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Application of Behavioural Economics for Promotion of Environment-friendly Agricultural Practices for Food Security and Enhanced Farm Income

D. Manikandan¹

Abstract

Over the years the balance between the food production and environmental sustainability is getting skewed towards adverse environmental practices. There is increasing focus on environmental sustainability. There are a number of country specific initiatives to promote environmentally sustainable cultivation practices in the form of special schemes, incentivizing best practices in the form of subsidy, premium for organic produce etc. In recent times the application of concepts of behavioural economics in policy design has received the most attention by policy makers globally, to have a positive impact of their citizen behaviour in various walks of life. This article analyzes the utility of behavioural economics concepts in the promotion of environmentally sustainable farming practices.

Key words: behavioural economics, agricultural practices, environmental sustainability

Introduction

Food security is one of the most fundamental rights of every citizen. Nearly one-third of the land on the globe is used for cultivation purposes (Wood, 2005). Food production is closely related to environmental issues due to usage of various kinds of chemicals in the form of fertilisers, pesticides etc. Fertiliser usage has been found to have increased from 100 kg/Hac to 180.75 kg/Hac from 2000 to 2011 (source: World Bank), which implies the rise in usage of chemical inputs for cultivation (FAO Statistics 2017; Max Roser and Hannah Ritchie, 2017). This large-scale usage of artificial inputs has created many environmental issues (Foley et al 2001 and Bennett et al 2001).

Over the years, the balance between food production and environmental sustainability has been disturbed and is skewed towards adverse environmental

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practices. The free rider issues on public goods, i.e. environmental sustainability, are becoming the most common area of discussions at global forums. Many country-specific initiatives have been undertaken to promote environmentally sustainable cultivation practices in the form of special schemes, incentivising the best practices in the form of frontend and backend subsidy, premium for organic produce etc. In recent times, the application of concepts of behavioural economics in policy design has received the most attention by the policymakers globally, as it emphasises the importance of the human psyche and produces long-lasting effects. This article analyses the utility of behavioural economics concepts in the promotion of environmentally sustainable farming practices.

Food security and environmentally sustainable farming

Globally, farming leads to large-scale employment. In India, more than 60 percent of aggregate employment is provided in the farming sector. On the other hand, global food security depends on the aggregate agricultural produce. Most of the Sustainable Development Goals (SