found to be very high, which indicates that Gopals were very active in creating awareness (Table 3).

Table 3. Effectiveness of CBIP Services

District	Level of Awareness of CBIP Services (%)	Utilization of CBIP Services 4-5 years back (%)	Improvement in cattle breed due to CBIP Interventions (%)
Adilabad	90.5	43	99
Kadapa	85.5	52	100
Medak	77.8	14	94
Prakasam	98.3	13	98

The herd composition changed positively due to the interventions. The herd composition constituted sixty five per cent of animals and 95 per cent of the young population of improved breed, indicating a substantial change in the quality of animals in the project area. It was observed that 31.0 per cent in Adilabad district, 48.3 per cent in Kadapa district, 55.6 per cent in Medak district and 38.3 per cent of farmers in Prakasham district had Milch animals born out of CBIP interventions by JK Trust (Table 4). It is a well known fact that genetic improvement in cattle is a long drawn out process. The success rate observed is an achievement and the change had been brought about within a short period of the project.

Table 4. Distribution of Milch Buffaloes of Improved Breed with CBIP Intervention

District	At present do you have Milch Cow of Hybrid Breed with CBIP Intervention			Do you think the progenies born out of CBIP are of better type		
	Yes	No	Total	Yes	No	Total
Adilabad	26 (31)	58 (69)	84 (100)	84 (100.0)	0	84(100)
Kadapa	29 (48)	31 (52)	60 (100)	60 (100.0)	0	60 (100)
Medak	20 (56)	16 (44)	36 (100)	34 (94.4)	2 (5.6)	36 (100)
Prakasham	23 (38)	37 (62)	60 (100)	60 (100.0)	0	60 (100)
Total	98 (41)	142 (59)	240 (100)	238	2	240

Figures in parentheses are percentages

Table 5 shows the perception of farmers about the quality of progenies born out of CBIP interventions. All the farmers (100%) in Adilabad, Kadapa and Prakasam districts and 94.4 per cent of farmers in Medak district, perceived progenies born out of CBIP as better. The Hybrid animals have the capacity to give high milk yield and they start giving milk at an early age as compared to indigenous breed. At the same time, it was observed that, the calves were very sensitive and die if proper care is not taken.

Table 5 shows the data regarding the ownership of F1 (First generation) and F2 (Second generation) animals born out of CBIP Interventions. Around 52.5 per cent of total respondent farmers were owners of F1 and F2 animals. Medak had maximum owners of F2 animals (61.1%), followed by Kadapa (58.3%), Prakasham (55%) and Adilabad (42.85%).

Table 5. Impact of CBIP Interventions

District	Family as a owner of F1 or F2			In case you are paying, the charges for the above services (you consider) are			
	F1 only	F1 and F2	Total	High	Adequate	Subsidized	Total
Adilabad	48 (57.1)	36 (42.85)	84 (100)	0	10 (11.9)	74 (88.1)	84 (100.0)
Kadapa	25 (41.7)	35 (58.3)	60 (100)	0	16 (26.7)	44 (73.3)	60 (100.0)
Medak	14 (38.9)	22 (61.1)	36 (100)	0	17 (47.2)	19 (52.8)	36 (100.0)
Prakasham	27 (45)	33 (55)	60 (100)	1	24 (1.7)	35 (40.0)	60 (58.3)
Total	114 (47.5)	126 (52.5)	240	1 (0.4)	67 (27.9)	172 (71.7)	240 (100.0)

Figures in parentheses are percentages

In order to measure the willingness of farmers to pay for the CBIP services, post JK trust interventions, the present study included a question in the schedule for beneficiaries. The data reveals that the majority i.e. (98.8%) respondents in Adilabad district, 100 per cent in Kadapa district, 94.4 per cent in Medak district and 98.3 per cent in Prakasam district expressed willingness to pay for CBIP services in the future after the completion of the project. This suggests that the CBIP program has a commercial viability and moving towards achieving sustainability in these districts (Table 6).

Table 6. Willingness to pay for CBIP services in the Future

District	Whether you will be willing to pay for the above services in future		Total
	Yes	No	
Adilabad	83 (98.8)	1 (1.2)	84 (100.0)
Kadapa	60 (100)	0	60 (100.0)
Medak	34 (94.4)	2 (5.6)	36 (100.0)
Prakasham	59 (98.3)	1 (1.7)	60 (100.0)
Total	236 (98.3)	4 (1.7)	240 (100.0)

Figures in parentheses are percentages

The average additional annual income per family accrued due to CBIP Interventions during the last three years, was worked out to be Rs. 7,646. It amounts to 11 per cent increase in the total annual family income in the project areas. It may be noted that this increase is only from the increase in milk income and does not include income from sale of male-calf, manure and draft value, etc.⁴. The total value of additional milk produced by the improved progeny is estimated at Rs. 195 crores, over the last 3 years. Thus, the average additional gross income per family per year in A.P due to CBIP interventions is Rs. 7646/- (Table 7).

Table 7. Impact of CBIP on Income of Households

Description	Year-1	Year-2	Year-3	Year-4	Year-5	Projected Yr 6
Female-Calves Produced	1875	12379	22464	31804	38902	54829
(Adj. For mortality @ 10%)	1688	11141	20218	28624	35012	49346
Expected in Milk (F1)	-	-	1114	7732	15844	23428
Expected next calving	-	-	-	735	5353	12192
	-	-	-	-	485	3698
	-	-	-	-	-	320
Total number of Improved Animals -Expected in Milk			1114	8467	21682	39639
Total Female Progenies produced during the Project						162253
No. of Calving from Progenies produced						70901
Av. Addl. Production per Lactation*						1400
Less 300 litres per lactation of Parent Animal						1100
Total Addl. Milk Production (in Litres in crores)						14.46
Total Value of Incremental Milk (in Rs. In crores)						38.99
Per family Incremental Income (in Rs.)						22938
Per family Incremental Income/ per year (in Rs.), over last 3 years						7646
Total Value of additional milk produced by improved progeny over last 3 years (Rs. 195 in Crores)						

* This is weighted average production of improved Buffaloes and Cows

⁴The reported milk production of improved cattle and buffaloes is around 1300 to 1500 litres per lactation (this is to be indicated that 82 per cent of the total stock is buffaloes and remaining are Ongole and crossbred in the study area). After adjusting for the milk production by ND buffaloes and cattle, the average incremental milk production by the improved progenies is 1100 Litres (1400 litre - 300 litre, per lactation of 300 days).

If the project would have been extended for a further period of 5 years, the average gross income per family would have been increased by Rs. 18,240/-. It would be over 20 per cent of total family income, making dairying as one of the key and stable income generating activities of the family. The extended project would also create net additional animal wealth worth Rs. 95,078/- per family. This would further contribute to the project to take deeper roots thereby enhancing the sustainability of the project.

The study reveals that 82 per cent of the total improved progeny is buffaloes and 18 per cent Ongole and crossbred. Focus group discussions (FGDs) indicated that the additional average value of the Buffalo-heifer is Rs. 20000 (discounting Rs. 5000 for the local breed), buffalo-male calf Rs. 1000/-, for Ongole heifer the additional average value is Rs. 12,000 (discounting Rs. 3000 for the local breed) and for the male-Ongole calf is Rs. 10,000 (discounting Rs. 5000 for the local breed). The total number of calves born during the project period is 3,24,506 (male and female both). The net additional value of this stock works out to Rs. 344 Crores. Thus, on an average, for each family, an additional livestock wealth worth Rs. 40,429 has been added due to project interventions (Tables 8 & 9).

Table 8. Projected Per Year Additional Family Income due to CBIP in AP for a 10-Year CBIP Project

Description	
Female Progenies likely to be Produced during the Project (number)	381569
No. of Calving from Progenies produced: (number)	451013
Av. Addl. Production per Lactation (Litres)	1400
Less 300 Litres per lactation of Parent Animal (Litres)	1100
Total Addl. Milk Production (Litres in crores)	4.96
Total Value of Incremental Milk (Rupees in crores)	124.03
Per family Incremental Income, in 8 years (Rupees)	1,45,916
Per family Incremental Income/ per year (Rupees)	18,240

Table 9. Asset Creation due to CBIP

Description	
Total calves born (number)	324506
Female calves born (number)	162253
Value of milk produced (Rs. In crores)	390
Asset Value of female stock (Rs In crores)	301
Asset value of male stock (Million Rs)	425
Total assets created - male + female (Rs. In crores)	344
Incremental assets and milk value for all calves born (Million Rs)	7336
Asset and milk value created per calf - for females only (Rs)	42594
Asset and milk value created per Rs.1000/- of investment	20960

The project interventions have generated an additional employment to the extent of 53 lakh person days over the last 5 years for managing the improved progenies at the farm level. This is based on the studies of Patil & Udo^{1*} (1997) which reported 15 additional person days per year for every improved animal. This works out to 62 additional person days per family in the project area. No separate additional employment has been considered for the male progenies, as they are generally disposed off at an early age. In addition, direct full-time employment has been provided for 291 local rural youth, who have been trained and deployed as Gopals of ILDC (Integrated Livestock Development Centre) during the project period (table 10).

Table 10. Employment Generation due to CBIP and Cost Benefit Ratio

Description	
Project period	5 years
Project investment (Rs.in crores)	35
Additional man-days created at farmers level in the project period (number in lakhs)	5.3
Value of total man-days in the project period (Million Rs)	735
No. of Gopals employed	291
Income to Gopals through direct employment (Rs. In crores)	1.05
Total employment benefits - Gopals + farmers (Rs. In crores)	84
Value of additional employment generated per Rs.1000/- of investment	2399
Total value of assets, milk and additional employment generated (Rs. in crores)	817.6
Cost Benefit Ratio for the project	1: 23.4

The CBIP project has resulted in the creation of net additional livestock wealth of Rs. 344 crores, in addition to the net additional income of Rs. 390 crores from the additional milk produced. Further additional employment worth Rs. 84 crores has been generated in the project area. With Rs. 35 crores as an investment over a five-year period, the project areas have benefited to the tune of Rs. 817.6 crores. Thus, the cost-benefit ratio works out to 1:23.4, excluding intangible benefits like better knowledge and awareness, more employment opportunities, improved livestock management practices and possibly improved family nutrition.

Conclusion

CBIP interventions led to increased employment in terms of man days and increased income of the farmers due to breed improvement interventions. Making dairying as one of the key and stable income generating activities of the family was possible by creating awareness among farmers towards the benefits of improved

^{1*}Patil B.R., Udo H.M. J. (1997) *The Impact of Crossbred Cows at Farm Level in Mixed Farming Systems in Gujarat, India*, Asian-Australasian Journal of Animal Science, Vol 10 (no. 6) 621-628, 1997.

breed over ND cattle and by providing AI services of J.K. Trust. In the context of farm distress being reported from several parts of the country, sustaining farmers' income through supplementary activities like milk production assumes greater significance. There is an urgent need to spread the NPCBB breed improvement programmes to address the farm distress.

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Animal Husbandry Extension Service Delivery: Farmers' Perception in Four Major Indian States

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Abstract

The present study was conducted to analyze farmers' perception on the effectiveness of animal husbandry extension services delivery in four major Indian states viz., Karnataka, Maharashtra, Odisha and Uttar Pradesh. Purposive sampling technique was used for the sample selection. A questionnaire was used to elicit information from 80 sample respondents. Data were analyzed using descriptive statistics such as mean, frequency counts, percentages, standard deviation and Kruskal-Wallis test. Results showed that majority of the farmers (48.75 per cent) belonged to middle age group with more than 20 years of experience (41.25 per cent) and majority (91.25 per cent) of the interviewed were full-time farmers in the small farmer (35 per cent) category with 1.1 to 2.0 ha land. With regards to extension contact, the cumulative frequency indicates that animal husbandry officer is the most contacted person as he/she is in touch with farmers in the service area. Thirty-nine practices scaled by 20 farmers from each state on a three-point continuum scale reveal that majority of the farmers were moderately satisfied with the services of animal husbandry officers, with farmers in Maharashtra state being more satisfied followed by Karnataka, Uttar Pradesh and Odisha. Based on the study findings it is concluded that for animal husbandry extension to be efficient, effective and visible, there needs to be more integration among the extension personnel of agriculture and allied sectors. The study recommends a review of extension methods perceived to be non-effective or slightly effective and collaboration among the stakeholders for strong extension services. It will be imperative to ensure that methods considered to be effective are mainly used to deliver extension messages.

Keywords: Extension Service Delivery, Animal Husbandry, Farmers' Perception.

Introduction

Agriculture plays a vital role in India's economy. Over 58 per cent of the rural households depend on agriculture as their principal means of livelihood.

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Agriculture, along with animal husbandry, fisheries and forestry, is one of the largest contributors to the Gross Domestic Product (GDP). The share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) is expected to be 17.3 per cent of the Gross Value Added (GVA) during 2016-17 at 2011-12 prices (Central Statistics Office). The extension approaches and services followed by the service providers, mainly institutions of State Department of Agriculture, have resulted in wider spread of modern technologies and increase of agricultural production worldwide.

The delivery of allied sector extension services, particularly animal husbandry services is an important emerging area due to increasing demand for livestock and its products for enhancing and optimizing livestock production and management. In 2005, the National Sample Survey Organization (NSSO) revealed that only 5 per cent of farm households access any information on animal husbandry against 40.1 per cent farm households accessing information on crops. Moreover, a plethora of studies (Shweta, 2014; CALPI, 2008; Ravikumar *et al.*, 2007) have indicated that the State Department of Animal Husbandry is the major service provider for livestock farmers, apart from other private agencies, dairy cooperatives and NGOs which function at the regional level. However, it has been repeatedly observed by the researchers that the extension component in animal husbandry is generally found weak.

In this context, it is necessary to explore the reasons for the weakness of extension component in allied sectors. MANAGE, Hyderabad planned an in-depth study for the “Analysis of Extension Approaches in the Allied Sector Departments”. The study has been conducted in four major Indian states *viz.*, Uttar Pradesh, Odisha, Maharashtra and Karnataka. These states as well as the districts in these states wherein all the allied sectors *viz.*, animal husbandry, horticulture, sericulture and fisheries were present and operational were selected purposively. A total of 480 respondents (240 Government Officers and 240 Farmers) were selected from two districts of each state (Table 1). The details of sampling are as follows:

Table 1. Selection of Respondents

State		Uttar Pradesh				Odisha				Maharashtra				Karnataka			
District		Basti		Faizabad		Sonapur		Bargarh		Ahmednagar		Aurangabad		Kolar		Chikkaballapur	
Respondents		O	F	O	F	O	F	O	F	O	F	O	F	O	F	O	F
Department	Animal Husbandry	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Horticulture	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Sericulture	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05
	Fisheries	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05
Total		30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Gross Total		480															

Note: O=Officers, F=Farmers, Total Sample Size=480(240 Officers + 240 Farmers)

In view of the immenseness of research, it is difficult to discuss all the research findings in a single research paper comprehensively. One of the specific objectives of the research was to determine farmers' perception of delivery of extension services by the allied sector departments *i.e.*, Animal Husbandry, Sericulture, Horticulture and Fisheries in four study states. In the present paper, "perception of farmers of all four states with respect to effectiveness of the animal husbandry extension service delivery" is discussed. The total sample size of the study is 80 farmers who are practising animal husbandry.

Perception of Farmers towards Animal Husbandry Extension Services

Perception is the feeling of individuals towards the services offered by the service provider. In this investigation, perception towards extension services offered by the State department of animal husbandry staff is expressed through 'agreement-disagreement' on item statements of the perception schedule. Understanding of their perceptions helps in strengthening the capacities of staff of the department of animal husbandry through proper training. The farmers' perception is measured in terms of Rank Based Quotient (RBQ) value, which denotes satisfaction level of the farmers towards extension services.

(RBQ) Value computation for satisfaction level of farmers

$$RBQ = \sum_{i=1}^n \frac{f_i (n+1-i) \times 100}{N \times n}$$

- i = Concerned rank (1 to 3 ranks of the problem) and rank value is the reverse of the ranks
- N = Total number of farmers (20 farmer respondents)
- n = Number of practices in each enterprise ranks ($n=3$),
- fi = Number of farmers reporting the satisfaction level on that particular item of the enterprise like animal husbandry, sericulture, fisheries & horticulture as highly satisfied, moderately satisfied and somewhat satisfied.

The problem having the highest RBQ value indicates the perception of summated satisfaction level by respondent farmers.

Objectives

1. To study farmers' perception of usefulness of services offered by the animal husbandry officers;
2. To know farmers' perception of satisfaction with respect to services offered by the animal husbandry officers; and
3. To provide suggestions for improvement of services offered by the animal husbandry officers.

Methodology

The study was conducted in four states, namely, Karnataka, Maharashtra, Odisha and Uttar Pradesh. From each state two neighbouring districts were selected purposively with a simple criterion that all the four allied sector departments viz., animal husbandry, sericulture, horticulture and fisheries were present in the district. Further 10 respondents were selected from each district using purposive and simple random sampling methods. The sample size of each state (from two districts) was 20. Hence, the total sample size from all the four states was 80.

Data Collection Tool

Taking into consideration the scope and objectives of the study, a draft interview schedule was prepared after perusal of available literature and through consultation with experts in the field of extension education and other related fields. After incorporating their suggestions, a well-structured interview schedule was finalized in English and translated into Hindi, Marathi, Kannada and Oriya languages for collecting data from the farmers.

Statistical Analysis

The data collected from the farmers were scored, tabulated and analysed using suitable statistical methods. The statistical analysis was done using SPSS (Statistical Package for Social Sciences). Keeping in view the objectives of the study and amenability, the data were subjected to different statistical tools. These tools included frequency, percentages, mean, standard deviation, and Kruskal-Wallis test. The other statistical tools like correlation coefficient were also used in analysing the data.

Results and Discussion

Socio Economic Profile

Table 2 shows that Odisha state has more number of young farmers (35 per cent) while Karnataka state has more number of old farmers (65 per cent). Nearly half of the farmers (45 per cent) of Maharashtra and Uttar Pradesh have completed high school education. The findings are in line with Nishi *et al.*, (2011). Karnataka state was found with more experienced farmers among the four states. On an average 91 per cent respondents of all four states said that agriculture was their primary occupation. Similar findings were reported by Rathod *et. al* (2014). As far as landholding is concerned, the number of marginal farmers was more in Karnataka state while Maharashtra had the highest number of large farmers.

Table 2. Socio-personal Variables of Animal Husbandry Farmers (n=80)

S. No.	Socio-personal variable	Maharashtra f / %	Odisha f / %	Karnataka f / %	Uttar Pradesh f / %
A		Age			
1	Young (up to 35 years)	6 (30)	7 (35)	2 (10)	4 (20)
2	Middle (36-45 years)	7 (35)	4 (20)	5 (25)	6 (30)
3	Old (> 45 years)	7 (35)	9 (45)	13 (65)	10 (50)
B	Education				
1	Illiterate	0 (0)	4 (20)	3 (15)	3 (15)
2	Primary school	3 (15)	1 (5)	6 (30)	1 (5)
3	Middle school	3 (15)	0 (0)	8 (40)	2 (10)
4	High school	9 (45)	5 (25)	3 (15)	9 (45)
5	12 th	1 (5)	7 (35)	0 (0)	1 (5)
6	College	4 (20)	3 (15)	0 (0)	4 (20)
C	Experience				
1	0-10 years	7 (35)	8 (40)	3 (15)	5 (25)
2	11-20 years	7 (35)	4 (20)	6 (30)	7 (35)
3	> 20 years	6 (30)	8 (40)	11 (55)	8 (40)

D Occupation

1	Full-time farmer	18 (90)	17 (85)	20 (100)	18 (90)
2	Farming +other	2 (10)	3 (15)	0 (0)	2 (10)

E Size of landholding

1	Landless	0 (0)	1 (5)	0 (0)	0 (0)
2	Marginal (0.1-1.0 ha)	0 (0)	2 (10)	13 (65)	9 (45)
3	Small (1.1-2.0 ha)	6 (30)	7 (35)	6 (30)	9 (45)
4	Semi-medium (2.1-4.0 ha)	8 (40)	6 (30)	1 (5)	1 (5)
5	Medium (4.1-10.0 ha)	2 (10)	4 (20)	0 (0)	1 (5)
6	Large (>10 ha)	4 (20)	0 (0)	0 (0)	0 (0)

Utilization of Information Sources by Livestock Farmers

With regard to utilization of information sources, the cumulative frequency indicates that farmers contacted the animal husbandry officer 'Occasionally' (Figure 1). National Sample Survey Organization (NSSO) in 2005 revealed that progressive farmers were the most used information source by the farmers.

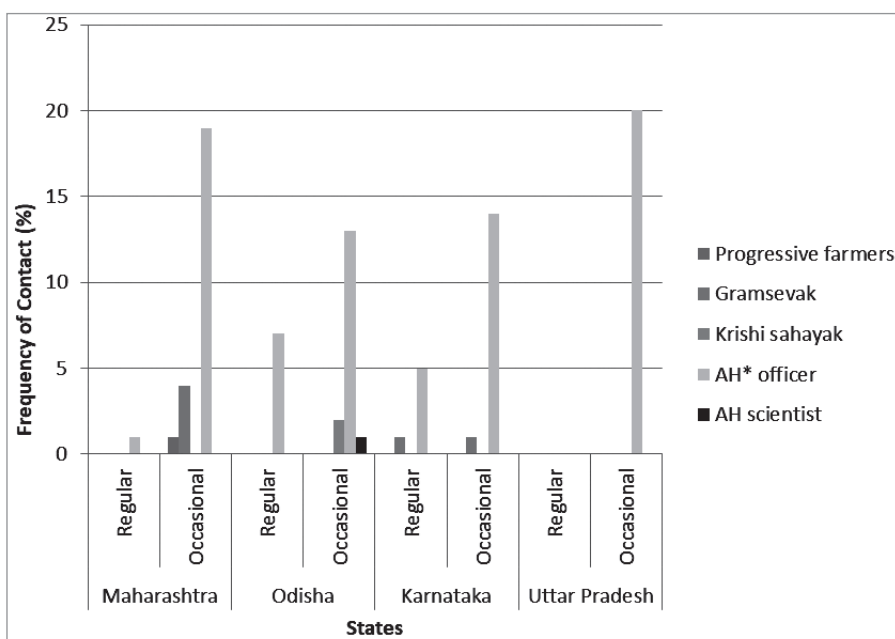


Figure 1 : Utilization of Information Sources by Livestock Farmers

Farmers' perception of satisfaction with reference to services offered

The farmers' perception with reference to the services offered viz., breeding, feeding, healthcare, management and extension activities by animal husbandry officers is presented in Table 3.

Almost 75 per cent farmers from Maharashtra were moderately satisfied with the breeding services like heat detection and AI (Artificial Insemination). In case of pregnancy diagnosis 65 per cent of the farmers and in treatment of reproductive disorders 55 per cent of the farmers were somewhat satisfied. It is observed that the animal husbandry officers in Maharashtra are not doing follow-up after providing AI services to the farmers. In Odisha, animal husbandry officers fare very poor in providing breeding services, as indicated by the farmers' perception wherein the majority are somewhat satisfied with heat detection (50 per cent), AI (60 per cent), pregnancy diagnosis (80 per cent) and treatment of reproductive disorders (70 per cent). Farmers in Karnataka show almost the same trend like Maharashtra farmers, wherein the majority are moderately satisfied with heat detection and AI, while with pregnancy diagnosis (55 per cent) and treatment and diagnosis of reproductive disorders (50 per cent) they are somewhat satisfied. Uttar Pradesh farmers show similar trend like Maharashtra and Karnataka farmers.

Table 3. Satisfaction Level of Farmers with Respect to Services Offered by the Animal Husbandry Officers

S. No.	Particulars	Maharashtra			Odisha			Karnataka			Uttar Pradesh		
		HS	MS	SS	HS	MS	SS	HS	MS	SS	HS	MS	SS
		<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
I	Breeding												
1	Heat detection	0 (0)	15 (75)	3 (15)	0 (0)	2 (10)	10 (50)	0 (0)	13 (65)	2 (10)	0 (0)	8 (40)	4 (20)
2	Artificial Insemination (AI)	0 (0)	15 (75)	5 (25)	2 (10)	2 (10)	12 (60)	0 (0)	17 (85)	3 (15)	0 (0)	14 (70)	6 (30)
3	Pregnancy diagnosis	2 (10)	5 (25)	13 (65)	1 (5)	3 (15)	16 (80)	0 (0)	6 (30)	11 (55)	1 (5)	5 (25)	14 (70)
4	Diagnosis and treatment of reproductive disorders	1 (5)	8 (40)	11 (55)	0 (0)	2 (10)	14 (70)	2 (10)	5 (25)	10 (50)	6 (30)	3 (15)	3 (15)

Note: HS=Highly Satisfied, MS=Moderately Satisfied, SS=Somewhat Satisfied

In all the four states none of the livestock farmers go for pasture rotation, conservation of grazing land or growing of legume crops. Twenty per cent of farmers in Maharashtra, 75 per cent in Karnataka and 25 per cent in Uttar Pradesh were somewhat satisfied with the balanced feed/concentrates while 60 per cent of Odisha farmers were moderately satisfied.

II Feeding

S. No.	Particulars	Maharashtra			Odisha			Karnataka			Uttar Pradesh		
		HS f (%)	MS f (%)	SS f (%)	HS f (%)	MS f (%)	SS f (%)	HS f (%)	MS f (%)	SS f (%)	HS f (%)	MS f (%)	SS f (%)
5	Pasture rotation	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	Conservation of grazing lands	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	Recommended fodder material	0 (0)	1 (5)	1 (5)	1 (5)	1 (5)	5 (25)	0 (0)	1 (5)	2 (10)	0 (0)	2 (10)	1 (5)
8	Recommended growing of legume crops along with fodder crops	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
9	Balanced feed /concentrates	0 (0)	1 (5)	4 (20)	4 (20)	12 (60)	4 (20)	0 (0)	3 (15)	15 (75)	0 (0)	1 (5)	5 (25)
10	Storage of fodder	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (10)	2 (10)
11	Feed and fodder management to ruminants	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	7 (35)	0 (0)	0 (0)	2 (10)

None of the farmers were aware of the control measures for diseases and skills for controlling an outbreak in all the four states. Majority of farmers from Maharashtra (65 per cent), Karnataka (50 per cent) and Uttar Pradesh (50 per cent) were somewhat satisfied with vaccination, while 75 per cent of Odisha farmers were moderately satisfied.

III Health

Sl. No.	Particulars	Maharashtra			Odisha			Karnataka			Uttar Pradesh		
		HS f (%)	MS f (%)	SS f (%)	HS f (%)	MS f (%)	SS f (%)	HS f (%)	MS f (%)	SS f (%)	HS f (%)	MS f (%)	SS f (%)
12	Control measures for diseases	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
13	Vaccination	2 (10)	5 (25)	13 (65)	0 (0)	15 (75)	5 (25)	5 (25)	5 (25)	10 (50)	5 (25)	5 (25)	10 (50)
14	Recommend skills in case of outbreak of diseases	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
15	Maintenance of hygiene conditions	0 (0)	9 (45)	1 (5)	0 (0)	2 (10)	5 (25)	0 (0)	4 (20)	9 (45)	0 (0)	4 (20)	4 (20)
16	Information on disinfectants	0 (0)	4 (20)	0 (0)	0 (0)	0 (0)	4 (20)	0 (0)	3 (15)	6 (30)	0 (0)	4 (20)	1 (5)
17	First aid	0 (0)	13 (65)	3 (15)	0 (0)	2 (10)	3 (15)	0 (0)	9 (45)	8 (40)	0 (0)	7 (35)	9 (45)
18	Information on deworming	1 (5)	18 (90)	1 (5)	2 (10)	8 (40)	10 (50)	0 (0)	15 (75)	5 (25)	0 (0)	8 (40)	12 (60)
19	Organize health camps	1 (5)	15 (75)	4 (20)	0 (0)	3 (15)	6 (30)	5 (25)	7 (35)	8 (40)	1 (5)	3 (15)	16 (80)

Almost none of the farmers from all the four states were aware about the construction of shelter house, information on sale and purchase of animals and information related to marketing, value addition and safe disposal of dead animals. Majority of farmers in Maharashtra (65 per cent), Odisha (70 per cent), Karnataka (80 per cent) and Uttar Pradesh (40 per cent) were somewhat satisfied with clean milking techniques.

IV Management

S. No.	Particulars	Maharashtra			Odisha			Karnataka			Uttar Pradesh		
		HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)	HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)	HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)	HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)
20	Construction of shelter house	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
21	Clean milking techniques	0 (0)	0 (0)	13 (65)	0 (0)	2 (10)	14 (70)	0 (0)	0 (0)	16 (80)	0 (0)	0 (0)	8 (40)
22	Provide information on sale of animals	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
23	Provide information on purchase of an animal	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
24	Information related to marketing	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
25	Value addition	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
26	Safe disposal of dead animals	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	2 (10)	0 (0)	0 (0)	4 (20)	0 (0)	0 (0)	0 (0)

Majority (80 per cent) of farmers from Odisha were somewhat satisfied with the training programs while majority of farmers from the four states were somewhat satisfied with exposure visits and conduct of exhibitions by the animal husbandry department. Dissemination of information through literature and help in getting program benefits were the parameters that majority of farmers were somewhat satisfied with in the four sample states.

V Extension activities

Sl. No.	Particulars	Maharashtra			Odisha			Karnataka			Uttar Pradesh		
		HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)	HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)	HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)	HS <i>f</i> (%)	MS <i>f</i> (%)	SS <i>f</i> (%)
27	Training programs	0 (0)	1 (5)	0 (0)	2 (10)	2 (10)	16 (80)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (10)
28	Exposure visits	0 (0)	0 (0)	1 (5)	0 (0)	4 (20)	10 (50)	0 (0)	0 (0)	4 (20)	0 (0)	0 (0)	2 (10)
29	Conduct of Exhibitions	0 (0)	0 (0)	12 (60)	0 (0)	2 (10)	5 (25)	0 (0)	0 (0)	8 (40)	0 (0)	0 (0)	4 (20)

30	Demonstrations	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	3 (15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
31	Campaigns	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
32	Organize farmer-scientific interaction	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)
33	Formation of groups	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
34	Help in getting programme benefits	0 (0)	1 (5)	1 (5)	0 (0)	3 (15)	4 (20)	0 (0)	1 (5)	6 (30)	2 (10)	14 (70)
35	Disseminate information through literature	0 (0)	0 (0)	3 (15)	0 (0)	3 (15)	8 (40)	0 (0)	0 (0)	9 (45)	0 (0)	3 (15)
36	Getting loans from banks	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	2 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
37	Insurance coverage	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (15)	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)
38	Take feedback	0 (0)	2 (10)	14 (70)	1 (5)	3 (15)	9 (45)	0 (0)	2 (10)	16 (80)	0 (0)	6 (30)
39	Maintain continuous communication contact	0 (0)	1 (5)	9 (45)	4 (20)	3 (15)	11 (55)	1 (5)	3 (15)	4 (20)	0 (0)	8 (40)
	Overall satisfaction level (frequency) for all 39 services/ activities	7	114	103	17	72	196	13	95	164	10	66
	RBQ value	45.1			50.1			50.4			38.2	
	% satisfaction level over 39 services/ activities and over 20 farmers	15	13	2	9	25	2	12	21	1	8	15

The RBQ values indicate Odisha and Karnataka, followed by Maharashtra and Uttar Pradesh. There is a lot of scope for Uttar Pradesh to improve its animal husbandry services.

Majority of the farmers believe that production is affected by the lack of animal husbandry services of the department and the standard of living of animal husbandry farmers has not improved significantly across the four states even after the intervention of the animal husbandry department.

VI Others

Particulars	Maharashtra		Odisha		Karnataka		Uttar Pradesh	
	Yes	No	Yes	No	Yes	No	Yes	No
1. Standard of living is improved with the services of department officials	2	18	5	15	4	16	3	17
2. Production is affected if the extension services are withdrawn	14	6	13	7	19	0	15	0
Total	16	24	18	22	23	16	18	17

Note: Not all the respondents have expressed their opinion on the services offered by the animal husbandry officers in four states. Therefore, the 'n' value is not consistent in different parameters like breeding, feeding, health, management and extension activities. This might be due to irrelevance of a particular service to the farmer or he/she might be unaware of the services.

Thirty-nine practices scaled by 20 farmers on a three-point continuum reveal that majority of the farmers were moderately satisfied with the services/ activities of animal husbandry officers with Maharashtra state being more satisfied followed by Karnataka, Uttar Pradesh and Odisha. The reason could be Maharashtra farmers are progressive and respond better to extension interventions.

Majority of the farmers in Maharashtra have expressed their opinion about moderate usefulness of animal husbandry department, while other states have given 'good' to 'very good' response (Fig.2). This indicates that there is scope in Maharashtra for its animal husbandry sector to cater to the higher expectations of the progressive farmers who look forward to higher returns and services and also have higher aspirations. It is therefore a challenge to satisfy the farmers of Maharashtra in the animal husbandry sector. Operative strategies and approaches are needed for effective implementation. The same challenge is true for other states as well and it does not call for complacency of services, rather positioning the services at a higher level of an aspiration is the need for the departments through convergence and other approaches of extension.

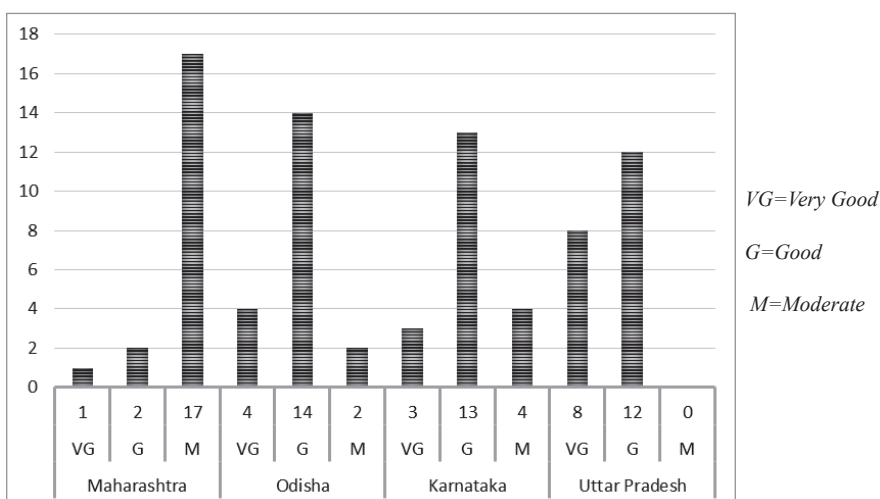


Figure 2. Perception of Farmers Regarding Overall Quality of Extension Services Offered by the Department

Suggestions for Improvement

Farmers from all the four states put forward their suggestions for improvement of the services provided by the respective animal husbandry department. Inadequate funds for infrastructure, programmes and schemes of the department were given first rank followed by intensive monitoring (2nd), flexibility to the implementing authority (3rd) and frequent and effective field visits (4th) as suggestions for improvement (Fig.3). Similar findings were reported by Mahesh Chander and Prakashkumar Rathod (2013) and Patil A.P *et al.* (2009).

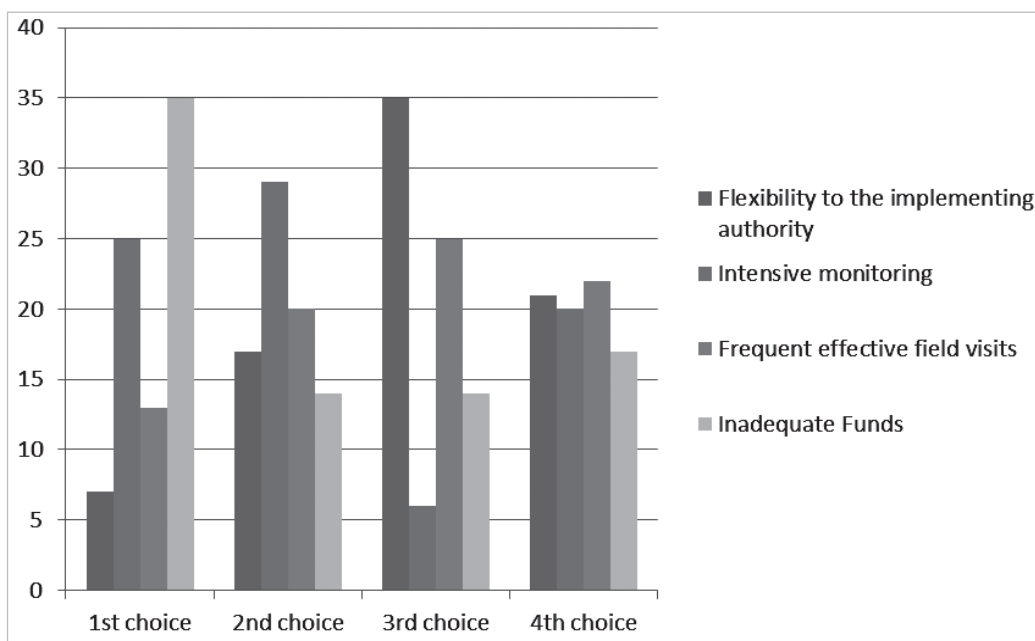


Figure 3. Suggestions for Improvement

Policy Implications and Conclusion

The study concludes that the state department of animal husbandry should pay adequate attention and streamline its animal husbandry extension service delivery with programmes, funds, infrastructure and human resources development initiatives in order to train the manpower and deliver the extension services to the farmers effectively. Providing adequate funds and intensive monitoring of the programmes and schemes will assure improvement in animal husbandry sector across states. Intensive monitoring and frequent and effective field visits will provide suggestions for improvement of extension service delivery in the animal husbandry sector.

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Strengthening Farmer - Market Linkages

B.K. Paty¹, Shalendra² and K.C. Gummagolmath³

Abstract

The Government of India has introduced reforms to promote development of the agricultural marketing sector by encouraging private participation, infrastructure creation and establishment of institutions supporting integrated supply chain. The measures may be slow, sporadic and scanty, but have helped in bringing desired change in the sector as reflected by the progress, made under direct marketing, contract farming and establishment of farmer-consumer markets. The liberal environment of business and trade has led to the evolution of many institutions offering market access to small producers like cooperatives, farmers' organizations and organized retail. The increasing use of ICT in agriculture marketing has the potential to propel the small farmers placed at the bottom of the pyramid upward by enhancing their income through better dissemination of information and their direct interaction with consumers. The states should come forward to implement the identified reforms, in letter and spirit, of the provisions laid down in the Model Act circulated by the central government to benefit the small and marginal farmers.

Key words: integrated supply chain, infrastructure creation, private participation, ICT, e-marketing

Introduction

The dominance of small and marginal farmers (more than 85 per cent) in the agricultural economy of India is no doubt an important concern to be factored in for any policy formulation for the sector. With just 44 per cent of the total land, the smallholders are producing 70 per cent of vegetables, 55 per cent of fruits and 52 per cent of cereals. Thus, given the importance of the smallholders, their problems are of prime concern for the sector. The concern is even more pronounced on the marketing front, as an assurance of remunerative price to the smallholder is a formidable challenge due to typical factors prevailing in the agricultural marketing

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scenario of the sector. The smallholders are mainly producing for local markets as their access to more lucrative markets operating at national and global level is stymied by factors such as long marketing channel, poor value creation, lack of economies of scale, the absence of quality based pricing, responsive marketing information system to change, inability to eliminate redundant intermediaries, lack of information and horizontal coordination.

Instruments like contract farming, spot markets, direct marketing and different aggregation mechanisms such as FPCs, SHGs accompanied by requisite infrastructure have the potential to reduce marketing risk and transaction costs, thereby enhancing the access of the smallholders to market. However, what is much called for, is requisite reforms in the prevailing marketing system to facilitate the free play of market forces for these instruments to operate.

A number of reform measures have accordingly been introduced by the government to create an environment conducive for infrastructure creation, participation of private players and the development of institutions to help establish linkages between farmers and the market. This paper is a survey of the reforms introduced so far and their impact on the ground, in terms of introduction of new models to create hassle free producer-buyer linkages. Evolution of different institutions as an outcome of liberal reform measures and the opportunities created by the reforms for smallholders to interact directly with buyers have also been covered in the analysis.

When market information and markets themselves are not accessible to the smallholders, no amount of infrastructure facilities can be successful in adding any value to the farmers in their marketing efforts. ICT has the potential not only to deliver market information, but can also serve as a platform for performing various market functions more efficiently and thus establishing better producer-buyer linkage. As ICT has potential in many other sectors to provide last mile connectivity (Mammo, 2015), the paper also covers the importance of ICT application in enhancing market access to the small farmers.

Agricultural Marketing Reforms

Marketing of agricultural produce in India is under the ambit of regulation. The public control on all the agricultural marketing functions and functionaries was established by introducing the Agriculture Produce Marketing (Regulation) Act by various States and Union Territories during 1960s and 1970s. The regulations helped in getting rid of several malpractices and imperfections prevailing in agricultural markets and ensured a fairer deal to the farmers in selling their produce

(Acharya, 2004). The regulations, however, were considered to be relevant only when private trade was underdeveloped, exploitative and controlled by mercantile power (Chand, 2012). The atmosphere of control and licensing of a strict regulatory regime has, however, outlived its utility now, with increased account of liberalization, privatization and globalization (Kaplinsky and Morris, 2000).

With an objective to overhaul the sector, Government of India introduced reforms by constituting an Inter-Ministerial Taskforce to review the existing marketing system and prepare a Model APMC Act in consultation with state governments and UTs in 2003. The same was circulated to all the states and UTs for introducing requisite reforms. Many leading states and UTs amended their acts as per the provisions suggested in the Model Act (Figure 1).

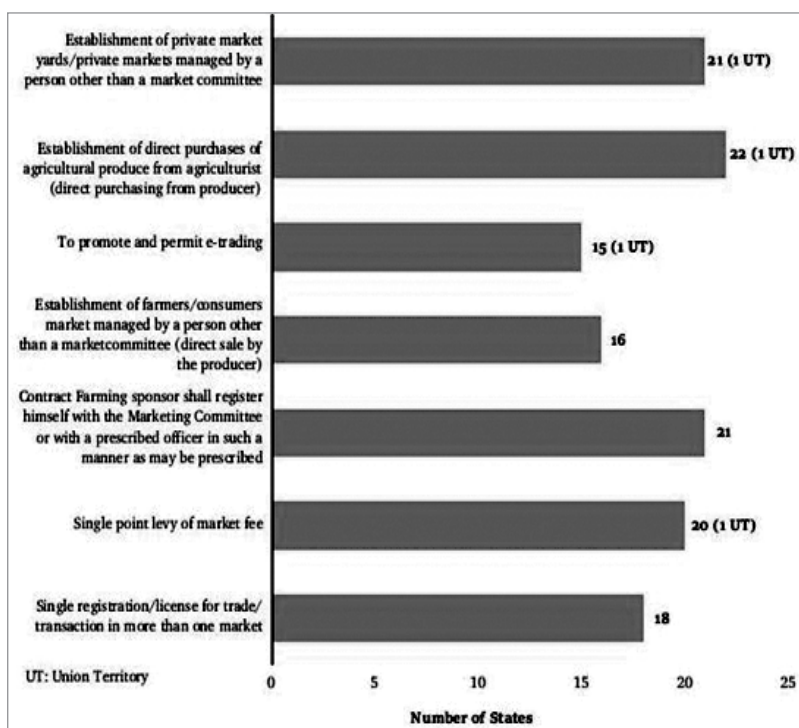


Figure 1. Status of Marketing Reforms with Reference to Seven Key Areas (as on 27.04.2017)

Source: Ministry of Agriculture and Farmers Welfare, GoI

Further, during discussions and consultations at various levels, there has been a persistent demand for expediting reforms in agricultural marketing in order to facilitate private sector investment in this important area. Accordingly, the Ministry of Agriculture, Govt. of India took this major initiative to set up an Empowered

Committee of State Ministers in-charge of Agricultural Marketing on 2nd March, 2010 to suggest further reforms, necessary to provide a barrier free national market for the benefit of farmers and consumers.

The implementation was, however, observed to be patchy, sporadic and cosmetic (Singh, 2017) and was not found to be sufficient as warranted by the dynamic nature of the sector. No state in the country implemented an entire set of market reforms (NITI). The same was reflected by a comprehensive index developed by NITI Aayog during 2016 covering Farmer Friendly Reforms across Indian states and UTs like agricultural market reforms, land lease reforms and reforms related to forestry on private land (Figure 2).

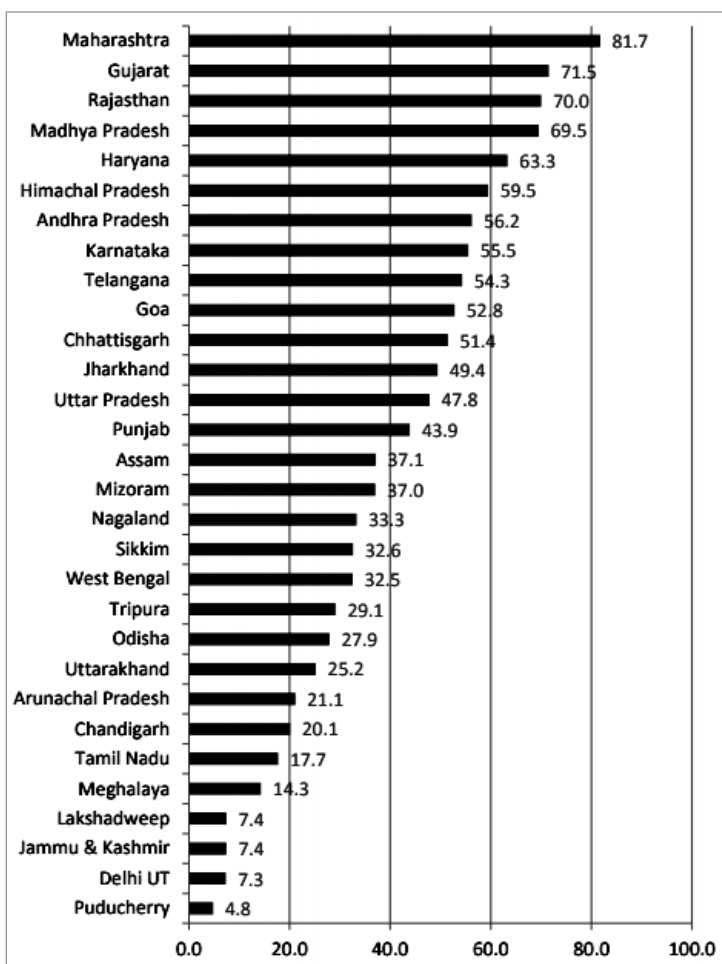


Figure 2. Agricultural Marketing and Farmer Friendly Reforms

Source: NITI Aayog

In order to enhance the pace of reforms in the sector and make it more dynamic and liberal, a more comprehensive Model Act called Model-State/UT Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017 was prepared and circulated by the Government to enhance the pace of market reforms and induce ability to push farm enterprise towards realizing the vision of doubling the income of farmers.

Reform Encouraged Alternative Models for Enhancing Producer-Buyer Linkages

Some of the provisions suggested in the Model Act to help farmers get integrated with the market are discussed below:

Farmer - Consumer Market - Traditional agricultural marketing chain in India is fairly long due to the presence of a large number of intermediaries adding up to the costs without much addition to the value (GoI, 2013). Retail oriented direct marketing facilitates farmers in getting a higher price and supply of fresh, high quality produce to consumers at reasonable prices (Gallons, 1997). Direct selling to consumers will increase the chance of attaining high income levels by farmers (Govindasamy, 199) as it allows farmers to retain a higher share of the final value of the produce (Aguglia, 2009) by eliminating numerous intermediaries and performing additional functions. High value crops like fruits and vegetables are more suitable for direct marketing. As diversification towards high value horticulture crops is emerging as a major growth factor in agriculture, direct marketing by establishing farmer-consumer markets will help farmers realize better price. Farmers' markets can play an important role in enhancing farm profitability mainly for farmers producing as per the preferences of the consumer (Conner, 2010). An appropriate model of farmers' market also has the potential to address various community based issues. But this concept is not free from challenges in terms of making sufficient infrastructure available and encouraging farmers to bring their produce as only limited growers have access to Apni Mandi in Punjab due to reasons like stay for long hours for sale of vegetables in such markets. The major share of vegetables cannot be sold through Apni Mandi because the traditional wholesalers and retailers have their dominance in vegetable marketing.

Contract Farming - Contract farming has the potential to address many challenges faced by smallholders like access to technology, capital, inputs and market. Contract farming offers benefits by reducing marketing cost,

transaction cost, production cost and improving yield. The small scale producer is benefitted by such arrangements by overcoming constraints like higher transaction costs (Birthal, 2009). Contract farming helps in lowering down the risks and improving expected returns, productivity and farm income (Ramaswami, 2006 & Sharma, 2008). Contract Farming is significantly more profitable (81 per cent higher net income) than independent production, the main pathway being yield and higher price realization (Kumar, 2016). The Model Act circulated in 2017 has advocated for the need of a separate Act for contract Farming. However, so far only 21 states have amended their act as per the provisions prescribed for contract farming in the Model Act circulated in 2003 by the Government of India.

Direct Sale - The traditional regulated system restricts procurement of the produce directly from the farmers by players like processor/manufacturer/exporter, retailer as sourcing has to be done in regulated markets. Such barriers limit the access of small farmers to alternative marketing models. Sourcing of produce from regulated markets will only add to the cost due to multiple intermediaries. Direct marketing may act as one of the potential alternatives of marketing which can benefit both the producer and consumer. This arrangement will not only help in bringing down the marketing cost, but will also help in avoiding the multiple handling of the commodities and thus leading to a reduction in post harvest losses.

Impact of Reforms

The reform process, has, no doubt had its impact on the ground, but it has not been able to keep pace with the rate warranted by the rising production and diversification experienced by the sector. As per the report of the Committee of Ministers In-charge of agricultural marketing, more than 350 farmer consumer markets have been established by different states with different names like Rythu Bazar in Andhra Pradesh, Apni Mandi in Haryana and Punjab and Uzhavar Santhai in Tamil Nadu. The same has also been the case with contract farming as suggested by 31 cases of registration of contract farming. About 2.87 lakh farmers have been benefitted under contract farming across different states and different crops. More than 400 licenses have also been issued for direct sourcing from the producer (Table 1).

Table 1. Status of Performance of different States with reference to different Provisions of Reforms

States	No. of Farmer-Consumer Markets	No. of Direct Marketing Licenses issued for Direct sourcing from farmers	No. of Licenses to Private Markets issued	No of Contract Farming (CF) Cases Registered	Farmers Covered under CF (in 000)
Maharashtra	--	107	26	7	26.87
Andhra Pradesh	107	171	4	1	250.00
Gujarat	--	17	13	2	1.60
Karnataka	15	9	3	--	0.00
Madhya Pradesh	--	2	--	1	2.17
Rajasthan	--	76	2	--	0.00
Haryana	37	--	--	6	2.70
Rajasthan	26	22	--	9	3.75
Tamil Nadu	179	--	6	5	0.00

Source: GoI (2013)

Agricultural Marketing Institutions

Institution is the structure of relations between individuals within the system of market interactions, which include players like producers, consumers and the state. Institutions play five potential roles in strengthening the markets for the commodities produced, bought and sold by smallholders i.e. reducing transaction costs, managing risk, building social capital, enabling collective action and enhancing access to market. The liberal policy regime has also helped in ushering in many institutional arrangements, such as cooperatives, producer companies and organized retail providing farmers better access to inputs, information, credit and assured market.

Cooperatives

Cooperative model has demonstrated its potential in linking farmers with markets. Cooperatives have been helpful to small farmers not only in providing assured market with higher returns, but also provide credit, inputs and extension services. Grape Marketing Cooperatives in Maharashtra (MAHAGRAPES), Mulukanoor Cooperative Society, Telangana and HOPCOMS model of Karnataka are ideal examples of offering benefits to farmers through cooperatives. Such examples

operating under the Cooperative system have helped in achieving economics of scale, access to domestic and international markets, supply of quality inputs, development of infrastructure, quality enhancement and better returns to the farmers.

Producer Companies

The instrument of the Farmer Producer Company, registered under the Companies Act, is emerging as the most effective model for linking farmers to market. It offers a wide range of benefits compared to other formats of aggregation of the farmers. FPC members can collectively tap high value markets and enter into partnerships with private entities on equitable terms. Most of the FPCs remain focused on addressing issues of crop planning, technology infusion, input supply and primary marketing. However, there is a need for such organizations to leverage their presence further up the value chain, entering into direct retailing, value addition, storage and processing and engage in contract production of primary and processed agricultural produce.

There are more than 1000 such producer companies in India now. FPCs have performed well in states like Maharashtra, Madhya Pradesh and Kerala and farmers have been able to realize higher returns for their produce. Some successful examples of producer companies are; Sahyadri Farmer Producer Company Ltd., Nasik, Vegetable Growers Association of India, Pune, Jagannath Crop Producers Company Ltd., Chetna Organic Agriculture Produce Company (COAPCL), Chetna Organic Farmers Association (COFA), Pashusamvardhan Producers Company Ltd., Dhari Krushak Vikash Producer Company Limited, VAMCOL, VANILCO, BIPCL, Rangсутra, Fab India, etc.

Organized Retail

The retail sector is gaining popularity in most of the cities today. The price-sensitive Indian shopper has reached out to stores such as ITC, Reliance, More, Food World, Spencer's, Big Bazaar mainly for the steep discounts and bulk prices. Metro, Wal-Mart and Carrefour have already entered the market through their partnership with Indian firms, and gained opportunity for some early observations. This would lead to a greater demand for graded quality produce in the requisite lot sizes through a transparent and competitive system. Modern retailing can bring in new technology and reduce consumer's prices, thereby, stimulating demand and enhancing employment in production. With the increasing tendency of organized retailing (like supermarkets), farmers' organizations should be provided support

in the form of necessary infrastructure of grading, sorting and packaging that will help in strengthening farm-to-fork linkages.

Opportunities for smallholders under New Regime of Reforms

The Government of India expects state governments to encourage holistic development of the sector through the reform measures with a focus on making the agricultural market system liberal, efficient and uniform for interstate trade. One of the important aspects is to encourage models/ institutions that facilitate direct linkage between producers and consumers either individually or through bulk buyers. The new Model Agricultural Produce and Livestock Marketing (Promotion and Facilitation) Act, 2017, has certain legal provisions to enable farmers avail opportunities for linking directly to consumer.

Function	Player	Allowed	Tax/Fee	• Mean	• Remark
Retail	Farmer	Yes	Nil	• Farmers Market • Consumers • Bulk Buyers	• Tax structure may change after standardized packing and branding
Procurement	Organized bulk buyers	Yes	Fee as prescribed	• License for direct procurement	
Marketing of F&V	All	Yes	Nil	• Outside market	• Deregulation of Marketing of F&V • Marketing of F&V outside the market yard deregulated while allowing regulation when traded inside the market yard

ICT as a Tool to link Farmers with Markets

The measures taken up by the government through reforms have opened up the marketing system and made it more liberal for participation of private player. There is need to strengthen farmers to avail themselves of these opportunities, so as to speed up the process of integration of smallholders with the market. ICT will help farmers in better price realization and enhance market access as has been observed in many other sectors like finance and insurance.

Information Dissemination

Several ICT based initiatives are being utilized in India under different ownership to provide information to the farmers using a number of approaches ranging from

text to voice SMS, digital videos, tele-infrastructure, internet, social media, etc., to get the information delivered to the end users effectively. A matrix of initiatives, their ownership and means used to deliver information is presented in Table 2.

Table 2. Categorization of ICT Initiatives in Indian Agriculture

Ownership/ Delivery Mechanism	Government	Non-Government	Cooperative/ Private/ Consortium
Web-based	AGRISNET, eKrishi, AGMARKNET	-	Pravara, Akashganga, iKisan, aAQUA, Mahindra Kisan Mitra, Haryali Kisan Bazar
Sanchalak (Facilitator between the user and service provider)	-	-	Warana, eSagu, iKisan, e-Choupal
Mobile/ Mixed Approach	KCC, e-Arik, Digital Mandi, e-Agri Kiosk	Fisher Friend Mobile Advisory, Digital green, MSSRF FFMA	IKSL, Reuters Market Light

Wholesale Marketing

ICT has also been used as a platform for wholesale marketing. Electronic National Agricultural Market (e-NAM) or Rashtriya e-market Services Ltd. (ReMS) are examples of ICT based initiatives taken up by the government to enhance market access to the farmers. Both the initiatives provide a virtual market operating on an electronic trading portal, but supported by physical markets at the backend. It has the potential to bring in better price discovery, transparency, competitiveness, efficiency and better participation of farmers by integrating a wide range of functions and functionaries like farmers, commission agents, traders, electronic auction, clearing and settlement, payment gateway, logistics, warehousing, banking with facilities for grading and assaying. The concepts like e-NAM and ReMS operating at national and state level will help in ensuring remunerative price to the farmers on one hand and reasonable cost to the consumers on the other.

ICT as a Platform for Marketing

There are private initiatives as well using ICT as a platform for providing market solutions to farmers like Farmer Friend, an online portal bringing producers and consumers together. The initiative facilitates linking of farmers directly with the consumer. Such models help in bridging the gap between the farmers and the consumers by providing a platform wherein farmers can contact the end-customer directly and vice-versa.

Recommendations

Some of the recommendations to enhance small farmers' access to market are discussed below:

- Some of the obvious measures to enable the smallholders to overcome the disadvantages of the present system are aggregation at the grass-root level, direct marketing through linkages with consumers / exporters / processors / retail chain, shortening the traditional long channels through ICT (e-NAM), etc. Apart from these measures, enhancing processing / export / value addition, and participation of farmers in the modern instruments like Futures Market, Spot market etc., will ensure better returns to the farmers.
- There is a need to set up a marketing cell in every line department of State governments to bring about the perspective of market driven production in agriculture and allied sector. The cell should promote all the modern instruments of marketing on the extension platform such as contract farming, retail chain linkages, farmers-exports / processor linkages, spot markets, direct marketing, aggregation mechanisms such as FPCs, SHGs, cooperatives etc., for their respective commodities.
- The unemployed youth in rural areas have to be incentivized to set up enterprises to directly supply different agriculture/horticultural produce to households, hotels, restaurants, hospitals, etc. This will go a long way towards bringing about direct linkages and shortening of long marketing chains.
- The states should come forward to implement the identified reforms, in letter and spirit of the provisions laid down in the Model Act circulated by the central government to benefit the small and marginal farmers.

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Impact of DAESI Program on Trained Input Dealers: a Perception Study

N. Balasubramani¹

Abstract

Most of the farmers in India seek farm advice from Input dealers. However, majority of these input dealers do not have technical knowledge on Agriculture. Hence, the National Institute of Agricultural Extension Management (MANAGE) launched an innovative program namely, “Diploma in Agricultural Extension Services for Input Dealers (DAESI)” to enhance the technical competency of input dealers. This program is conducted in 11 states. A Perception Study was conducted to analyze the impact of DAESI Program on trained input dealers, by taking 10 per cent of the sample randomly from all the 11 states. The significant findings of the study reveal that there is a positive trend of young people with higher qualifications joining DAESI Program; majority of them are small retailers or selling more than one category of agri inputs; most of the trained input dealers felt that topics covered in the class room, study material given to them and field visits organized were most relevant to them. The level of satisfaction with class room sessions and exposure visits was very good. Majority perceive that they have fully gained Knowledge and Skills on various aspects of agriculture, and gained confidence in technology dissemination, which are sufficient to give suitable advice to field level problems of farmers. Majority felt that their customer base and sale of inputs have increased and they have changed their approach in analyzing the field problems after DAESI Program.

Key words: Agricultural Extension, input dealers, field visits

Introduction

Public extension is one of the major extension systems. Besides this, other private players such as agribusiness companies, agripreneurs, NGOs, input dealers, etc., are also playing a major role in technology dissemination to the farmers. Among various players, input dealer is one of the important sources of information to the farmers. There are about 2.82 lakh input dealers in India (DAESI guidelines, 2014). However, most of these input dealers are not having technical qualification in

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Agriculture. Hence, the National Institute of Agricultural Extension Management (MANAGE) has launched a program titled “Diploma in Agricultural Extension Services for Input Dealers (DAESI)” to enhance the technical competency of input dealers with a view to facilitate better advisory to the farmers. Currently, this program is being implemented as a Central Sector Plan Scheme with the help of various Nodal Training Institutes (NTIs) such as Agricultural Colleges, Krishi Vigyan Kendras, Farmers’ Training Centres, Agricultural Technology Management Agency (ATMA), etc. The program is conducted once in a week at the district level, spread over a period of one year covering various areas of agriculture, business ethics, extension, Acts and Regulations of agri-inputs, etc. As the program is being organised across 11 states of the country, it is felt necessary to learn about various aspects of DAESI with the following objectives.

Objectives

- To study the profile of input dealers trained under DAESI
- To understand the perception of trained input dealers about DAESI program
- To analyse the perceived impact of DAESI program on trained input dealers

Methodology

MANAGE has conducted DAESI program in 11 states during the year 2017-18 covering 2500 input dealers. A list of Nodal Training Institutes and details of State-wise and batch-wise trained input dealers during this period were collected from DAESI division of MANAGE. A sample of 10 per cent was selected randomly from all the 11 states and thus, a total of 250 trained input dealers constituted the respondents of the study. The data were collected by using a pre-tested interview schedule and the results were analysed using frequency, percentage and mean. A Paired t - test was used to compare the impact of DAESI program in terms of confidence gain, increase in customer base and volume of business.

Results and Discussion

Profile of Input Dealers

The selected socio-personal characteristics such as age, education, experience, type of dealership, type of agri-input sold, number of villages covered, information source of DAESI program, source of motivation to join DAESI program were analysed and the results are presented in Table 1.

Table 1. Profile of Input Dealers (N=250)

S. No.	Variable	Category	Number	Per cent
1.	Age	Young (<35 years)	75	30.00
		Middle (36-45 years)	92	36.8
		Old (> 45 years)	83	33.2
2.	Education	10 th Standard	44	17.6
		PUC (11-12) / Intermediate	57	22.8
		Graduate (Arts or Science)	105	42.0
		Post Graduate	33	13.2
		Any other (technical course)	11	4.4
3.	Experience	Low (0 - 4 years)	35	14.0
		Medium (5-21 years)	180	72.0
		High (22-48 years)	35	14.0
4.	Type of Dealership	Retailer	170	68
		Wholesaler	17	6.8
		Wholesaler & Retailer	63	25.2
5.	Type of Agri-input Sold	Seeds	4	1.6
		Fertilisers	22	8.8
		Pesticides	10	4.0
		More than one input	214	85.6
6.	Number of Villages Covered	1-10	96	38.4
		11-25	76	30.4
		26-50	51	20.4
		51-100	9	3.6
		101-500	14	5.6
		>500	4	1.6
7.	Number of Farmers Covered	1-100	18	7.2
		101-250	49	19.6
		251-500	64	25.6
		501-1000	46	18.4
		> 1000	73	29.2
8.	Information Source of DAESI program	Print media	13	5.2
		Electronic media	1	0.4
		MANAGE website	20	8.0
		Extension officers	146	58.4
		Trained input dealers	28	11.2
		Other sources / More than one source	42	16.8

9.	Source of Motivation to join DAESI program	To gain knowledge in Agriculture	64	25.6
		To obtain diploma certificate	16	6.4
		To become a para-extension worker to help farming community	48	19.2
		To have an efficient business	5	2.0
		Other sources / More than one source	117	46.8

Table-1 reveals that majority of the trained input dealers (66.8 per cent) belong to middle and young age category with the age group upto 45 years. As they are acquiring technical knowledge on Agriculture at a young age through DAESI program, it will help them to disseminate better advisory services to the farmers for a longer period. As per DAESI guidelines, the minimum educational requirement for enrolment is 10th standard. However, a majority of the respondents (42 per cent) are graduates and a considerable percentage of them are post graduates and a few of them are also possessing technical degrees. A significant number of input dealers (72 per cent) are having medium experience in agri-input trading. Higher qualifications with considerable years of experience in the field of agri-input trading of the respondents naturally would help them grasp the content covered in the program in a better way. The positive trend of young people with higher qualification joining DAESI program will facilitate quality information delivery to the farmers.

Majority of the input dealers (68 per cent) are retailers having small business entities and about 85.6 per cent of them are selling more than one category of agri-inputs either seeds / fertilisers or seeds / pesticides or a combination of all the agri-inputs. Majority of input dealers (38.4 per cent) are covering upto 10 villages and almost equal number of input dealers are covering 11 - 25 villages. A majority of input dealers (25.6 per cent) are covering 251-500 farmers.

Majority of input dealers (58 per cent) have expressed that they received information about DAESI program through the extension functionaries of Agriculture Department and also through input dealers trained (11.2 per cent) under DAESI program. This may be due to the fact that as per the DAESI guidelines, the input dealers are enrolled by the Department of Agriculture for DAESI program and they are also the license issuing agency and hence, the Department of Agriculture is naturally the major source of information to the input dealers about DAESI program.

Majority of input dealers (46.8 per cent) have perceived that more than one reason motivated them to enroll for the program. The reasons such as, joining DAESI program is an opportunity for them to gain knowledge in agriculture as they do not have any technical qualifications in agriculture; obtaining the diploma is a mandatory requirement for renewal of license, hence, business interest also motivated them to join; a considerable number of the input dealers (19.2 per cent) have felt that they can extend their technical knowledge to the farming community as para extension workers by enhancing their technical competency etc., were motivating factors for them to join the program.

Perception of Input Dealers about DAESI Program

Perception of trained input dealers on various perception items about DAESI program such as topics covered, study material, resource persons and facilitators, records and assignments, facilities and procedure adopted and perceived changes among trained input dealers were collected, analyzed and presented in Table 2.

Table 2. Perception of Input Dealers about DAESI Program (N=250)

Sl. No.	Perception Item	Category	Number	Per cent
1.	About Topics Covered and Study Material			
a	Relevance of the topics covered in classroom	Most Relevant	174	69.6
		Relevant	76	30.4
		Not relevant	0	0
b	Relevance of study material	Most relevant	166	66.4
		Relevant	84	33.6
		Not relevant	0	0
c	Relevance of the field visits conducted	Most relevant	199	79.6
		Relevant	51	20.4
		Not relevant	0	0
2.	About Resource Persons and Facilitators			
a.	Quality of resource persons in delivering the sessions	Very good	193	77.2
		Good	56	22.4
		Poor	1	0.4
b.	Quality of Facilitator in coordinating / conducting the program	Very good	213	85.2
		Good	37	14.8
		Poor	0	0

Sl. No.	Perception Item	Category	Number	Per cent
3.	About Level of Satisfaction of Classroom Sessions and Exposure Visits			
a.	Classroom sessions	Very good	200	80
		Satisfactory	50	20
		Not satisfactory	0	0
b.	Visit to research stations / SAUs	Very good	190	76
		Satisfactory	60	24
		Not satisfactory	0	0
c.	Visit to labs	Very good	171	68.4
		Satisfactory	78	31.2
		Not satisfactory	1	0.4
d.	Visit to Farmers' field	Very good	166	66.4
		Satisfactory	83	33.2
		Not satisfactory	1	0.4
e.	Demonstrations / Field trials/ Hands-on experience	Very good	164	65.6
		Satisfactory	83	33.2
		Not satisfactory	3	1.2
4.	About Records and Assignments			
a.	Problem-solution register	Very useful	183	73.2
		Useful	66	26.4
		Not useful	1	0.4
b.	Field visit register	Very useful	172	68.8
		Useful	78	31.2
		Not useful	0	0
c.	Record for sketches	Very useful	179	71.6
		Useful	67	26.8
		Not useful	4	1.6
d.	Assignment and presentation	Very useful	182	72.8
		Useful	67	26.8
		Not useful	1	0.4
5	About Facilities and Procedure Adopted			
a.	Maintenance of attendance and time management adopted	Most sufficient	233	93.2
		Sufficient	17	6.8
		Insufficient	0	0
b.	Facilities in the classroom	Most sufficient	215	86.0
		Sufficient	34	13.6
		Insufficient	1	0.4
	Assessment of program	Most sufficient	158	63.2
		Sufficient	91	36.4
		Insufficient	1	0.4

Sl. No.	Perception Item	Category	Number	Per cent
6. About Perceived Changes among Trained Input Dealers				
a.	Gained Knowledge and Skill in Crop Production Technologies	Fully	166	66.4
		Partially	77	30.8
		Not at all	7	2.8
b.	Gained knowledge and skill in pest and disease management	Fully	171	68.4
		Partially	75	30
		Not at all	4	1.6
c.	Gained knowledge and skill in soil health management	Fully	150	60
		Partially	93	37.2
		Not at all	7	2.8
d.	Gained knowledge and skill in water management	Fully	138	55.2
		Partially	107	42.8
		Not at all	5	2
e.	Gained knowledge and skill in farm machinery	Fully	127	50.8
		Partially	112	44.8
		Not at all	11	4.4
f.	Gained knowledge and skill in extension management	Fully	134	53.6
		Partially	109	43.6
		Not at all	7	2.8
g.	Change in orientation towards business ethics	Fully	128	51.2
		Partially	108	43.2
		Not at all	14	5.6
h.	Overall knowledge and skill gained in DAESI program is sufficient to give suitable advice to the field level problems of farmers	Fully	166	66.4
		Partially	78	31.2
		Not at all	4	1.6

Table 2 clearly shows that most of the input dealers who have undergone DAESI program have the feeling that the topics covered in the class room, study materials given to them and field visits organised are most relevant to them. This is mainly because MANAGE has launched DAESI in the year 2003 on a pilot basis and the curriculum has been fine-tuned over a period of time, based on the feedback from the input dealers, facilitators and various resource persons. The location-specific crops and problems are given more focus with the help of resource persons from the nearby agricultural colleges, research stations, KVKs, etc. Similarly, 85.2 per cent of the respondents have felt that the quality of facilitators in coordinating the program is very good. This might be due to the criteria adopted in selection of facilitators. All the facilitators are having graduation / post-graduation in agriculture, have rich field experience in organising training programs and possess adequate knowledge about agricultural activities of the district.

Similarly, the findings clearly show that the perception of respondents about the level of satisfaction of classroom sessions and exposure visits to research stations/ SAUs, labs, innovative farmer's fields and demonstration / field trails was very good. Most of the respondents have expressed that though they are in the business for many years they did not visit KVKs / Agricultural colleges, research stations within and outside the district. Eight field visits arranged during the program period have given an opportunity for them to get an exposure to various research organisations and their activities.

The respondents felt that the three Records such as Problem-Solution Register, Field Visit Register, Record for Sketches maintained by the input dealers during the program period and Presentation of Assignments were very useful. Out of three registers majority of the respondents felt that Problem - Solution Register was very useful. They indicated that they used to record all the queries / problems of farmers who had come to their shop and the remedies given by them in the Problem - Solution Register. The same was reviewed and discussed every week in the class room continuously during the program period. They felt that this process had helped them to improve their diagnostic ability and provide better control measures for the field problems of the farmers over a period of time.

Majority of the respondents felt that the facilities and procedure adopted in the program were most sufficient. This might be due to the fact that most of the activities of the program are being organised in Agricultural colleges, Krishi Vigyan Kendras (KVKs) and other agriculture related training institutes which are selected by the state level selection committee based on the availability of necessary training infrastructure such as class room facilities, audio-visual equipment, etc. In addition minimum 80 per cent of attendance, both in classroom sessions and field visits, was mandatory to appear for the final examination. The performance of candidates is assessed regularly through bi-monthly quizzes, mid-term and final exams, practical and viva-voce by the external examiner from the universities or research stations. Due to these reasons, the respondents might have felt that the facilities and procedure adopted in the program are most sufficient.

It is clear from Table 2 that majority of the respondents have a perception that they have fully gained knowledge and skill in crop production technologies, pest and disease management, soil health management, water management, farm machinery, extension management, change in orientation towards business ethics and overall knowledge and skills gained in DAESI program is sufficient to give suitable advice to the field level problems of farmers. The reasons expressed

for such results are that the program is spread over a period of one year, topics are covered holistically by experienced resource persons from the universities, research stations, KVKs, etc., each topic is covered every week in capsule form, review of problem-solution register, field record, record for sketches followed by concurrent evaluation of candidates through bi-monthly quizzes, mid-term and final exams which made them learn various aspects of agriculture fully. They have been exposed to both *kharif* and *rabi* crops. They have also expressed that as they are already in the business for many years and familiar with the field problems, they could relate the classroom learnings and learn quickly. They also opined that as the learnings were having immediate field application it had helped them to learn things better.

Perceived Impact of DAESI Program

Perceived impact of DAESI program in terms of confidence in technology dissemination, increase in customer base, volume of business were assessed and presented in the Table 3.

Table 3. Perceived Impact of Program (N=250)

S. No.	Category	Number	Per cent	
1. Confidence in Technology Dissemination after DAESI Program				
a.	Gained confidence in technology dissemination	250	100	
b.	Not gained confidence in technology dissemination	0	0	
2. Customer Base after DAESI Program				
a.	Increased	248	99.2	
b.	Not Increased	2	0.8	
2.1. Extent of Increase in Customer Base after DAESI program				
a.	Up to 10%	31	12.50	
b.	11-15%	51	20.56	
c.	16-25%	67	27.02	
d.	26-50%	49	19.76	
e.	More than 50%	50	20.16	
2.2. Change in Customer Base after DAESI Program				
S. No.	Category	Before DAESI	After DAESI	Per cent Change
a.	For advice	19.05	34.59	81.57
b.	For Purchase of Inputs	28.39	43.54	53.36
c.	Level of adoption of suggested recommendations in the field by the farmers	24.67	40.84	65.54
d.	Repeat customers for advice	26.90	43.62	62.16

Paired t-test : P < 0.001

Sl. No.	Category	Number	Percent
3. Sales Status			
a. Increased		246	98.8
b. Not increased		4	1.6
3.1 Extent of Increase in Sales / Volume of Business			
a. 1-20 %		132	53.66
b. 21-40 %		72	29.27
c. 41-60 %		29	11.79
d. 61-80 %		8	3.25
e. 81-100%		5	2.03

The results presented in the Table 3 indicate that cent per cent of the respondents felt that they had gained confidence in technology dissemination as they could gain sufficient knowledge in classroom sessions, practicals and exposure visits. They expressed that even if they were unable to diagnosis certain symptoms, they are now having the contact numbers of all the resource persons and facilitators who handled the classes and hence they would consult them and pass on suitable advice to the farmers.

A majority of the input dealers (99.2 per cent) felt that their customer base had increased after DAESI program due to their proper diagnosis of problems and appropriate suggestions for remedies. About 27 per cent of input dealers felt that their customer base had increased 16-25 per cent. One-fifths of the respondents expressed that their customer base had increased to more than 50 per cent. The customer base for seeking advice and for purchase of inputs had increased to 81.57 and 53 per cent, respectively, in the post-DAESI period. Repeat customers for advice also increased to 62 per cent. It is evident from the paired test value which is highly significant at 1 per cent.

The study also indicates that most of the respondents (98.8 per cent) have indicated that sale of inputs increased. More than half of the respondents (53.66 per cent) have expressed that the sale of inputs has increased 1-20 per cent in the post-DAESI period.

Status of Field Problem Analysis Approach after DAESI Program

The approach of input dealers in analyzing the field problem after DAESI program was assessed and presented in Table 4.

Table 4. Approach of Input Dealers in Analyzing Field Problem after DAESI Program (N=250)

S. No.	Category	Number	Per cent
1.	Changed	245	98.00
2.	Not changed	5	2.00

4.1 Change in Input Dealers' Field Problem Analysis Approach after DAESI program

S. No.	Category	Before DAESI		After DAESI	
		Number	Per cent	Number	Per cent
1.	Before giving advice, I analyze the problem duly discussing with farmers about the symptoms, the previous practices / inputs applied	40	16.33	234	95.51
2.	I ask the farmers to bring specimens for diagnosis	42	17.14	234	95.51
3.	I consult the other trained input dealers before advising the farmers	56	22.86	214	87.34
4.	I consult the resource persons and facilitators before giving advice to the farmers	49	20	229	93.46
5.	I visit farmers' field to understand the actual problem and suggest remedies	44	17.95	235	95.9
6.	I refer relevant study material given in DAESI program	17	6.93	242	98.77
7.	I advise farmers to go for soil test and apply fertilisers as per the Soil Test Result	48	19.59	238	97.14
8.	I advise farmers to encourage beneficial insects in their fields	32	13.06	236	96.33
9.	I advise farmers on the importance of bio-fertilisers and bio-pesticides to ensure eco-friendly and quality produce to consumers	32	13.06	241	98.36
10.	I update the farmers about the programs and schemes of Dept. of Agriculture and guide them to consult the Department officials to avail the benefits	50	20.41	238	97.14

Paired t-test : P < 0.001

The result indicated in Table 4 shows that 98 per cent of the respondents have changed their approach in analyzing the field problem after DAESI program. It is evident from the highly significant value of paired t-test at one per cent. Most of the respondents have expressed that they are not giving the insecticides or any other agri-inputs without proper analysis like they were doing prior to DAESI program. Instead, they have indicated that they discuss with the farmers to

understand the practices adopted by them, sometimes they ask the farmers to bring disease-affected specimens and visit farmer's field to observe the symptoms, if required. The trained dealers have formed WhatsApp group and hence, sometimes they share the symptoms through WhatsApp to get suggestions of the group members. They have also expressed that they have the contact numbers of all the resource persons who took classes throughout the program period. They used to contact the resource persons, in case they were unable to diagnosis the problems. They felt that they had realized the importance of their clients/farmers to sustain their business and hence, they used to advice the farmers to go for soil test and soil test based fertiliser application as well as bio-pesticides to ensure eco-friendly and quality produce to consumers. They indicated that earlier they were dependent only on representatives of agri-business companies for information. But now their approach has changed totally to analyze the field level problems.

Need for Refresher Training Program

The need for a refresher training program and the areas of training required for the trained input dealers were assessed and are presented in Table 5.

Table 5. Need for Refresher Training Program and Areas of Training (N=250)

S. No.	Category	Number		Per cent			
a. Need for Refresher Training Program							
1.	Needed	215		86.00			
2.	Not needed	35		14.00			
b. Areas of Training Needs of Trained Input Dealers in Refresher Training Program							
S. No.	Areas of Training	Most needed		Needed		Not Needed	
		Number	Per cent	Number	Per cent	Number	Per cent
1.	Agricultural inputs	101	46.97	91	42.33	23	10.70
2.	Pest and disease management	122	56.74	83	38.60	10	4.65
3.	Crop diversification	92	42.79	105	48.84	18	8.37
4.	Soil health management	106	49.30	96	44.65	13	6.04
5.	Irrigation / Water management	87	40.46	103	47.90	25	11.63
6.	Weed management	107	49.77	94	43.72	14	6.51
7.	Processing and value addition	79	36.75	104	48.37	32	14.88
8.	Marketing	89	41.40	104	48.37	22	10.23

9.	Bio-control agents / Bio-pesticides	113	52.56	88	40.93	14	6.51
10.	Precautions in handling, storing and use of antidotes in case of accidents	100	46.51	99	46.05	16	7.44
11.	Schemes and Programs	86	40	117	54.42	12	5.58
12.	Weather information	98	45.58	94	43.72	23	10.70
13.	Credit information	81	37.68	102	47.44	32	14.88
14.	Farm machinery / implements	87	40.47	116	53.95	12	5.58
15.	Consumer behaviour	94	43.72	86	40	35	16.28
16.	Record Keeping	104	48.37	96	44.65	15	6.98
17.	Computer application in file and business management	109	50.70	101	46.97	5	2.33

Table 5 clearly indicates that majority of the respondents (86 per cent) have expressed that they need Refresher Training program. They have realised the importance of regular trainings for updating their technical knowledge to sustain their business in future. Most of them are ready to pay for their training. Hence, the district level organisations such as KVKs, ATMA or state level organisations such as SAMETI can organise two to three day training program every year on recent advances in agriculture.

They have also indicated the most needed topics for refresher training program as Pest and Disease Management (56.74 per cent), Bio-Control Agents Bio-Pesticides (52.56 per cent), Computer Applications in File and Business Management (50.70 per cent), Weed Management (49.77 per cent), Soil Health Management (49.30 per cent), Record Keeping (48.37 per cent), Agricultural Inputs (46.97 per cent), Precautions in Handling, Storing and Use of Antidotes in Case of Accidents (46.51 per cent), Weather Information (45.58 per cent), etc. The training institutes may consider the above topics while organizing refresher trainings to meet the needs of input dealers.

Reasons for Farmer's Access to Input Dealers

The reasons why farmers are coming to the input dealers as their customers are analysed and presented in Table 6.

Table 6. Reasons for Farmer's Access to Input Dealers (N=250)

S. No.	Category	Number	Per cent
1.	Proximity	166	66.4
2.	Low price	194	77.6
3.	Easy accessibility	229	91.6
4.	Quality of input	238	95.2
5.	Timely availability	233	93.2
6.	Relevant and practical solution	240	96
7.	No alternative available	106	42.4
8.	Visiting field	216	86.4

The above Table indicates the reasons for farmer's approach / access to input dealers' shop. Ninety-six per cent of the respondents indicated that relevant and practical solution given by the dealers is the main reason for farmers' visit to their shop. Quality of input (95.2 per cent), timely availability (93.2 per cent), easy accessibility (91.6 per cent), etc., are various other reasons for farmer's visit to a particular input dealer's shop.

Constraints Faced by Agro-input Dealers

Various constraints faced by the input dealers are collected, analysed and presented in Table 7.

Table 7. Constraints Faced by Agro-input Dealers (N=250)

Sl. No.	Constraint	Number	Per cent
1.	Lack of capital	133	53.2
2.	Non-availability of bank loan	109	43.6
3.	Fluctuation of selling price of input due to seasonal demand	199	79.6
4.	High cost in transportation	193	77.2
5.	Lack of need-based training	168	67.2
6.	Inadequate knowledge in maintaining stock book and sales register of the product	155	62
7.	Lack of technical knowledge of the retailers about brands of product	137	54.8
8.	Delay in renewal of license	85	34

Table 7 shows that 79.6 per cent of the respondents felt that fluctuation of selling price of input due to seasonal demand is one of the main problems. As majority of the cultivable area is under rainfed condition with short crop duration of only 3-4 months, their business is only in the peak cropping season. In the remaining months only the irrigated farmers purchase inputs and hence, for about 8 - 9

months they have no good business in the off-season. High cost of transportation, lack of need-based training, etc., are some of the other problems of input dealers.

Suggestions for Improvement of DAESI Program

The suggestions of respondents for improvement of DAESI program with regard to duration, timings, number of field visits, study materials, methodology etc., were assessed and presented in Table 8.

Table 8. Suggestions to Improve DAESI Program (N=250)

Sl. No.	Suggestion	Category	Number	Per cent
1.	Duration of Program	Increase	72	28.8
		Decrease	23	9.2
		No change	155	62.0
2.	Timings of program	Increase	36	14.4
		Decrease	26	10.4
		No Change	188	75.2
3.	Interval of classes	Increase	31	12.4
		Decrease	32	12.8
		No change	187	74.8
4.	Number of sessions per day	Increase	45	18.0
		Decrease	19	7.6
		No change	186	74.4
5.	Number of practical classes	Increase	132	52.8
		Decrease	7	2.8
		No Change	111	44.4
6.	Number of field visits	Increase	140	56.0
		Decrease	6	2.4
		No change	104	41.6
7.	Study material	Require more	123	49.2
		Require less	29	11.6
		No change	98	39.2
8.	Methodology of program	Require change	48	19.2
		Slight change is required	66	26.4
		No change	136	54.4
9.	Content and curriculum/ syllabus	Require modification	46	18.4
		Slight modification is required	76	30.4
		No change	128	51.2

As per the above Table, majority of the respondents have clearly indicated that there is no change required in the existing program in the areas of duration and timings of the program, interval of classes, number of sessions per day, methodology of the program and content and curriculum/syllabus. However, 56 per cent of the respondents suggested increasing the number of field visits, 52.8 per cent of them suggested increasing the number of practical classes and 49.2 per cent of them felt some more study material is required.

Conclusion

As majority of the farmers rely upon input dealers for technical advice, enhancing technical competency of the input dealers would improve the quality of farm advisory services. The study reveals that DAESI program has helped the input dealers to gain confidence in technology dissemination. Hence, in the post-DAESI period also the input dealers should be given continuous training to keep them updated with latest technologies and innovations so as to make them as para-extension professionals.

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Factors Influencing the Entrepreneurial Behaviour of Agripreneurs in Andhra Pradesh

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Abstract

This study aims to identify the factors that influence the entrepreneurial behaviour of agripreneurs in three selected districts of Andhra Pradesh i.e. Chittoor, Krishna and Visakhapatnam, which were selected based on the highest number of agri linked enterprises. Two hundred and forty agripreneurs were selected through proportionate random sampling. Expost- facto research design was used in the study. An attempt has been made to evolve a set of factors influencing the entrepreneurial behaviour through a data reduction process of factor analysis. The factors include: need for independence, communication network, innovativeness, achievement motivation, leadership behaviour, entrepreneurial self-efficacy, decision making and business skills. Results reveal that two factors such as entrepreneurial potential and entrepreneurial skill factor accounted for the maximum percentage of the total variance on overall entrepreneurial behaviour of agripreneurs.

Key words: Agripreneurship, entrepreneurship, factor analysis.

Entrepreneurs and entrepreneurship are the pillars on which economic health of societies was built. Their role has been highlighted in opportunity creation through new ventures and maintenance of existing ones. In the present context, entrepreneurial behaviour has been operationalized as the cumulative outcome of eight components namely, need for independence, communication network, innovativeness, achievement motivation, leadership ability, decision making, entrepreneurial self-efficacy and business skills. Parimaladevi *et al.* (2006) reported that the most important factors influencing establishment of agro based enterprises were attitude towards self-employment, entrepreneurial ability and self-confidence. Dedicated personnel with managerial skills are a critical input for successful agri business (Arora, 2001). Hence, it has been felt imperative to study the determinants of entrepreneurial behaviour through a data reduction process on entrepreneurial

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behavioural components. Principle component analysis and factor analysis (with varimax rotation) was adopted to assess the determinants of entrepreneurial behaviour among agripreneurs. Principle component analysis (PCA) is a data reduction technique, i.e., it reduces a larger set of predictor variables to a smaller set with minimal loss of information. PCA may be applied before running regression analyses or for exploratory purposes to help researchers understand relationships among their variables or discover patterns in their data (Kristin and Sainani, 2014).

Material and Methods

The study was conducted by using ex-post facto research design. The state of Andhra Pradesh was selected purposively. One district was selected from each region of Andhra Pradesh based on the highest number of agro based enterprises *i.e.* Visakhapatnam from north coastal, Chittoor from Rayalaseema and Krishna from southern region of Andhra Pradesh. From the selected districts 80 agripreneurs were selected by using proportionate random sampling. Thus a total of 240 agripreneurs were included in the study. The primary data were collected using a pre-tested structured interview schedule by conducting personal interview. Data was tabulated, classified and analyzed using principle component analysis technique.

Results and Discussion

Principle Component Analysis of Entrepreneurial Behavioural Components

To study the entrepreneurial behaviour of agripreneurs, eight major components were taken into consideration. In this section, PCA and factor analysis (with varimax rotation) were used to group the components into factors based on the communalities observed.

Principle component analysis was carried out with all the components and the results are furnished in Table 1.

Table 1. Eigen values for Components of Entrepreneurial Behaviour of Agripreneurs

Component number	Eigen value	Cumulative variation (%)
I	5.109	63.86
II	1.714	85.28
III	0.156	87.23
IV	0.032	87.63
V	0.202	90.15
VI	0.351	94.53
VII	0.137	96.24
VIII	0.302	100.00

Extraction Method: Principal Component Analysis.

Table 1 provides details of Eigen values and percentage of variance explained by the components. The components which are having more than one Eigen value were selected. Thus, from the eight components, two factors were extracted and these factors together explained a total variance of 85.28 per cent towards entrepreneurial behaviour. From the results, it could be concluded that two factors having more than one Eigen value are contributing 85.28 per cent variation towards entrepreneurial behaviour of agripreneurs.

Rotated Factor (Varimax) Matrix of Components

The results of principle component analysis clearly indicated that there are two factors which explained maximum variation (85.28%) in entrepreneurial behaviour. Further, factor loading of each component under two factors were analyzed and furnished in Table 2.

Table 2. Rotated Factor (Varimax) Matrix of each Component

Sl. No.	Entrepreneurial Behavior Components	Factors	
		1	2
1.	Need for independence	0.868	-0.183
2.	Communication Network	0.923	-0.034
3.	Innovativeness	0.239	0.788
4.	Achievement Motivation	0.812	0.295
5.	Leadership Behaviour	-0.178	0.879
6.	Entrepreneurial Self-Efficacy	0.730	0.632
7.	Decision Making	0.786	0.544
8.	Business Skills	0.450	0.853
	Eigen values	5.109	1.714
	Per cent of variation explained	63.86	21.42
	Cumulative per cent variation explained	63.86	85.28

From Table 2 each factor column was scanned for identifying the components which were more significantly correlated with the particular factor. Thus, from each factor column, the components having a factor loading of more than 0.65 were selected and grouped in Table 3.

Table 3. Factors-wise Components with Factor Loading

Factors	Components of Entrepreneurial Behavior	Factor loadings
Factor 1	Need for independence	0.868
	Communication network	0.923
	Achievement motivation	0.812
	Decision making	0.786
	Entrepreneurial self-efficacy	0.730
Factor 2	Leadership behavior	0.879
	Innovativeness	0.788
	Business skills	0.853

The data in Table 3 revealed the grouping of components under each factor with their factor loadings.

Factor 1

This factor was identified as ‘prime factor’ as it explained 63.86 per cent of variation in entrepreneurial behaviour of agripreneurs. From Table 3 it could be inferred that under factor 1, communication network is influencing the entrepreneurship to a greater extent with the highest factor loading of 0.923 followed by need for independence (0.868), achievement motivation (0.812), decision making (0.786) and entrepreneurial self-efficacy (0.730). Since, these factors primarily deal with entrepreneurs’ self-potential, it has been termed as ‘Entrepreneurial potential’ factor of entrepreneurial behaviour in this study.

Entrepreneurial potential factor which includes communication network, need for independence, achievement motivation, decision making and entrepreneurial self-efficacy were indicative factors of entrepreneurial behaviour and vital to start and continue the business. The success in agribusiness requires enough competence and experience to leverage the modes of business operations. Networking with concerned stakeholders could provide enough support and way forward in running the agribusiness and achievement motivation decide the expansion of any business and they are bound to have profound impact on the entrepreneurial behaviour of agripreneurs. Due to the above facts, five components *viz.*, need for independence, communication network, innovativeness, achievement motivation, decision making and entrepreneurial self-efficacy were found to be interlinked with each other and have been loaded in Factor 1.

Factor 2

Among the total variation of 85.28 per cent, the second factor explained the entrepreneurial behaviour variation to the extent of 21.42 per cent. From the results, it could be concluded that among the three components in factor 2, leadership behaviour has been found to manipulate the entrepreneurial behaviour to a greater extent with the highest factor loadings of 0.879 followed by business skills (0.853) and innovativeness (0.788). As these factors mainly deal with skills of the entrepreneurs, it has been termed as 'Entrepreneurial skill' factor.

Leadership behaviour, business skill and innovativeness are critical skills that one should possess to do business. Therefore, these three components could have been interlinked with each other and significantly loaded in a single factor namely entrepreneurial skill factor. Hence, it could be interpreted that entrepreneurial skill factor was bound to have profound impact on the entrepreneurial behaviour and contributed for 21.42 per cent of total variance.

It could be concluded from the above analysis that perceived entrepreneurial behaviour of agripreneurs could be determined by the factors such as entrepreneurial potential and entrepreneurial skill. Among these factors, entrepreneurial potential factor accounted for the maximum percentage of the total variance on the overall entrepreneurial behaviour of agripreneurs.

Conclusion

It could be concluded from the above analysis that perceived entrepreneurial behaviour of agripreneurs could be determined by the factors such as entrepreneurial potential and entrepreneurial skill. Among these factors, entrepreneurial potential factor accounted for the maximum percentage of the total variance on the overall entrepreneurial behaviour of agripreneurs.

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Crop Based Community KVK - a Predictive Innovative Model of Technology Delivery to Reach the Unreached

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Abstract

Efforts have been made from time to time to raise the productivity of farmers through extension services but their objectives are still poorly met. The purpose of extension is to disseminate advice to farmers. Gaps in knowledge contribute to the yield gap in biophysical and economic settings. The current extension worker to farmer ratio is very wide in India and hence to address the particular crop in a particular block is very low. The Mandate of Krishi Vigyan Kendra and technology delivery is focussed to particular interventions and is not specific to crop based zone. Technology decision support system is not available within the crop zone and the farmers are unable to get the required knowledge. On the demand side, self-selection on the part of larger, more commercial farmers may bias outcomes. Extension service budgets may be inadequate. Issues of motivation, competence, performance and accountability of extension institutions and their agents may affect results. The main lacunae in reaching small and marginal farmers in rainfed areas for service delivery of technological information's is limited staff. To overcome these constraints and fulfil demands of the farmers, the proposed predictive innovative model of Crop based Community KVK will certainly play a major role in transferring the technologies through trainings by creating farmer experts and shaping them as unique Cluster Crop Experts in the selected village clusters. Community KVK is an innovative conceptual model designed for technology delivery of farm information to the farming community in cluster villages by establishing similar set up of KVK in villages by training and networking of socially amicable farmers. Upscaling this model, can convert farmer Subject Matter Specialists into paid service consultants and they can excel in comparison to input dealers who do not possess crop based knowledge. Further, marketing linkage can be created through farmers groups like commodity groups, FIGs and other groups.

Key words: Crop Based Community, innovative model of technology

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Introduction

Efforts have been made from time to time to raise the productivity of farmers through extension services but their objectives are still poorly met. Farm extension is mainly concerned with two pronged services of information empowerment and technology delivery. ICT led extension service attempts to address the information requirements of extension agents to a great extent. However, the function of technology delivery is the major concern of today. So, a need has been felt for an innovative technology delivery medium through which the technology can be delivered to remote farmers with limited extension functionaries. Thus it is high time to analyze the various extension approaches under the changing agricultural scenario to address the issue of technology delivery.

The current extension worker to farmer ratio is very wide in India *i.e.* 1:5000 whereas in case of China it is 1:625 (*Ragasa et al. 2013*). It is on record that about 40 per cent of the field level extension workers are not in position. The percentage may further increase as at least 25 per cent of the extension workers are in administrative or supervisory position who are not directly in touch with farmers. With remaining extension workers, at least 50 per cent of the time goes for administrative work, official correspondence, works of health department, census works, panchayat department works *i.e.* in non-farm activities. In India, out of 143,863 positions in the Department of Agriculture, only 91,288 posts are filled (*Chandragowda, 2011*). Combined with the large number of farm households in the country, this small number of positions means that on an average, extension services only reach 6.8 per cent of farmers (GFRAS, 2012). About 21,000 agricultural scientists are working in the public sector and 70 per cent of them are involved in research on different crops and coming out with different novel technologies but failed to reach the farmers on account of shortfall in extension agents and lack of effective delivery mechanism.

The purpose of extension is to disseminate advice to farmers. Gaps in knowledge contribute to the yield gap in biophysical and economic settings. Services and purchased inputs such as seeds and synthetic complements are essential productivity-enhancing tools. However, their effective use requires knowledge, which advisors need to articulate and communicate to farmers. The knowledge farmers need goes well beyond production. It includes price and market information, post-harvest management techniques, and an understanding of product quality determinants and safety standards. Some farmers marshal and command the needed knowledge on their own. The 'resource-poor' majority of farmers (growers of a large share of

the nation's food) depend on science-based extension from outside to complement their local knowledge for improved farming and prospects for sales. How, therefore, can one best get meaningful advice to farmers and create learning environments that help achieve the desired outcomes and results?

Farmers living in widely dispersed communities can be difficult to reach. Farmers' information needs vary across locations, making extension challenging. Supply side rationing may be a problem in the sense that there are likely to be too few extension agents relative to the number of farmers. On the demand side, self-selection on the part of larger, more commercial farmers may bias outcomes. Extension service budgets may be inadequate. Issues of motivation, competence, performance and accountability of extension institutions and their agents may affect results (Anderson, 2007).

The grand challenge now is (i) to improve farmers' access to the right kind of timely knowledge and information and (ii) to reach all farmers. Public and private information systems should complement each other and operate in partnership rather than at cross-purposes or duplicative at the expense of under serviced areas.

Extension approaches for Technology Delivery

The age-old practice of extension-farmer contact on a one-to-one basis, though very effective, is expensive and unsustainable as the sole means of reaching farmers with agricultural technology. New methods emphasize the passing on of agricultural technology to farmers in organized groups (farmer groups) like *Innovative Farmer Approach*: Resource rich farmers had utilized the government support but small and marginal farmers have been left out; *Farmer-Group Approach*: A farmer group is a collection of farmers interacting with one another towards achieving a common goal. A group size between 20 and 30 is ideal and manageable in order to provide a face-to-face interaction, better communication and the free flow of information. However, as veritable machinery, which is sustaining and relatively cost-effective, the farmer-group approach is dependent on sufficient mobilization at the grassroots and in social units in order to achieve the desired objectives of the approach.

Role of Krishi Vigyan Kendra in Agricultural Technology Dissemination

In India, Krishi Vigyan Kendra (KVK) is one of the most significant technology delivery media to disseminate the latest agricultural technologies to the farming community living in remote rural areas through a scientific manner. One of the mandate of Farm Science Centre or Krishi Vigyan Kendra (KVK) is imparting need based training to farmers and extension professionals on a regular basis.

KVK in Vellore district of Tamil Nadu is located in Vada Vrinjipuram village (K V Kuppam block) functioning since 2004, as a Knowledge and Resource centre for the entire district. The six scientists working at the KVK are catering to the needs of farmers visiting the KVK and satisfy their queries by emails, phone calls, SMS and through direct diagnostic field visits.

The KVK provides periodical updates of knowledge on latest technologies in agriculture, horticulture and animal husbandry through monthly zonal workshops to Extension officials and also through trainings, newsletters, pamphlets, booklets, CDs *etc.* for faster dissemination of technology to farmers. The KVK has made many outstanding contributions for the upliftment of farmers and its impact has created a huge demand and expectations from the farmers that the service should reach more number of farmers in remote villages.

The main lacunae in reaching small and marginal farmers in rainfed areas for service delivery of technological information is that only six scientists or limited staff are available. These scientists could not cover all the 20 blocks of Vellore district due to constraints of time, manpower, finance, transport facilities *etc.* Four to five blocks nearby, *i.e.* KV Kuppam, Gudiyatham, Anaicut, Vellore and Kaniyambadi are mostly covered. To impart trainings, the Assistant Director of Agriculture of the concerned block is consulted and selected farmers are given training. Many-a-times the same set of farmers attend the training thus not giving a chance to other small and marginal farmers.

To overcome these constraints and fulfil the demands of the farmers, a conceptual model of Community KVK is proposed to transfer the technologies through trainings by creating farmer experts and shaping them as unique subject matter specialists in the selected village clusters.

Methodology for Innovative Conceptual Model - Community KVK

Community KVK is an innovative conceptual model designed for technology delivery of farm information to the farming community in cluster villages by establishing similar set up of KVK in villages by training and networking of socially amicable farmers.

Objectives of the Community KVK Innovative Conceptual Model

1. To demarcate the crop zone in a particular block with the help of line department
2. To identify the farmers and train them as Community KVK experts with master trainers (Scientists)

3. To disseminate agricultural and allied sector technologies to all sects of farming community
4. To create a network of knowledge experts by establishing a Community KVK
5. To solve field level problems at village level by the villagers themselves
6. To bring out socio economic changes among the rural community

Selection of Community KVK Village Clusters (CKVC)

Based on the single major cropping area of the district, village clusters will be identified covering a radii of 10 km and will be called as Community KVK. The crops will be agricultural, horticultural and other crops.

These will be selected based on the participatory discussion with scientists, extension officials, farmers, key informants of KVK and also based on the request from the villagers of the district.

The selected villages will be monitored through Community KVK experts throughout the cropping period.

Identification of Community KVK Programme Coordinator (CKPC)

The KVK scientist team will extensively explore the selected Community KVK Village Clusters and conduct focus group discussions and meetings with key informants, opinion leaders, progressive farmers and others. The interested trustworthy farmers will be called for a meeting and informed about the objectives of Community KVK and their roles and responsibilities.

The selected CKPC will be given training on capacity building, leadership, communication and management skills so that they act as good leaders, motivators, coordinators and trainers. These CKPC will be trained in any one major crop production, protection, water conservation, value addition, horticultural and animal husbandry aspects and required handy reference book materials will be provided.

Requirements

- Minimum school education of 10th standard
- Key informant to KVK and opinion leader in that village
- Seniority in age and experience is desirable
- Volunteer
- A Village leader
- Amicable and trustworthy

Identification of Community KVK Subject Matter Specialist (CKSMS)

Similar to the set up of KVK functioning in the district, six CKSMS will be selected based on the needs and interests of the farmers in the selected Community KVK Village Cluster. They will be trained in the following subject matter areas:

1. Agronomy (Crop production aspects)
2. Plant Pathology (Crop protection aspects)
3. Horticulture (Crop production of fruits, vegetables and forestry crops)
4. Agricultural Extension (Capacity building, group formation, communication skills)
5. Home science (Value addition)
6. Animal Husbandry (Veterinary related aspects) similar to the KVK scientific set up

Minimum Requirements

- Service minded attitude
- Minimum School Education of 10th standard
- Ability to read and write Tamil and English fluently

Personal qualities required for CKSMS

- Ability to bear risks and responsibilities
- Project a cheerful, enthusiastic and optimistic image
- Good communication skills
- Listening behaviour
- Courage to delegate
- Accept and capitalize change
- Knowledgeable about village and villagers issues and problems
- Ability to interpret and analyse the situation
- Avoid needless confrontation
- Trustworthy and respectful

The CKPC will facilitate in selection of these CKSMS in the village cluster and terms and conditions will be formulated. The tenure of these CKSMS will be rotated once in two years by giving opportunity to other interested farmers.

Method of Training

The selected CKSMS will be provided with training *viz.*, on campus training, off campus training, vocational training, exposure visits, field days and hands on experience in laboratories and field demonstrations by the scientists of KVK, Vellore within a period of six months.

They will be called for and given priority in all the training programmes of KVK and University to update their knowledge in various sectors from time to time.

They will be provided with minimum of 3-4 trainings that will be conducted in the village itself before the start of season, during mid season and at harvest season.

The CKSMS will be examined for their pre and post training knowledge gain by conducting pre-test and post-test evaluation after their participation in the training.

After confirming their satisfactory level of knowledge gain, these CKSMS will be directed to train their fellow farmers and disseminate the technologies in the respective village clusters.

These CKSMS will be advised to select already formed self-help groups, farmer discussion groups, commodity interest groups *etc.* for imparting training and/or spread of information gained at KVK, Vellore.

Any new area of need or interest of the villagers will be brought to the notice of KVK scientists and accordingly required training will be imparted to the set of interested farmers.

These well trained CKSMS will be able to analyse any agricultural, horticultural or veterinary related problems at the village level and give solutions based on the knowledge gained at the KVK. This would reduce the drudgery of transport, money and time delay in contacting the KVK directly for solving simple issues.

In case of any problem of pests and diseases which could not be solved by the CKSMS, they need to send their queries to KVK scientists over phone or send photos through internet/e mail or mobile, WhatsApp and get the solutions to pass on to the villagers.

Stipend and Honorarium

Though the selected CKSMS will be working on voluntary service basis, they need to be provided with monthly stipend to meet their transport costs, communication (charges for phone calls and internet usage) and refreshment charges during the initial period of establishment of Community KVK.

Besides, honorarium may be provided to them by inviting the Community KVK Programme Coordinator and Community KVK Subject Matter Specialists as guest speakers in the regular KVK training programmes.

Role of KVK in establishment of Community KVK

The role of the KVK could be in

- Identification of major crop based village cluster in the selected blocks of Vellore district
- Identification of village cluster key informants as CKPC by various means of focus group discussion by involving line departments
- Imparting trainings to CKPC for selection of Community KVK SMS
- Identification of CKSMS in the selected Village clusters
- Subject wise training to each CKSMS and making them experts
- Fixing/determining rules and regulations for operation of Community KVK
- Determination of duties and responsibilities of CKPC and CKSMS
- Monitoring and evaluation of Community KVK activities by visiting the village clusters every fortnight
- Impact study on socio economic status of the farmers in the selected village clusters
- Enhancing the crop based problem solving ability of the Community KVK SMS
- Linking the Community KVK with the line departments viz., Department of Agriculture, Department of Horticulture, Department of Agricultural Engineering, NGOs, Farmer Associations, Farmer Producer Companies and Input dealers
- Uplifting the Community KVK experts as/into farming consultants

Outcome of the Proposed Model of Community KVK

- A network of Community KVKs and Community KVK Subject Matter Specialists will be created through trainings of ICAR-SAU KVKs and disseminate knowledge at village level
- Faster dissemination of knowledge on latest technologies
- Farmers start analysing their problems and village issues and come out with their own solutions to solve at the village itself
- Mandate of ICAR-SAU KVK will be fulfilled and limitations of manpower will be managed

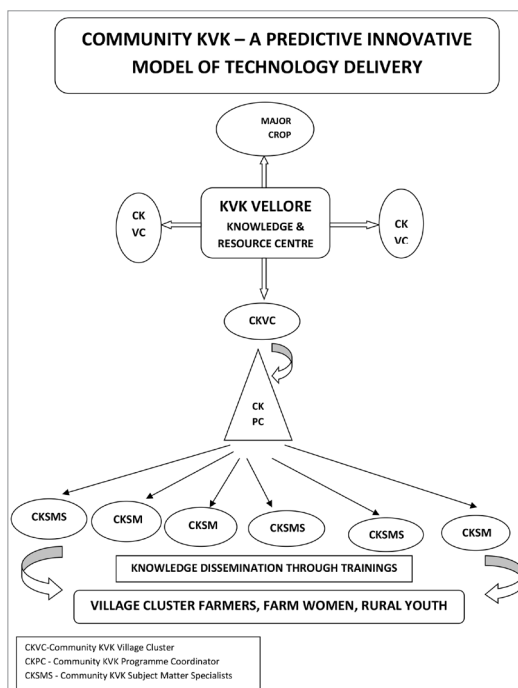
- Farmers become experts in modern agriculture and even turn as scientists paving the way for Researcher-Farmer scientists' interaction and evolve new location specific varieties and technologies
- Production and productivity of the selected crop zone will be enhanced
- Overall social change will occur through agricultural growth expansion and rural upliftment

The main lacunae in this model will be the selected farmers who possess less qualification and their degree of service mindedness may vary as the time passes on.

Conclusion

The current extension worker to farmer ratio is very wide in India *i.e.* 1:5000 whereas in case of China it is 1:625 (*Ragasa et al. 2013*) and hence to address the particular crop in a particular block is very low. The Mandate of Krishi Vigyan Kendra and technology delivery is focussed to particular interventions and not specific to crop based zone. Technology decision support system is not available within the crop zone and the farmers are unable to get the required knowledge. On the demand side, self-selection on the part of larger, more commercial farmers may bias outcomes. Extension service budgets may be inadequate. Issues of motivation, competence, performance and accountability of extension institutions and their agents may affect results. The main lacunae in reaching small and marginal farmers in rainfed areas for service delivery of technological information is that only six scientists or limited staff are available. To impart trainings, the Assistant Director of Agriculture of the concerned block is consulted and selected farmers are given training. Many-a-times the same set of farmers attend the training thus not giving a chance to other small and marginal farmers. To overcome these constraints and fulfil demands of the farmers, the proposed predictive innovative model of Crop based Community KVK will certainly play a major role in transfer of the technologies through trainings by creating farmer experts and shaping them as unique *Cluster Crop Experts* in the selected village clusters.

Upscaling this model, can convert farmer SMS into paid service consultants and they can excel in comparison to input dealers/shop merchants who don't possess crop based knowledge. Further, a marketing linkage can be created through farmers groups like commodity groups, FIGs and other groups.



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Does Demographics Influence Adoption of Information Technology Devices?

–an understanding of Rural Consumer Behaviour

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Abstract

The Information Technology sector has immensely contributed to India's growth story. It has put India's name on the global map and has been a major contributor towards the growth of Indian economy. This study assesses the ownership of information technology devices among rural consumers, their preferences towards these devices and whether the demographic characteristics have an impact on ownership and preferences of these devices. Data collection from rural consumers was through a structured questionnaire with questions related to the demographic profile of the respondents, currently available information technology devices and factors responsible for not having them and also related to preferred information technology device. Through the study new information has been generated which is useful in assessing the adoption of information technology devices like laptops, computers, smart-phones, tablets, notebook/netbook etc. by rural consumers. It has been observed that, although the penetration of mobile phones has reached a remarkable number, there is a lot more to be done in order to popularise and increase the demand for other technological devices in rural areas.

Keywords: Rural India, Information Technology, Information Technology devices, Ownership.

Introduction

With more than 1210 million population, India is the second most populous country in the world. Of this population, almost 833 million people are living in rural areas and 377 million people are living in urban areas. From the above figures, it is right to say that India lives in its villages as almost 69 per cent of the total population is living in rural areas. A major chunk of India's economy depends on the rural

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areas, which is clear from the fact that 69 per cent of the population, 56 per cent of income, 64 per cent of expenditure and 33 per cent of India's savings are coming from rural India (Kashyap 2012). Further, since timely adoption and proper use of information technology can have socio-economic impact on a country and its people, therefore, studying the adoption, acceptance and problems associated with it is of immense importance to further streamline the pace of development in rural areas.

Rural development has remained a persistent challenge in both developed as well as developing countries. The basic reason for this is low population density and hence low density of markets leading to distant markets and information resources (Malecki, 2003). As far as developments of Information & Communication Technology (ICT) services are concerned, rural areas are far behind the urban areas. Although the pace of developmental schemes have considerably increased income of rural people, still majority of the population is not having even a computer at their disposal. A recent study conducted by KPMG-MAIT has revealed that the Personal Computer (PC) penetration in India is just 10 per cent which is way below the major emerging economies of the world. There is systematic lack of ICT enabled services in rural India. Government of India has not been able to put much effort to popularise the use of computer technology in rural areas. Amongst 168 million rural households only 9 million households currently have PCs. However the Government is spending millions of rupees in order to popularise and promote information technology among the masses through various kiosk schemes. But in bringing technology to the masses majority of the efforts end up in providing solutions to the problems of accessibility, awareness, experience, illiteracy, economical solution *etc.* instead of delivering the real benefits of technology to the masses (Mistry *et. al*).

Background

The development of Information and Communication Technology (ICT) services in rural areas in developing countries like India has always been questionable. It is a common question whether the money be utilized for computer and communication devices or on providing food, shelter, health and education to the rural people (Arunachalam 2002). Therefore, it is really important that the technology suffices the genuine advantage of its existence in such places. It is necessary to understand the need of the villages before the introduction of any kind of new technology in these areas (Gopinath 2007). Gilbert *et al.* (2010) has informed that there are

unique technological needs of the rural communities but how they use the modern technology is very less known which results in collective lack of knowledge about how to design for the rural life. Narula *et al.* (2010) considers ICT as a crucial requirement for sustainable agriculture development in developing economies. Opportunities for the poor people can be enhanced by improving access to markets, health and education and by expanding the governance services for them (Malhotra *et al.* 2008).

Kendall *et al.* (2012) believes that development of ICTs can have a positive effect on productivity & growth and can improve market access for rural people thus reducing price dispersion and transaction cost and hence promoting market integration. Schwittay (2008) believes that ICTs are a great tool in developing projects creating new sources of income, making Government schemes more transparent and accessible, improving healthcare and overcoming social exclusion and discrimination.

The development of ICT services in rural India mainly started from the year 2000 onwards. The major ICT projects are (Lather *et al.* 2009): Drishtee (2000), ITC e-choupal (2000), n-Logue communications (2002), Azim Premji Foundation (2001), Hole-in-the Wall Education Limited (2000), i-Shakti by HUL(2001), ARTI (Appropriate Rural Technology Institute) (1996), Computers on Wheels (2003), Village Knowledge Centre (1998), Saksham by Microsoft (2006), e-Seva center by Tata Consultancy Services (2001) *etc.* Most of these ICT initiatives provide agriculture related information, education, healthcare, training, entrepreneurship development *etc.* Government of India launched 'Digital India' campaign in July 2015 to ensure that Government services are delivered to citizens electronically by making the country empowered in digital technology. Digital India aims to connect rural India with high speed internet connection and bring universal digital literacy.

Although a number of ICT services are existent in rural areas but as far as adoption of information technology at household level is concerned the situation is worrying and a major bottleneck. It is clear from the recent study conducted by KPMG MAIT research agency, that only 10 per cent households in India have computers installed at their homes. The situation is further grim in rural areas where out of 168 million households only 9 million have computers installed at their homes. Further adding to the concern is the report published by CII & IMRB International (2013), which states that India has less than 1 broadband connection

per 100 inhabitants with only 6.8 million connections in the year 2009 which is much lower than Brazil and China.

A number of studies have been conducted on ICT development services and various ICT projects, but there is insignificant research on rural consumer's ownership and his/her preferences in adoption of Information Technology devices among rural households. Prado *et al.*, (2011) while evaluating ICT adoption in rural Brazil stated that ICTs in rural communities are mainly being used for entertainment, engaging in civic participation and for practicing professional skills and this digital inclusion among the communities creates opportunities for them thus leading to human development. Internet can further help rural consumers to overcome time and distance constraints through online shopping (McHugh 2014). However, almost 68 per cent of the rural Indian population has much to experience as far as online shopping is concerned (Mir 2014). It is significantly known that information technology devices like smart-phones, laptops, computers, tablets, notebooks/netbooks *etc.* are becoming popular with each passing day. Therefore, it is necessary to find out the ownership and preferences of these devices by rural consumers and how significant is the role of demographics while adopting them.

Objectives

The following objectives have been established to find out the ownership and preferences of information technology devices of the rural consumers:

1. To determine the ownership of Information Technology devices among rural consumers.
2. To identify factors affecting ownership of information technology devices amongst rural consumers.
3. To determine the preferences of information technology devices amongst rural consumers.
4. To study internet usage behavior of rural consumers.

Methodology

The study was conducted in four villages of Kurukshetra district in the state of Haryana, India. Primary data collection was carried out with the help of a structured questionnaire which was distributed amongst randomly selected households in each of the four villages of the district.

The research paper aims to find out the ownership and preferences of Information Technology devices by the rural consumers and assess influence of demographics on the adoption of these devices amongst them. The primary survey was conducted in four villages of Kurukshetra district thereby covering randomly 50 households from each village and the total sample size of 200 from four villages in the district. The data was collected from Dhyangla, Bakali, Sultapur and Gudha village of Thanesar tehsil in Kurukshetra district.

The questionnaire sought information relating to the general demographic profile of the rural respondents, educational qualification, family income, available information technology devices, easy to use devices, preferred information technology tool with respect to ease of using them and information related to influence of the social group in making a purchase decision.

Demographic Profile of the Respondents

Of the total sample of 200 respondents, 91 per cent were male and 9 per cent were female. This indicates that ICT owners and users in rural areas are predominantly males. Gender disparity has been observed in the usage of ICT devices.

Majority of the respondents were between 31-40 years (41.5%) of age, followed by those between 19-30 years (38%) and 41-50 years (18.5%) (Table 1). There were only two per cent respondents between 51-60 years of age. It is, therefore, obvious that the ICT owners are relatively young adults and middle aged. This trend may have significant implication for ICT usage as elderly people in rural areas might be least interested in owning and using ICT services and prefer oral and written information channels or personal sources as more reliable sources for seeking information.

Majority (67.5%) of the respondents were found to be married, with only 32.5 per cent being single. This indicates that majority of the respondents in rural area of Kurukshetra were married with family responsibilities.

Regarding education levels, it was found that most of the respondents were graduate (43.5%), or completed high school (32.5%). Very less number of respondents were post graduates (16.5%) or had completed secondary school (7%) (Table 1). This indicates that respondents were not illiterate and had at least one or the other educational qualification which could enable them in utilizing ICT devices and services for work efficiency and better rural livelihood.

Table 1. Demographic Profile of the Respondents

	Variables	Frequency	Per cent
Age in years	19 to 30	76	38
	31 to 40	83	41.5
	41 to 50	37	18.5
	51 to 60	4	2.0
	Total	200	100.0
Highest Educational Qualification	Primary	1	.5
	Secondary School	14	7.0
	High School	65	32.5
	Graduate	87	43.5
	Post Graduate	33	16.5
	Total	200	100.0
Occupational Status			
	Student	25	12.5
	Private job	22	11.0
	Government job	6	3.0
	Own Business	42	21.0
	Laborer	30	15.0
	Farmer	71	35.5
	Other	4	2.0
	Total	200	100.0
Monthly income (income of all family members)			
	Below Rs. 5000/-	1	.5
	Rs. 5001 to 10000	61	30.5
	Rs. 10001- 15000	68	34.0
	15001-20000	43	21.5
	20001 or above	27	13.5
	Total	200	100.0
Languages Known			
	Hindi	200	100.0
	English	115	57.5
	Punjabi	66	33.0
	Total	200	100.0

Regarding occupational activities it was reported that 35.5 per cent of the respondents were farmers, 21 per cent were businessman, 15 per cent were laborers, 12 per cent were students, 11 per cent were in private jobs while only 3 per cent were in Govt. jobs. Out of 42 respondents owning business, 12.5 per cent were shop owners, 5.5 per cent had workshops, while very less percentage had either a dhaba or factory. Out of 30 laborers, 5.5 per cent were working in a factory, 5 per cent in farms, 2 per cent in shops while 1.5 per cent were in some other type of labour intensive work. Out of 22 respondents who were in private jobs, most of them were working as technical staff.

This indicates how diverse the information needs of rural respondents can be and a wide scope of ICT usage by rural consumers. Farmers may harness these devices for seeking timely and relevant information related to agriculture, sources of credit, and better market prices thereby improving the agricultural productivity, farmers' income, well-being of family and improved livelihood. Businessmen can efficiently manage their inventory, payrolls, accounts, networks and business relationships while students can use it for educational needs such as completing assignments, accessing web resources and e-books, applying for various jobs or pursuing educational programmes through distance learning.

With respect to their income levels, majority of the respondents had earnings between 10,000-15,000 per month (34%), followed by 5000-10,000 (30.5%). For the remaining respondents it was found that 21.5 per cent were having income between 15,000-20,000 while only 13.5 per cent had income above 20,000 per month. This signifies that respondents can afford an average priced ICT tool. They may not be willing to spend much on ICT services and may adopt if affordable within this income.

Out of 200 respondents, it has been found that all of them were having at least one mobile/smartphone at their disposal. It is not surprising to see that mobile was the most popular device owned by rural consumers. Various mobile apps such as Kisan Suvidha, Krishi Mitra, Pusa Krishi, Kheti-badi to name a few are helping farmers in agriculture and achieving sustainable development. However, possession of other information technology devices such as computer, laptop, tablet, notebook *etc.* was negligible. Only 3.5 per cent had tablets while 2 per cent had laptops. Consumers prefer to buy information technology devices through cash payment.

If the respondents had higher income then they had a tendency to purchase IT devices other than mobile or smart phones.

It was found that the prime reason for not possessing ICT devices such as laptop, tablet or notebook in large numbers was the lack of proper infrastructure and high cost (Table 2). Except mobile and smart phones, they did not perceive any use of possessing other information devices. Many respondents felt that digital illiteracy, language barrier and insufficient income are significant barriers for owning a laptop or tablet but no one reported lack of education or illiteracy as the reason for non-possession of an IT tool/device. The rural respondents were able to use the devices in English but responded that they would be more comfortable in using the devices in their native or local language. This has a strong policy indication. If the mobile apps are in regional language of rural consumers, it will break the literacy barrier and make the information simple to understand.

Table 2. Reasons for not owning other ICT devices by Rural Respondents

Reason for not possessing IT devices	Frequency	% of respondents
Lack of proper infrastructure in the area	188	94.0
No perceived use	162	81.0
High cost of IT devices	114	57%
Lack of digital literacy	89	44.5
Language barrier	69	34.5
Low Income	42	21.0
Lack of parental/peer support	3	1.5
Illiteracy	0	0

N=200

Analysis

Rural Respondents' Demographics and Ownership of Information Technology Devices

It was observed that there is no significant relationship between age, gender, educational qualification and ownership of information technology devices.

Table 3. Chi-square Analysis with regard to Age, Gender and Ownership of IT Devices

Particulars	Value	df	Asymp. Sig. (2-sided)
1. Gender v/s Ownership of IT device			
i.) Laptop	.331	1	.565
ii.) Tablet	.588	1	.443
iii.) Dongle	.081	1	.775
2. Age v/s Ownership of IT device			
i.) Laptop	1.052	3	.396
ii.) Tablet	1.870	3	.195
iii.) Dongle	.259	3	.795

Note:

*All respondents had Mobile/smartphone

* None had notebook/netbook, computer, router & modem

The chi square value for the relationship between monthly family income and ownership of the various IT devices is shown in Table 4. Chi square value for laptop is 14.112 and its corresponding p value is 0.007. Since the p value is less than 0.05, there is a significant relationship between the monthly income and possession of laptop. For other IT devices there is no significant relationship between their ownership and family income.

Table 4. Chi-square Analysis with regard to Income and Ownership of IT Devices

Particulars	Value	df	Asymp. Sig.(2-sided)
1. Monthly income v/s Ownership of IT device			
i.) Laptop	14.112	4	.007
ii.) Tablet	4.250	4	.373
iii.) Dongle	3.670	4	.453

Note:

*All respondents had Mobile/Smartphone irrespective of income

* None had notebook/netbook, computer, router & modem

Rural Respondents' Demographics and Comfortability of Using Information Technology in English Language

Table 5 reveals that the Chi square value for relationship between age group and comfortability in using IT in English is 24.034 and its corresponding p value is $0.001 < 0.05$. Since the p value is less than 0.05, there is a significant relationship between the age group and comfortability in using IT in English. The Chi square value for relationship between the gender and comfortability in using IT in English was 1.865 and its corresponding p value is $0.393 > 0.05$. Since the p value is more than 0.05, there is no significant relationship between the gender and comfortability in using IT in English. The Chi square value for relationship between highest education and comfortability in using IT in English was 78.392 and its corresponding p value is $0.000 < 0.05$. Since the p value is less than 0.05, there is a significant relationship between the highest education and comfortability in using IT in English. The chi square value for relationship between occupation and comfortability in using IT in English was 47.805 and its corresponding p value is $0.000 < 0.05$. Since the p value is less than 0.05, we can conclude that there is a significant relationship between the occupation and comfortability in using IT in English. The chi square statistic corresponding to the relationship between monthly income of the family and comfortability in using IT in English was 30.549 and its corresponding p value is $0.000 < 0.05$. Since the p value is less than 0.05, we can conclude that there is a significant relationship between the monthly income of the family and comfortability in using IT in English.

Table 5. Chi-square Analysis with regard to Comfortability of using IT in English Language

Particulars	Value	df	Asymp. Sig. (2-sided)
1. Comfortability of using IT in English Language			
i.) With Age	24.034	6	.001
ii.) With Gender	1.865	2	.393
iii.) With Educational qualification	78.392	8	.000*
iv.) With Occupational Status	47.805	10	.000*
v.) With Monthly Income	30.549	8	.000*

People who are younger are more comfortable with English language as compared to those who are older. Graduates and Post graduates are somewhat comfortable with using English language while respondents who have passed only secondary school or high school are not very comfortable in using English language. As the monthly income increases they have better resources and opportunities of learning and find ease in the use of English as a medium of communication.

Rural Respondents' Demographics and Comfortability of Using Information Technology in Local Language

Table 6 reveals that the chi square value for relationship between age group and comfortability in using IT in local language is 1.31 and its corresponding p value is $0.727 > 0.05$. Since the p value is more than 0.05, there is no significant relationship between the age group and comfortability in using IT in local language. The chi square value for relationship between gender and comfortability in using IT in local language is 2.371 and its corresponding p value is $0.124 > 0.05$. Since the p value is more than 0.05, we can conclude that there is no significant relationship between gender and comfortability in using IT in local language.

The chi square statistic corresponding to the relationship between highest education and comfortability in using IT in local language is 4.815 and its corresponding p value is $0.307 > 0.05$. Since the p value is more than 0.05, we can conclude that there is no significant relationship between the highest education and comfortability in using IT in local language.

The Chi square statistics for relationship between occupation and comfortability in using IT in local language was 3.759 and its corresponding p value is $0.585 > 0.05$. Since the p value is more than 0.05, we can conclude that there is no significant relationship between the occupation and comfortability in using IT in local language. The chi square statistic corresponding to the relationship between monthly family income and comfortability in using IT in local language was 6.852 and its corresponding p value is $0.144 > 0.05$. Since the p value is more than 0.05, we can conclude that there is no significant relationship between the monthly family income and comfortability in using IT in local language.

Table 6. Chi-square Analysis with regard to Comfortability of using IT in Local Language

Particulars	Value	df	Asymp. Sig. (2-sided)
1. Comfortability of using IT in Local Language			
i.) With Age	1.310 ^a	3	.727
ii.) With Gender	2.371 ^a	1	.124
iii.) With Educational qualification	4.815 ^a	4	.307
iv.) With Occupational Status	3.759 ^a	5	.585
v.) With Monthly Income	6.852 ^a	4	.144

Therefore, there is no significant relationship between demographics and comfortability of using IT devices in local language. All are at ease irrespective of age, gender, education, income or occupation.

The most preferred device that rural respondents wanted to own was mobile/smartphone due to its ease of use and wider application (Table 7). Laptop was the second preference, followed by netbook/notebook being the third preference, tablet being the fourth preference and computer being the last preference. The size of the device, portability, and usefulness were verbally emphasized as the major reasons of preference.

Table 7. Devices preferred to be owned by Rural Respondents

IT Device	1 st Preference		2 nd Preference		3 rd Preference		4 th Preference		5 th Preference	
	No.	%	No.	%	No.	%	No.	%	No.	%
Computer	4	2	7	3.5	38	19	24	12	127	63.5
Laptop	16	8	104	52	41	20.5	35	17.5	4	2
Mobile/Smartphone	177	88.5	17	8.5	6	3	0	0	0	0
Netbook/Notebook	0	0	42	21	82	41	61	30.5	15	7.5
Tablet	4	2	28	14	33	16.5	79	39.5	56	28

N=200

Influence of Social Group on Purchase of IT Devices

As seen from Table 8, respondents who were influenced by the family/relatives/friends/ office/ work group for making a purchase decision were extremely limited and they were making individual decisions without involving other members, to decide on the IT tool.

Table 8. Influence of Social Group for making a Purchase Decision

Social Group	Frequency	% of respondents
Family/Relatives	18	9
Peers/Friends	6	3
Teachers/Experts	0	0
Office/work group	1	0.5
Individual decision	175	87.5

N=200

*As many as 87 per cent of the rural respondents made an individual decision for purchasing the Information technology tool.

Internet Usage

As can be seen from Table 9 the usage of internet per week amongst rural respondents has been found to be low. It is observed that though the number of internet connections have increased over the years, most of the rural respondents were using internet for only 2-4 hours per week. The age group between 41-60 years had limited internet connection and usage which can be seen from Table 10.

Table 9. Frequency Distribution with respect to Internet Usage in no. of hours/week

No. of Years	Frequency	% of respondents
< 1 year	26	13
1-2 year	120	60.0
>2 years	31	15.5
Usage/week	Frequency	% of respondents
< 2 hours	16	9.03
2-4 hours	142	80.22
4-6 hours	18	10.16
>6 hours	1	0.5

N=177 (Since 23 respondents had no internet connection)

* Almost 80 per cent of the users were using internet for about 2-4 hours per week.

Table 10. Cross tabulation of Age in Years v/s Frequency of using Internet Connection in one Week

Age	Less than 2 hours		2-4 hours		4-6 hours		More than 6 hours		No internet	
	No.	%	No.	%	No.	%	No.	%	No.	%
19-30	3	18.8	63	44.4	9	50	1	100	0	0.00
31-40	6	37.5	65	45.8	9	50	0	0.00	3	13
41-50	6	37.5	12	8.5	0	0.00	0	0.00	19	82.6
51-60	1	6.2	2	1.4	0	0.00	0	0.00	1	4.3
Total	16	100	142	100	18	100	1	100	23	100

N=200

* Almost all the age groups are using internet for 2-4 hours per week.

Rural Respondents' Demographics and their Internet Usage Behaviour

There is significant relationship between age and frequency of internet usage/week (Table 11). A higher percentage of people who are young use internet more often as compared to those who are older. With increase in educational qualification a higher percentage of people use internet for 2-4 hrs/week.

Table 11. Chi-square Analysis with regard to Frequency of Internet Usage per Week

Particulars	Value	df	Asymp. Sig. (2-sided)
1. Frequency of Internet usage /week			
i.) With Age	82.400	3	.000*
ii.) With Gender	2.568	1	.15
iii.) With Educational qualification	56.138	4	.000*
iv.) With Occupational Status	14.67	5	.23
v.) With Monthly Income	17.868	4	.332
2. Years of Internet usage			
i.) With Age	72.203		.000*
ii.) With Gender	3.314		.346
iii.) With Educational qualification	55.903		.000*
iv.) With Occupational Status	32.43		.504
v.) With Monthly Income	25.604		.012

In addition, a higher percentage of the younger age group are using internet for more number of years as compared to the higher age group. A higher percentage of more educated people are using internet for 1-2 years as compared to less educated people. The percentage of people using internet for 1-2 years increases with the increased monthly family income.

Most of the respondents were very comfortable if information was accessible in their local language. They were somewhat comfortable even if it is available in English language.

Discussion

No respondent had a computer, some respondents having monthly income above Rs. 20,000 had laptops, while respondents having monthly income between Rs. 10,000 - 20,000 had tablets, notebooks, possessed dongle and routers. It was surprising that not even a single respondent had a personal computer. However, all the individuals irrespective of their income, age and qualification had a mobile/smartphone at their disposal purchased through cash. Since most of the respondents were using mobile or smartphones, formulating appropriate text messages for the farmers and empowering them to use mobile phones can lead to increased adoption of latest practices.

The main factors responsible for the ownership of limited IT devices were lack of proper infrastructure in the area, no perceived use, high cost of the IT devices, low income and lack of digital literacy. Respondents also had a difficulty with the language. Some were having lack of parental/peer support too. These were some of the reasons emphasized for not using the IT devices.

Rural respondents who were comfortable in using IT devices in English were mainly unmarried males belonging to the age group of 19-30 years. They were primarily students and had a monthly income between Rs. 10000-15000. The rural respondents who were comfortable in using IT devices in the local language were male graduates between the age group of 31-40 years with the main occupation being farming and had monthly income between Rs. 10000-15000.

Assessing their intention to own an IT tool, it was found that the first preference of the rural respondents for purchasing IT devices in future was mobile/smartphone followed by laptops. They preferred mobile because it was easy to use and carry. The third preference was for a notebook/netbook, fourth for tablets and computers being the last and least preferred. The size of the device and the ease in carrying it were verbally emphasized as the major reasons of preference.

The influence of the social group on rural respondents' decision of purchasing an IT tool was minimum. The majority of the rural respondents exhibited no influence of the social/family/relatives *etc.* but it was an individual decision to purchase the IT devices. They believed in their own choices. However, as compared to males, female respondents were more influenced by their families in making a purchase decision.

The internet usage behaviour of the rural consumers is not very different from that of urban consumers. Majority were having internet connection since the last two years. Most of them were using it for 2-4 hours per week. Majority were using the internet services of Idea followed by Vodafone and Airtel. However, while comparing the age groups using the internet services per week it was revealed that majority of the respondents between the age group of 19-40 years were using internet for at least 2-4 hours per week and age group of 41-60 years did not have an internet connection except for a few.

Policy Implications and Conclusion

The main aim of the study was to assess adoption of Information technology by rural consumers, their ownership and preferences towards IT devices and the

effect of demographics over ownership, usage and preference. The study revealed new and important information regarding the adoption of information technology devices. The study also revealed that majority of the rural consumers were having internet connection. However, some of the challenges that are of concern are rural consumers' resistance to change their behaviour, the socio-economic backwardness of the rural market, problem of language, and a feeling of sufficiency *i.e.* no further need or requirement for an advanced technology. Though there is a great impact of the demographics over the adoption of IT devices, however, improper infrastructure, lack of perceived use, high cost *etc.* were also signaled as reasons behind the poor ownership of IT devices.

Tirkaso *et. al.* (2011) reported some major challenges in the rural areas regarding the implementation of policies. He also reported that socio-economic features like age, gender, marital status, size of the family are related to the adoption and application of the ICT. Other factors are the low degree of awareness among rural consumer about the importance of these technologies. According to Rajesh (2003) the major problems related to ICT adoption were policy structure of the government, high user charges, infrastructure problems, political, economic, technological and cultural factors *etc.* These research findings support the discussion of present study.

This study is useful in guiding policy makers and service providers. An attempt to address the concerns of rural consumers while designing consumer driven services would narrow down the gap between planning and implementation of various projects. The adoption of IT devices in rural areas will not only enhance the literacy rate of rural consumers but also make them more employable. It will give them new opportunities in learning and pave a path for their development which in turn will bring a change in the scenario of the rural economic environment.

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A Case study on Utilization of Common Service Centre among the General Public

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Abstract

Common Service Centres (CSCs) form a part of the National e-Governance Plan envisioned in providing Government services to the citizens at their doorstep at an affordable cost, and in a sustainable manner. The CSCs are run by Village Level Entrepreneurs (VLEs) as a component of Public-Private Partnership (PPP) model. (Shadrach and Sharma, 2013). Timely delivery of services through CSC has made life easier for both people and government departments and has increased its efficiency. There are a total of 34 Common Service Centres in Coimbatore district. Various Government and Business-to Consumer services like Aadhaar, Telecom services are provided at an affordable cost through CSC. A study was carried out in one representative CSC, drawn as a case, in Kalveerampalayam, Coimbatore. It was conducted as an ex-post facto research study and percentage analysis was used to analyze the data collected. Three-fourth (76.7%) of the respondents were found to have medium level of utilization of various services provided by the CSC, with Aadhaar being the most used (63%) service. It was prevalent mostly among educated and high-income category of people.

Keywords: Common Service Centre, Utilization, Services, Public, Agriculture

Introduction

The major objective of a Government is to reach out to the people and provide them services through various means. In this digitally revolutionized world those means of dissemination by digitization seem to be essentially needed. The National e-Governance Plan (NeGP) of the Government of India envisions providing Government services to the citizens at their doorstep at an affordable cost and in a sustainable manner. To achieve this, under the NeGP framework, more than 99,000 CSCs have so far been established in rural areas as a means of providing access to

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services and technology as well as assuming the task of assisting citizens with the provision of both private and public services (Shadrach and Sharma, 2013).

CSCs are a strategic cornerstone of the Digital India programme. They are the access points for delivery of various electronic services to villages in India, thereby contributing to a digitally and financially inclusive society. These centres, most of which have been operational for more than five years with varying degrees of success, are now entering the second phase of implementation. The CSC's are run by Village Level Entrepreneurs (VLEs), who are chosen through a careful selection process adopted by Service Centre Agencies (SCAs) that have entered into a service level agreement with the State Governments within the Public-Private Partnership (PPP) model. One VLE may cover up to six villages. Currently, plans are on to expand the number of these centres from its current spread in over 99,000 villages to each and every 250,000 Panchayat villages in the nation (<https://csc.gov.in>). The common service centres provide various Government to Consumer services such as Aadhaar, passport, PAN *etc.* and Business to Consumer services such as Telecom and Financial services. A total of 34 CSCs were present in Coimbatore district, covering all major rural and urban areas (<http://www.apnacsconline.in>).

This paper attempts to analyze the utilization of Common Service Centres by the people in its service locale with the following objectives.

Objectives

1. To study the socio- economic profile of the users of CSC and
2. To find out overall utilization behaviour of users.

Research Methodology

Ex-post facto research design was followed for this study. Singh (1986) defined, ex-post facto research as a design that draws inferences regarding the relationship between variables on the basis of such independent variables whose manifestations have already occurred. This particular study was carried out in the CSC in Kalveerampalayam, situated on the outskirts of Coimbatore city. This place being a semi-urban area, was purposefully chosen as a representative case as it covered both rural and urban population. Besides, this CSC in Kalveerampalayam was one of the earliest established centres in the district which is being utilized by a relatively a large number of people in the locale.

Simple random sampling technique was used to identify the sample and 30 was the sample size fixed for the study on the utilization of Common Service Centres. The

variable age was measured as the number of years completed by the respondent at the time of collecting the data. Education was measured as the total number of years spent by the respondent under formal education system. Occupational status refers to the primary activity in which the respondents were engaged to meet their livelihood. Annual income was operationalized as the gross income obtained per year by the respondent. Social participation refers to the degree of involvement of the respondents in formal organizations as either member or Office bearer. Mass media exposure refers to the respondent's utilization behaviour of mass media to gather information regarding Public Services. As regards the overall utilization behaviour of the respondents, it refers to the awareness, degree and frequency of Utilization of various services offered by the CSC. The respondents were further categorized into low, medium and high based on the cumulative frequency method. The data was collected using interview schedule and was analyzed through Percentage analysis and Cumulative frequencies.

Results and Discussion

The profile characteristics of the users of CSC was analyzed and the data is presented in Table 1.

Table 1. Distribution of Respondents based on their Profile Characteristics

Categories	Number	Percentage
Age		
Young	12	40.00
Middle	13	43.33
Old	05	16.67
Total	30	100
Educational Status		
Illiterate	2	6.67
Primary education	2	6.67
Middle Education	3	10.00
Secondary education	6	20.00
Collegiate education	17	56.67
Total	30	100
Occupational Status		
Farmer	5	16.67
Business	5	16.67
Government	8	26.67
Private	8	26.67
Others	4	13.33
Total	30	100
Annual Income		
Low	2	6.67
Medium	10	33.33
High	18	60.00
Total	30	100

Social Participation

No participation	18	60.00
Participation in one organisation	6	20.00
Participation in more than one organisation	6	20.00
Total	30	100

Mass Media Exposure

Category	Frequently		Rarely		Never	
	No.	%	No.	%	No.	%
Radio	1	3.33	5	16.67	24	80.00
Television	19	63.33	10	33.33	1	3.33
Newspaper	21	70.00	8	26.66	1	3.33
Magazines	2	6.67	11	36.67	17	56.66
Internet	7	23.33	13	43.37%	10	33.33

It could be seen from Table 1 that almost half (43.33%) of the respondents belonged to middle age category followed by young (40%). More than half (56.67%) of the respondents had pursued collegiate education indicating the awareness on CSC among educated people. Regarding the occupation nearly one- fourth (26.67%) of the respondents were Government servants followed by Private, Farmers and Businessmen. The immense employment potential in the surrounding area has taken farmers out of equation. More than half (60%) of the people belong to high-income category owing to their occupational status. Nearly 60 per cent of the respondents did not form a part of any social organization. With respect to Mass media exposure, Television and Newspapers were the most frequently utilized media, with 63.3 per cent and 70 per cent of the respondents exposed to these media respectively. Generally, people inclined towards mass media tend to be more aware and hence their utilization of CSC was higher.

Table 2. Distribution of Respondents based on Overall Utilization of Services

No.	Category	No.	Percentage
1	Low	3	10.00
2	Medium	23	76.77
3	High	4	13.33
	Total	30	100

The overall utilization of services provided by the Common Service Centre was at medium level with 76.7 per cent of the respondents falling under the category as may be seen in Table 2. It is attributed to the fact that only three services were utilized by a larger section of people, though CSC provides a range of various services.

Table 3. Distribution of Respondents based on their Utilization of various Services offered by CSC

S. No.	Services provided	Number	Percentage
Government to Consumer			
1.	Agriculture	0	0.00
2.	Scholarship	2	6.67
3.	License	0	0.00
4.	Birth/Death Certificate	4	13.33
5.	PAN	5	16.67
6.	Aadhaar	22	63.33
7.	Passport	2	6.67
8.	Patta/Chitta	2	6.67
Business to Consumer			
9.	Financial	11	36.67
10.	e- Learning	0	0.00
11.	Travel	2	6.67
12.	Telecom	14	46.67
Consumer to Government			
13.	Grievances	0	0.00
14.	Complaints	3	10.00
15.	Suggestions	0	0.00

It may be seen from Table 3 that Aadhaar was the most utilized service where two-thirds (63.33%) of the respondents benefitted from it. It was followed by telecom services such as mobile recharge where nearly one-half (46.67%) of the respondents used the service frequently. Utilization of few services such as e-learning, agricultural information by the public was not observed.

In order to access the social welfare schemes promoted by both the State & Central Governments, a Unique Identity Number was made mandatory for each and every citizen in the country. Hence most of the people had utilized the CSC to obtain Aadhaar Identity Card. Due to very low level of awareness by the respondents about the existence of e-learning and Agricultural information services, utilization of such services was found to be almost nil.

Table 4. Distribution of Respondents based on Frequency of Utilization of Services

S. No.	Category	Number	Frequency
1.	Weekly	3	10.00
2.	Monthly	8	26.67
3.	Whenever required	19	63.33
	Total	30	100

Regarding the frequency of utilization, almost 63.33 per cent of the respondents used the services as and when they required it genuinely (Table 4). Nearly one-third (36.67%) of the respondents used the services more frequently with Telecom services leading the way.

About 86.67 per cent of the respondents reckoned that they received timely services from the CSC. This particular CSC was found to be user friendly with 93.33 per cent of the respondents admitting it. The entire set of respondents paid for the services and they felt that it was affordable and cost effective.

Recommendations and Implications of the Study

Though CSCs have been received well among people, lack of awareness has limited its reach to the poorest and unreached. Ease of access to government services has been the major advantage of the CSCs and hence more and more services need to be incorporated, given the affordable cost. These centres can be expanded to all rural and semi urban areas so as to increase employment opportunities to work as Village level entrepreneurs and render effective services to the people. The time required to get services from CSC can be reduced further to make it more efficient.

The charges for services were collected exorbitantly from the people by the CSC as against the Government prescribed rates. Hence rules should be strictly enforced against the defaulters. Feedback from the users of CSC should be facilitated for the effective functioning of CSCs. In order to enhance the utilization of various services offered by the CSC, publicity may be given through mass media. Under Digital India initiative, more number of VLEs may be recruited so as to extend the services to remote areas wherever poor connectivity issues exist in the country. CSCs should broaden their services in the agricultural sector by providing cost effective, quality Agro-advisory services by working in tandem with the Extension officials of the Agriculture department.

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Future of Farming - Polyhouse Farming

Rachna Singla and Jasvinder Singh¹

Abstract

The adverse effects of the green revolution on soil fertility, emergence of new insect pests and diseases and declining water table level have tempted the farmers to consider alternate methods of cultivation which could curb the adverse effects and provide an opportunity to grow crops throughout the year. Protected Cultivation Technology was one such alternative which seemed promising to the farmers. Based on this, Krishi Vigyan Kendra, Patiala conducted training for growers and end-users on the use of complete technology for protected cultivation of high-value vegetables and flowers, including IPM, post-harvest handling, on-farm value-addition, packaging, etc. and marketing. By adopting hi-tech farming practices, Mr. Meharban Singh, a farmer, has become an icon for other farmers of the region. His adoption of modern practices is very rewarding both economically and socially. He is very satisfied with the technological intervention. Judicious use of pesticides on his vegetables has helped him in getting a good price in the market and has enabled him to create a niche for himself. Other farmers of the adjoining areas often seek guidance from him regarding cultivation of vegetables etc. and he personally encourages them to adopt crop diversification as a means to conserve the environment and increase income.

Keywords: Protected cultivation, Polyhouse

Background

Since ancient times, agriculture is an outdoor or open field production of crops. Open field production is climate and weather dependent. In fact, growth and development of crops under a particular set of climate parameters defines geographical location, productivity and production period of different crops. The magnitude of impact of climate and weather on agricultural productivity and quality of produce is appreciated by farmers and the scientific community, including horticulturists. Abiotic and biotic environments govern crop production potential and quality of products. Among the major constraints in production of horticultural crops are temperature (hot or cold), sunlight duration and quality, water deficiencies or excesses, atmospheric moisture (relative humidity), weeds,

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deficiency of nutrients, heavy winds, carbon dioxide and a host of diseases and insect pests. There are ecological optima for obtaining production potential of each of the crops. Deviation from these conditions results in yield losses partially and sometimes totally. However, near optimal climatic conditions could be created by controlling the climate with the help of greenhouse using different protected structures/methods/devices and such cultivation under controlled environmental conditions is termed as protected cultivation.

Protected cultivation is one of the most promising areas of agriculture in the current context. It is an upcoming and alternative production system involving high-tech and intensive practices mainly for meeting urban and export demands of horticultural and ornamental crops for food, nutrition and economic security. Burgeoning population, fragmentation of land holdings, depletion and erosion of natural resources are all adversely affecting agricultural productivity. Protected cultivation offers several advantages to grow high-value crops with improved quality even under unfavorable and marginal environments. It has the potential of fulfilling the requirements of small growers as it can increase the yield manifold per unit area. The crops can also be grown round the year, including off-season with increased profitability. The technology has already been adopted in many parts of the country. On the contrary, increasing trend of entrepreneurial mindset and commensurate opportunities of respectable business for educated youth among progressive farmers is opening up an exciting combination of brighter side of agriculture in India vis-à-vis protected cultivation. Besides, protected cultivation is one area where Government initiatives have been far more forthcoming though not as complimentary for human resource development and technical support to the farmers adopting protected cultivation.

Introduction

Though India is the largest producer of vegetables in the world next to China, its requirements of vegetables are rapidly increasing because of burgeoning population. India has a wide spectrum of diverse agro climatic conditions but vegetable cultivation practices in our country have been generally restricted to regional and seasonal needs with the technology and practices predominantly of traditional nature, which results in low yields and inconsistent quality and quantity produce supply in the markets. The factors such as adverse climatic conditions, high potential of vegetables, fruits and flowers, agro inputs availability, small and fragmented land holdings and increased demand for quality vegetables necessitate the adoption of protected cultivation. The adverse effects of the green revolution

on soil fertility, emergence of new insect pests and diseases and declining water table level (Jain 2010) convinced the farmers to consider alternate methods of cultivation which could curb the adverse effects of green revolution and provide an opportunity to grow crops throughout the year. Protected Cultivation Technology was one such alternative which was promising to the farmers. The only option is vertical expansion through increased productivity and cropping intensity using protected farming with environment control measures, quality seeds, fertilizers and plant protection measures (Paroda 2013, Gowda 2009, NAAS 2001, GOH 2013, Singh and Brahma 2012, Singh *et al.* 2005, Singh *et al.* 2004). India has entered into an era of greenhouse vegetables cultivation more recently and the total area under protected vegetable production is not more than 10000 ha (Mayanglambam and Nisha 2013). Protected cultivation offers several advantages to grow high-value crops with improved quality even under unfavorable and marginal environments. It has the potential of fulfilling the requirements of small growers as it can increase the yield manifold per unit area. The crops can also be grown round the year, including off-season with increased profitability.

The objectives of polyhouse farming are to promote the horizontal spread of latest technology among the farmers; promote production of off season vegetables and to increase the income per unit area.

The problems faced by the farmers are more or less the same in the majority of the villages of the district. However, the degree and intensity vary from village to village or farmer to farmer. As the climate of the district is congenial for off-season tomato cultivation most of the farmers grow tomato, cabbage and cauliflower during the *Kharif* season for getting more profit. Due to the cultivation of local degenerated variety, poor nutrient management, micronutrient deficiency, increasing pest incidence *etc.* the farmers are unable to get the desired level of yield and profit and used to face extreme difficulties to maintain their family. Increasing price of agro inputs, exploitation by middlemen and declining trend of market price were further intensifying the problem.

In view of this, Krishi Vigyan Kendra, Patiala conducted training for growers and end-users on the use of complete technology for protected cultivation of high-value vegetables and flowers, including IPM, post-harvest handling, on-farm value-addition, packaging, *etc.* and marketing. Adoption of improved package of practices in a holistic way, by using technologies such as design of structures and drip fertigation system, modern nursery raising and complete production

technology are extremely important and need to be adopted for enhancing production and raising income.

Data were collected from trainees who attended training programmes conducted by KVK with the help of a well-structured interview schedule. The data were analyzed and tabulated after applying statistical techniques like frequency, percentage, weighted mean and rank orders, and may be seen below.

a) No. of Training Courses Organized

Year	No. of training courses organized	No. of Participants
2012-13	4	95
2013-14	5	120
2014-15	5	105
2015-16	6	145
Total	20	465

b) No. of Method Demonstrations conducted

Year	Demonstration Area						Participants
	Design of structures	Installation of drip fertigation system	Nursery raising	Layout of plants	Training and pruning of plant	Method of harvesting & packaging	
2012-13	4	4	4	4	4	4	95
2013-14	5	5	5	5	5	5	120
2014-15	5	5	5	5	5	5	105
2015-16	6	6	6	6	6	6	145
Total	20	20	20	20	20	20	465

(c) Extension Activities organized

Year	Kisan Goshti	Exposure visits	Radio/TV talks
2012-13	7	4	5
2013-14	6	5	7
2014-15	5	5	5
2015-16	8	6	6
Total	26	20	23

By adopting hi-tech farming practice, Mr. Meharban Singh has become an icon for other farmers of the region. His progressiveness in adopting modern practices has been very rewarding both economically and socially. He is very satisfied with the technological intervention.

Success Story

Mr. Meharban Singh, a farmer of Village Saholi is a hard working youth, whose zeal to work, improve and innovate is an example to be followed by others. He

is a self cultivating farmer owing 12 acres of land where different agricultural enterprises had been adopted like polyhouse cultivation of vegetable crops (4 poly houses of 16,000 mt² area) and rest of the land is utilized for diversified open cultivation of vegetable crops.

Output

He adopts the latest technologies and takes regular consultations from the KVK scientists, PAU Ludhiana, IARI and other sources of knowledge. He also attends short trainings and vocational training conducted by the KVK from time to time. He visits other farmers and cultivators of repute to know what practices they are following and then tries to improve his net return in each crop by minimizing the cost of cultivation and through judicious use of inputs. He has adopted diversified cropping system and dropped cereal-cereal monoculture. He has his own compost unit and recharge well and he recycles all the agricultural waste and tries to conserve resources. Improvements effected are:

- Adopted foliage spray of fertilizers with power-sprayer for better results and lower costs in horticulture
- Regular soil & water testing for proper usage of fertilizers and crop selection
- Water Management through drip irrigation, underground pipes and water storage tank
- Mulching of tomato crop with paddy straw (available in plenty) to control weeds and conserve soil moisture.
- Crop rotation developed for better productivity:
 - Paddy > Ash Gourd
 - Paddy > Capsicum
 - Green fodder > Tomato > Green fodder
 - Green fodder > Ash Gourd > Pulses
 - Green fodder > Tomato > Cucumber
- Use of water storage tank for fishery
- Use of Cold Room (set up at own farm) for increasing shelf-life and quality of fresh vegetables and holding vegetables for longer duration for getting better returns.
- Developing marketing strategy by exploring different markets for fresh vegetables and use of pick-up van for timely supplies to vendors.

- Use of vermicompost in own farm as well as for marketing through small attractive packets of different weights.

The productivity levels achieved during the last five years may be seen in Table 1.

Table 1. Productivity Levels achieved in major income generating activity during the last five years

Name of the crop/ activity	Variety	Productivity level (q/ha)				
		2012-13	2013-14	2014-15	2015-16	2016-17
Tomato/ drip irrigation + mulch film	Avinash-2, 1001,524,7730 avinash-3, himshekher	625	695	705	898	1050
Capsicum	Indra , Bharat, Asha	375	445	459	600	700
Ash gourd	Kiran	360	400	450	459	520
Cucumber	Multistar, king star, kian, kuk	500	650	700	800	1100
Vermicompost	Red worms	230/ 2000sq.ft	235/ 2000sq.ft.	240/ 2000sq.ft.	250/ 2000sq.ft.	500/ 2000sq.ft
Wheat	PBW 343, DBW 17	45	47.5	50	53.75	58.0
Paddy	PR 118, 114	78.0	75.0	81.5	80.0	84.0

Outcome

- Increased farm productivity of participating farmers and an annual income generation of more than Rs 50,000/1,000 m² of cultivation area.
- Increased local employment opportunities in on-farm and off-farm activities reducing distress migration (10-12 persons).
- Increased livelihood options to participant families (>2 options per family).
- Inclusion in basic banking facility to build a capital base for farmers.
- Wider and easier access to finance for setting up village based enterprises.
- Better realization of price of farm products through post-harvest management, value-addition and market linkages.
- Empowered and vibrant people's organizations addressing their own developmental issues
- Ujjagar Singh Dhaliwal Award, by PAU, Ludhiana (2007) and Progressive Farmers' Award by Mehram group of publications, Nabha (2010) Chief Minister Award, by PAU, Ludhiana

Self-Employment and Local Direct Marketing

There has been concern in the recent years regarding the efficiency of marketing of fruits and vegetables in India. It is believed that poor efficiency in marketing channels and poor marketing infrastructure are leading not only to high and fluctuating consumer prices, but also to only a small proportion of the consumer rupee reaching the farmers.

There is also substantial wastage, deterioration in quality and frequent mismatch between demand and supply spatially and over time. With growing demand and accompanying supply response, fruits and vegetables have assumed great importance.

Off-Season Market

The off-season vegetable market in the entire region is a key focus area. For example during monsoons the local production of tomato is negligible. The tomato prices during June-October range from Rs. 15 to 20/kg and demand in towns like Patiala touches 30-40 tonnes/day whereas tomato price in peak season (November-March) comes down to Rs. 1-2/kg, providing no commercial gains to farmers.

Spread effect on Fellow Farmers

Other farmers of the adjoining areas often seek guidance from Mr. Meharban Singh regarding cultivation of vegetables *etc.* and he personally encourages them to adopt crop diversification as a means to conserve the environment and increase income. The farmer has motivated hundreds of the other farmers of the adjoining areas for the cultivation of vegetable crops like tomato, cucumber, capsicum, etc to fetch more profits. He is also running a Farmer's Field School sponsored by ATMA at his farm for 20 trainee farmers. He is invited to deliver lectures during various training programmes/ seminars for farmers at KVK Patiala. He also participates in radio / TV talk shows and contributes to print media for propagation of floriculture and diversification in the state. Inspired by his achievements, several farmers from different places all over Punjab/Haryana/U.P. have ventured into horticulture/vermiculture to improve their earnings.

Table 2. Activity wise income, cost-benefit ratio, gross and net income for last five years

Name of the crop	Area (ha)	Gross Income	Expenditure	Net Income	BC ratio
(i) Field Crops					
Paddy	2	175000	45000	130000	3.89
Wheat	2	125000	37500	87500	3.33
Green Fodder	2	30000	5000	25000	6.00
(ii) Horticulture Crops					
Cucumber	1	325000	48000	277000	6.77
Tomato	1.5	250000	50000	200000	5.0
Cucurbits	2	450000	75000	375000	6.00
Capsicum	1.5	480000	120000	360000	4.00

(iii) Livestock					
Dairy – 10 Cows		970000	620000	350000	1.56
(iv) Fisheries					
	0.4	185000	45000	140000	4.11
(v) Any Other					
Vermi-compost	2000 ft ²	200000	40000	160000	5.00

Impact

Mr. Meharban Singh along with other vegetable growers started their own registered Self Help Group “Innovative Farmers Group”. All the members in the group are having 80 per cent area under drip and sprinklers. The group helps each other in marketing, sharing information *etc.* They have distributed among themselves the markets where one is supposed to sell, though this keeps changing if there is surplus demand (then others are invited *etc.*). Presently, the group has over 60 members. Presently, the farmers of Patiala District are cultivating vegetables in poly-net houses spread over 52 acres of land.

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Uptake and Pathways in introducing the Vegetable Crop Capsicum by KVK Khordha, Odisha

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Abstract

This paper explains about uptakes and pathways of introducing a new vegetable crop capsicum in Khordha district of Odisha by Krishi Vigyan Kendra (KVK), Khordha. The crop was introduced in 2011 through different extension methods and today more than 550 farmers have adopted this crop replacing chillies. The on-farm trial results indicated that the net income was higher with an increase in yield of 170.8 - 215.1 per cent by adopting capsicum in open field condition compared to farmers' practice of cultivating green chilli. It was also observed that there was a reduction in yield and quality of capsicum grown during spring-summer in open-field condition. The technology trialed was planting of capsicum and maize in the ratio 4:1 by sowing of maize 45 days after transplanting capsicum. The KVK conducted a trial on intercropping of capsicum with maize. For any crop to be established in the district there is a requirement of employing different extension methods for larger adoption. In this case different extension methods viz., individual, group and mass media were employed for faster reach of this crop. On-farm trials, front line demonstrations, technology week, farmer scientist interactions, field days, exhibitions and trainings were the specific extension methods. During the period all possible ways for larger adoption of capsicum were undertaken by the KVK. The success points in introducing this crop is the availability of capsicum seeds with all input dealers and high market demand. KVK is still helping farmers in providing advisory services for increasing the area under capsicum and also for higher production.

Key words: Adoption, capsicum, new crop establishment, extension methods

Introduction

New crop development is the adoption of a plant in a particular geographic region (for the purposes of production) so that it can be manipulated as a crop for the

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generation of some commercial product for the satisfaction of consumers (Blade and Slinkard, 2002). Wallis *et al.* (1989) noted that it was important to have well-developed selection criteria to identify successful new crop industries in any region. The same is true in the introduction of crops to any region. This paper shares experiences in such a crop establishment in Odisha state of India. Odisha is an agrarian state in India with varied crops grown from time immemorial, however extension agencies have played a significant role in bringing changes in cropping systems. Introducing new crops that fetch more price among the farmers is one of the key agenda of the extension agencies. Uptake pathway involves the process of capturing how a biotech crop is introduced, adopted, disseminated and shared by farmers with others (Torres *et al.*, 2012). The same is true with hybrid crops being introduced, adopted and spread to larger communities.

In Odisha capsicum (*Capsicum annum* L. var. *grossum* Sendt) is grown on a limited scale in different districts and predominantly the supply of capsicum to the state is from other states. Khordha is one of the 33 districts of Odisha which has a favourable climate for cultivating cereals, pulses, oilseeds and different vegetable crops. Varieties of vegetables are grown during *rabi* season and this is found to be increasing day by day. Krishi Vigyan Kendra (KVK)-Khordha under the administrative control of ICAR-Central Institute of Freshwater Aquaculture is mandated to work in Khordha district with the mandates of technology assessment, refinement and demonstration. The KVK has been responsible for introducing new crops and varieties, breeds of animals and fish species with scientific package of practices for improving production and farm income. The farmers in Khordha district used to grow chilli after paddy was harvested and were not aware of capsicum cultivation, having the perception that “it will not grow in their soil and also will not be sold out in the local market.”

The KVK constantly tried to bring change in the pre-conceived idea of the farmers and introduce a high value and low volume vegetable capsicum under crop diversification in the district. Capsicum is also called bell pepper and is one of the high valued vegetables with higher concentrations of antioxidants. Nutritionists indicate that a small bell pepper could provide up to three times more of the recommended daily amount of vitamin C compared to any citrus food. The vegetable also possesses a very high content of vitamin A, C and E (all anti-oxidants) that help to effectively neutralize free radicals. India contributes one fourth of world production of capsicum with an average annual production of 0.9 million tons from an area of 0.885 million hectare with a productivity of

1266 kg per hectare (Sreedhara *et al.*, 2013). This paper is an analysis on the new crop development, its pathways and its performance through adaptive trials, demonstrations and using other extension methods with the following objectives:

1. To analyse the pathways of new crop development
2. To analyse the technology assessment and demonstration results undertaken in the crop
3. To study the impacts created in introduction of capsicum in the district

Materials and Methods

Study area

Khordha is one of the 31 districts of Odisha situated near the capital city Bhubaneswar. Khordha is the headquarter of the district of the same name and is situated on the National Highway No. 5. The district as a whole is divided into two geographical regions viz. South Eastern Coastal Plains and North Eastern Ghats comprising of 10 blocks. The former region has alluvial soils while the latter has red lateritic sandy soil and some patches of ideal alluvial soil. Except Baliana and Balipatna blocks which have alluvial soil, the other 8 blocks in the district have laterite sandy soils. While Baliana, Balipatna, Bhubaneswar and a small portion of Jatni Block are irrigated by canal systems of Mahanadi, Delta Stage II, Banapur Block is irrigated by Salia MIP, Tangi block by Malaguni MIP. Khordha district has about 39,702 hectares of high land, 43,499 hectares of medium land, 14130 hectares of cultivable and 15457 hectares of barren land. The high and medium land, together measuring around 83,151 hectares is conducive for horticulture while the cultivable and barren land is suitable for plantation of crops and vegetables. Cashew nut, mango, coconut, banana, citrus and brinjal, potato, cauliflower, onion, chilli, cabbage, cucumber, tomato *etc.* are the major fruit and vegetable crops in the district.

Selection of Farmers

The farmers under the study are the beneficiaries of the On-Farm Trial and Front Line Demonstrations of KVK. All the 30 farmers who benefitted out of the interventions of KVK were selected for the study. Farmers for the trials and demonstrations are selected from the adopted villages of KVK. The selected farmers have characteristic features of better socio-economic status and possess land to trial out the technology and are innovative. In the year 2012-13, 10 farmers were selected and 20 in 2013-14 from seven blocks (Tangi, Begunia, Khordha,

Jatni, Bhubaneswar, Baliana, Balipatna) and nine villages (Tankol, Kuradhilo, Saradhapur, Adakhandia, Kantia, Saradeipur, Nagapur, Taradapada, Rajas) of Khordha district.

Results and Discussions

Pathways of New Crop Development

Like any other crop introduction in the district, the KVK was working on awareness programmes for farmers to cultivate capsicum by replacing chillis to an extent, with the objective of increasing farmers' income. With this initiative the KVK constantly informed farmers that capsicum could be grown in Khordha district and the concern was "it will not grow in our soil and will capsicum be sold at the local market?" The opportunity to introduce the crop came to KVK during 2011 after the floods hit the district. KVK worked on the flood assistance programme and farmers were provided with seedlings of vegetables. Along with other vegetable seedlings capsicum seedlings were also provided but farmers were reluctant as they had the pre conceived idea that it would not grow in their soils. As the need of the hour farmers accepted the seedlings of capsicum and were astonished to infer that "Capsicum will grow in our Soil". Today the crop has spread to 550 farmers in the district cultivating capsicum due to the initiation of KVK. The timeline of the introduction is presented below:

Table 1. Timeline of Capsicum as a newly introduced crop in Khordha district

Year	2011-12	2012-13	2013-14	2014-16
Pathways	- Seeds were procured from other districts - No suppliers of capsicum seeds in Khordha district - Seeing is believing - Farmers become confident that capsicum can be grown in their soil	- KVK advised the input dealers to procure and supply seeds at district level - Location specific testing and confirmation	- Seed availability became common in the district - Capacity building of farmers through training, demonstration - Government provided seeds to farmers at subsidized rate (post phailin period)	- Inclusion in demonstration programmes under ATMA in different blocks of the district - Supply of capsicum seedlings free of cost through horticulture department - Various extension methods employed for horizontal spread - Spread to 550 farmers to adopt in the district - Local farmers have contributed to partial replacement of Capsicum supply from Bangalore

In 2011-12 capsicum seeds were procured from other districts as there were no input dealers who were interested to market. It was during this period that the flood assistance led to 150 farmers receiving and trying the crop from KVK. With a strong presence and contact with the input dealers KVK influenced them to procure capsicum seeds and today it is invariably available in all shops which paved

the way for farmers to adopt this crop. The pathway of new crop development took five years to influence the farmers to adopt this crop. Varietal Assessment and Frontline Demonstrations were carried out in the farmers' field selecting a hybrid variety "Indra" to assess its suitability to open field condition as well as the profitability of capsicum crop over green chilli. Today the district has more than 550 farmers who are cultivating both open-pollinated and hybrid varieties of capsicum adopting scientific management practices.

Varietal Assessment and Demonstrations

From the trial results it was observed that the net income was 142.7-163.2 per cent higher with an increase in yield of 170.8 - 215.1 per cent by adopting capsicum in open field condition compared to farmers' practice of cultivating green chilli. The farmers adopted a closer spacing of 60 x 45 cm for the hybrid Var. Indra instead of 75 x 60 cm as the plant growth is not vigorous in open field condition. The results of the assessment trials are presented below in Table 2.

Table 2. Results of Varietal Trials on Capsicum

Year	No of Trials	Yield (q/ha)		Net returns (in Rs/ha)		% of increase over control
		Farmers Practice	Recommended Practice	Farmers practice	Recommended Practice	
2012-13	10	112.0	353.0	130057	3,42,399	215.1
2013-14	20	123.6	334.7	238251	5,78,348	170.8

It was further observed that though fruiting continues in the plant with increase in temperature there is reduction in fruit size. The observation of fruit size during different stages is presented below in Table 3.

Table 3. Observation on Fruit Sizes at different stages of harvesting

Stage of harvesting	No of fruits (Ave no of fruits / kg)	Harvesting Period
Initial stage of harvesting	8-9	January-February
Mid stage of harvesting	12-13	March
Final stage of harvesting	18-22	April-May

The KVK also observed that there was a reduction in yield and quality of capsicum grown during spring-summer in open-field condition. The technology trailed was planting of capsicum and maize in the ratio 4:1 by sowing of maize 45 days after transplanting capsicum. To solve this problem KVK conducted an on-farm trial on intercropping of capsicum with maize.

Table 4. OFT results of intercropping of Capsicum and Maize

Result	Parameters	Data on Parameters	Cost of Cultivation	Net Income (Rs.)	B:C Ratio
T1	Yield of Capsicum(q/ha)	282.6	1,27,635	5,36,475	5.20
	Fruit/Kg	11-13			
	Fruit wt(gm)	97.4			
	Fruit damage (%)	6.15			
T2	Yield of Capsicum(q/ha)	311.7	1,40,195	5,98,300	5.68
	Yield of Maize cob(q/ha)	85.26			
	Fodder Yield(q/ha)	81.6			
	Fruit/Kg (no.)	10-11			
	Fruit wt(gm)	105.6			
	Green cob/ plant(no.)	1.625			
	Cob wt(gm)	530			
	Fruit damage (%)	3.85			

The trial indicated that intercropping of capsicum with maize has better profits for farmers with a B:C ratio of 5.68 compared to mono cropping of 5.28. The net income of monocropping was Rs. 5,36,475 and with intercropping it was observed to be Rs. 5,98,300 (Table 4).

Extension Methods Employed

For any crop to be established in the district there is need to employ different extension methods for larger adoption. In this case different extension methods, viz., individual, group and mass media were employed for faster reach of this crop. On-farm trials, front line demonstrations, technology week, farmer scientist interactions, field days, exhibitions and trainings were the specific extension methods. During the period all possible methods for larger adoption of capsicum were undertaken by the KVK. Special attempts were also made towards using mass media especially Doordarshan in documenting success stories. Farmers from all the blocks have been benefitted. The KVK also worked on popularising through the progressive farmers of the district as farmer to farmer extension will be faster. The employed extension methods and beneficiaries are presented in Table 5.

Table 5. Extension Methods and Activities towards promotion of Capsicum in the district

Year	Activity	Beneficiary	No. of blocks covered
2011-12	Technology Week on Integrated Agriculture	Farmers, Extension Personnel of Line Departments	10
	State Level Exhibition of KVKs of Odisha	Farmers, Extension Personnel of Line Departments	7
2012-13	Orientation Training Programme	Progressive Farmers, Block level ATMA Officials, LVAWs, VAWs	1
	Field Day	Farmers, Extension Personnel of Line Departments	1
2013-14	Vocational Training	Practicing Farmers	1
	Field Day	Farmers, Extension Personnel of Line Departments	1
2014-15	Training of Extension Functionaries	Block level ATMA Officials	4
	Door Darshan Coverage	Farmers	2
	Exhibition at Regional and State Level Krushi Mahostav	Farmers, Extension Personnel of Line Departments, NGOs	10
	Demonstration under ATMA	Farmers	1
	Farmer-Scientist Interaction	Farmers, Extension Personnel of Line Departments	4
2015-16	Pre-Rabi Sammelan	Farmers, Extension Personnel of Line Departments	10
	Exhibition at District Level Krushi Mahostav	Farmers, Extension Personnel of Line Departments	10
	Distribution of extension literature	Farmers, Extension Personnel of Line Departments	10
	Training	Progressive Farmers	7

Impact at Input and Market levels

The impacts of the interventions of KVK on this crop have been on the availability of seeds with all input dealers in the district. As the seeds are available and farmers have started cultivating the capsicum crop, its presence is widely seen in the local markets. Gradually the influx of capsicum from Bangalore markets to Bhubaneswar has been reduced as the crop is cultivated locally. It is also observed that Capsicum fetches a market price of Rs. 1600 to Rs. 4500/q during the months of January-April which is a boon to the farmers. The demand for capsicum is increasing at the household level and at the burgeoning chain of fast food restaurants. Udyan Fresh and Veggies Kart are looking for capsicum from KVK adopted farmers.

Conclusion

The lessons learnt in introducing capsicum by KVK, Khordha over the period of time are that employing a combination of extension methods for larger adoption, will be successful. With the availability of seeds with the input dealers it has become common for farmers to cultivate capsicum and farmers are also in an advantageous position as the crop fetches a good price in the market compared to chillies. The trials and demonstrations conducted by KVK and results linked to state governments to promote this crop is the key towards the spread. The net income was 142.7-163.2 per cent higher with an increase in yield of 170.8-215.1 per cent by adopting capsicum in open field condition compared to farmers' practice of cultivating green chilli which is one of the reasons for promotion. Over the period of time KVK expects that the district will be self sufficient with the availability of capsicum and reduce imports from neighbouring states. The flourishing small scale food cafes in Bhubaneswar city are a boon for the capsicum farmers.

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Youth in Agriculture: Role of Government Initiatives

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Abstract

Youth are the building blocks of a nation. The role of the youth in nation-building occupies the central position. Development of youth determines the development of the community and the country as a whole. The socio-economic development and prosperity of the rural areas depend upon the potential youth of the country, as the rural youth have abilities to orient themselves to go along with the main stream of the development process. India both before and after independence has witnessed emergence of youth as a potential force and to reckon with it, the involvement of youth in national developmental activities is necessary. It was felt significantly relevant because of their boundless energy and innate idealism, which could give a positive direction in improving the quality of life. To harness the potential of youth and to take the benefit of demographic dividend holistically, Government of India has announced multifarious schemes. These schemes are based on the principles of social inclusion, gender equality and sustainable development of rural areas. The difference in basic amenities, communication, health and education facilities between villages and urban areas attract youth towards the cities.

Keywords: Youth, Agriculture, Government initiatives

Introduction

The more empowered the youth, the more developed the nation is. The countries which channelize the potential of youth in the right direction are more developed. The energy and intellect of youth act as a torch-bearer for a nation. On the contrary, the countries which fail to realize the importance of the youth lag behind in every dimension of development. Of the 121 crore Indians, 83.3 crore live in rural areas while 37.7 crore live in urban areas (Census of India's 2011). The share of youth in total population has been increasing continuously from the level of 30.6 per cent in the year 1971 to 34.8 per cent in the year 2011 (The Hindu, 2017). As per Census of India 2011, youth (15-24 years) in India constitute one-fifth (19.1%) of India's total population. This important section of the rural population can respond to the needs of the country only if they are offered fruitful opportunities for growing

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up as useful citizens. In India, youth constitute a numerically dominant potential, resourceful and also adventurous segment of the population, (Anonymous 2014). Rural youth play an important role in agriculture and other allied activities. Rural youth, either male or female, because of their family background in farming can be active partners in various agricultural activities. Since youth are recognized as effective “agents of change” they can help in the process of dissemination and adoption of modern techniques and methods of agriculture and can take active part in the removal of resistance to innovations among rural people.

Importance of Youth in Society

Development of youth determines the development of the community and the country as a whole. The socio-economic development and prosperity of the rural areas depend upon youth of the country. They are the precious human assets who can play an important role in the nation building activities, if opportunities are provided. If a country can harness a creative and pervasive force like youth, it can substantially and quickly advance towards modernization. Youth have been playing quite a significant role in almost every country of the world as they possess zeal and vigour necessary to create opportunities for national development.

India both before and after independence witnessed emergence of youth as a potential force to reckon with. Involvement of youth in national developmental activities is felt significantly relevant because of their boundless energy and innate idealism, which could give a positive direction in improving the quality of life. The Government of India has been organizing planned and systematic programmes for the development of youth for their participation in national development. India is a country where majority of the population live in rural areas, therefore the role of youth is very important in the future of the country. In society their roles are more important in construction and adoption of new social values. The development and harnessing of the talents and energies of youth towards constructive work is of greater importance than any other effort.

Migration of Rural Youth from Agriculture

With 356 million, India has the world's largest youth population despite having a smaller population than China. The livelihood of a majority of Indian population is dependent on agriculture. The population of the country below 35 years of age is 51.8 per cent. Of this 48.2 per cent are women and 51.8 per cent are men, 30.1 per cent reside in urban areas and 69.9 per cent in rural India. (Rani, 2015).

Agriculture generally involves five stages *viz.*, production, processing, storage, marketing and consumption. In most of these stages rural youth can actively be involved. Rural youth participate in marketing where the trade or enterprise is highly/commercialized. Rural youth play a key role in performing various tasks related to dairy and goatery enterprises in activities like maintenance of cattle/goat shed, feeding of animals/goats, collection of fodder for animals/ goats *etc.*

But unfortunately, there is a continuous increase in the migration of rural youth to urban areas. Large numbers, mostly youth are moving away from rural areas to urban centres because there are fewer employment opportunities back home. The migration of rural people to cities is around 45 per cent in the country, which has several implications for the future of Indian agriculture. Out of total migrants from rural to urban areas youth account for 30 per cent. While the average age of Indian population is only 29 years, the average age of farmers is 55 years which indicates lesser youth participation in agriculture. Given the growing disinterest of youth in this sector, there are risks to agriculture raising the question of ‘who will do farming in the future?’

According to survey results, rural youth who currently live or have lived in urban communities relocated to large centres to pursue post-secondary education, find employment, or accompany family (Malatest, 2002). Rural youth have fewer opportunities after formal education than their urban counterparts. It is also acknowledged that youth get into trouble more often if they have nowhere to go and no meaningful activities to keep them occupied after school hours. Although youth migration has been a popular subject in recent years, little research has focused on the migration between rural and urban areas. One of the main factors affecting young people’s success in employment in agricultural practices was their limited connection with local informal networks. Informal networks provided young people with information about forthcoming employment opportunities or personal recommendations for jobs (Cartmel and Furlong, 2000). It is felt that extension educators can extend the opportunities in youth development issues (Ommani and Chizari 2006). They have the ability to help youth develop in different ways. In addition, efforts should be made to help youth to develop the capacity to voice their needs within the cultural, social, and political framework. Lucus (2007) explained, currently 472 million young people are living in rural communities in developing countries. Unfortunately, many rural young people are choosing to migrate to the city in order to make a better life for themselves or send money home to help their families-“an exodus that constitutes a severe threat to global food security”.

It is disturbing to note that our youth are losing interest and confidence in agriculture and allied activities; hence they are not willingly involved in agricultural operations. In spite of excellent and tremendous development in the field of agriculture, science and technology, only a few have been adopted. Youth are more receptive to new innovations or techniques in any field of development. The youth, if provided proper training in modern agricultural technologies, would not only come forward to accept changes but can also influence and educate the members of the farming community about modern agricultural technologies. The urban youth are mostly educated, organized in many forms and have access to facilities and institutions meant for youth services. On the other hand, rural youth are mostly having less opportunity for higher education, burdened with the needs of their own families, lack of opportunities for organizing themselves to engage in constructive work and also lack guidance for participation in development activities. Though rural youth have different fields of activities, they have not been involved and motivated to contribute to the development process. This is due to several reasons, such as, lack of nationwide youth programmes, lack of an appropriate network for youth organizations, lack of training and guidance, lack of inter-departmental or sectorial coordination.

All these factors largely contribute to rather unplanned and forced migration of youth from rural areas to urban centers. So, to stop this trend of migration and to make them participate in the general prosperity of the rural community, it is inevitable to develop different income generating activities to ensure their participation. Therefore, the development and harnessing of the talents and energies of youth towards constructive channels has always engaged the attention of a country's planners and policy makers. One of the most effective ways of development and channeling the potential of youth towards creative purpose is through the youth clubs. They help young people to develop themselves physically, mentally, socially and economically and prepare them to meet the future challenges of life effectively. The socio-economic development and prosperity of the rural areas depend upon the type of youth the country own, as the rural youth have the abilities to orient themselves to go along the main stream of the development process. The youth form the bulk of total population of the country. They are the national cream and the future crown with full possession of physical built and mental tenacity and power.

In our country, youth constitute a numerically dominant potential, resourceful and also adventurous segment of the population. According to 1991 census, youth

population in India with the age group of 15 to 35 years was around 31 per cent (246 million) of the total population. Out of this total youth population, 20 per cent (53 million) were urban youth, while the remaining 80 per cent (211 million) were rural (Shivalingaiah, 1995). India both before and after independence witnessed emergence of youth as a potential force, to reckon with. Involvement of youth in national developmental activities is felt significantly relevant because of their boundless energy and innate idealism, which could give a positive direction in improving the quality of life. The Government of India has been organizing planned and systematic programmes for the development of Indian youth for their participation in the national development. As agricultural operations/activities are seasonal in nature, the rural youth will be engaged in these activities during the seasonal period while during off/ lean period they will not have any work or they will be free. So rural youth will have to be given proper training and orientation about self-employment programmes like ACABC and WYTEP (Women and Youth Training Extension Project) *etc.* and encouraging them to take up self-employment, thereby contributing additional income to their family and improving their standard of living.

At present, the youth are having different needs, aspirations, attitudes, habits and values of life. The development of personal, social, economic and spiritual aspects of rural youth are possible, only when their needs, aspirations, attitudes, habits and values of life are recognized early and guided properly. Therefore, some of these aspects were considered which would be useful to the agencies involved in the development of rural youth.

Government Initiative to attract Youth in Agriculture

To harness the potential of youth and to take the benefit of demographic dividend holistically, Government of India has and is announcing multifarious schemes. These schemes are based on the principle of social inclusion, gender equality, and sustainable development of rural areas. Some of the schemes and steps are:

Attracting and Retaining Youth in Agriculture (ARYA) Scheme

This scheme ARYA has recently been launched by the Indian Council of Agricultural Research (ICAR). This program is planned to be implemented through Krishi Vigyan Kendras (KVK-Agriculture Science Centres) in 25 states of our country. Each KVK would train about 200 to 300 youth in taking up agriculture's allied and supplementary activities such as poultry farming, dairying, fisheries,

goat rearing, mushroom production and other similar activities which keep the rural youth attached to agriculture, either directly or indirectly. Finally, the trained young entrepreneurs would be assisted in preparing project reports for seeking bank loans.

Agri-Clinic and Agri-business Centre

Agriclinics and Agribusiness Centres (ACABC) scheme is implemented by the Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India (GoI) to foster entrepreneurship in agriculture. Through this scheme fresh and unemployed agricultural graduates are imparted training (for 2 months) on entrepreneurship avenues in agriculture and transformed as agripreneurs through establishment of need-based agribusiness ventures.

The purpose of the scheme is to provide gainful employment and foster entrepreneurship in agriculture and rural areas and to attract investment in agriculture. The aim is to supplement and complement the extension services of development departments of state governments in extending broad-based services to the farming community.

The scheme has the support from NABARD for extending loan facilities to the agripreneurs through banking sector and that of MANAGE and SFAC in training the fresh and unemployed agricultural graduates through nodal training institutes identified all over the country. The scheme has been in operation from 2002 onwards.

Skill India

Entrepreneurship efforts will not be succeeding until and unless the bridges of gap are fulfilled. So, there is a need for speedy reorganization of the ecosystem of skill development and entrepreneurship promotion in the country to suit the needs of the industry and enable decent quality of life to its population. However, there are gaps in the capacity and quality of training infrastructure as well as outputs, insufficient focus on workforce aspirations, lack of certification and common standards and a pointed lack of focus on the unorganized sector. Recognizing the need and urgency of coordinating the efforts of all concerned stakeholders in the field of Skill Development and Entrepreneurship, Skill India was launched. The National Skill Development Corporation India (NSDC) governed Pradhan Mantri Kaushal Vikas Yojana (PMKVY), outcome-based skill training scheme of the new

Ministry of Skill Development & Entrepreneurship (MSDE) was introduced to enable and mobilize a large number of Indian youth to take up outcome based skill training and become employable and earn their livelihood.

Skill Development in Agriculture

India's population is rising at a geometric rate. To combat with the increase in population, the demand for food and agri produce is increasing, but the supply is constant due to low agricultural productivity. This is predominantly due to improper Farm Management practices and loss in post-harvest handling. There is a requirement for specific set of skills in the field of agriculture. Considering the above factors, Agriculture Skill Council of India was set up in January 2013 as a Section 25 company under Companies act of Ministry of Company Affairs for building capacity in the Agriculture Industry and bridge the gap between laboratories and farms.

Start-up India & Stand-up India

Start-up India, Stand-up India initiative of the Government of India will boost entrepreneurship among the youth, create new job opportunities and help set up a network of start-ups in the country. The scheme will create an entire start-up ecosystem that would be set-up and will work as a friend, mentor and guide for start-ups through their entire journey of entrepreneurship.

Digital India

Digital India is an initiative to ensure that the government services are made available to citizens electronically by reducing paperwork and a lot of time. This initiative also includes a plan to connect rural areas with high-speed internet networks. This will give the rural youth more opportunities to interact with people from different walks of life and evolve better as an individual. Digital India will empower youth to know the government and its various departments better and to analyze the loops and strength unguided by political issues. The user friendly interface will connect more people to technology and the platform will act as a thought-pool. This will enable youth to gather more knowledge about the agro-based policies of the government and the benefits. The opportunities that Digital India provides may be in effectively harnessing ICT mediation in agriculture and the skilled youth in digital technologies may play a crucial role as change agents in partnership with a wide range of stakeholders in the Agricultural sector (Singh *et al*, 2016).

Government Programmes and Organizations for Youth in India

1. National Young Leaders Programme (NYLP)
2. Nehru Yuva Kendra Sangathan (NYKS)
3. National Service Scheme (NSS)
4. Rajiv Gandhi National Institute of Youth Development (RGNIYD)
5. National Programme for Youth and Adolescent Development (NPYAD)
6. Youth Hostels
7. Assistance to Scouting and Guiding Organisations

Skill Development of Youth

8. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
9. Deen Dayal Upadhyaya Grameen Kaushalya Yojna (DDU-GKY)
10. Deen Dayal Antyodaya Yojana - National Rural Livelihoods Mission (DAY-NRLM)
11. Prime Minister's Employment Generation Programme (PMEGP)
12. Enterprise and Skill Development
13. Assistance to Training Institutions (ATI) Scheme
14. Pradhan Mantri Kaushal Vikas Yojana (PMKVY)
15. UDAAN

International Initiatives for Youth

1. UN's Department of Economic and Social Affairs (DESA)
2. UN Centre for Human Settlements (HABITAT)
3. United Nations Development Programme (UNDP)
4. United Nations Environment Programme (UNEP)
5. United Nations Population Fund (UNFPA)
6. United Nations Children's Fund (UNICEF)
7. United Nations Programme on HIV/AIDS (UNAIDS)
8. International Labour Organisation (ILO)

9. Food and Agriculture Organization of the United Nations (FAO)
10. United Nations Educational, Scientific and Cultural Organization (UNESCO)
11. United Nations Volunteers (UNV)
12. United Nations Alliance of Civilizations (UNAOC)
13. United Nations Office on Drugs and Crime (UNODC)
14. UN Department of Public Information (DPI)
15. The World Programme of Action for Youth (WPAY).

Conclusion

The difference in basic amenities, communication, health and education facilities between villages and urban areas attract youth towards the cities. On the other hand, small land holdings are on the rise which poses a challenge to food security for the increasing population. Thus, it was felt to bring a comprehensive model for the development of rural youth in general and agriculture in particular. Government initiatives can harness the potential of youth. Convergence between various departments and their youth development schemes can lead to effective channelization to productive areas.

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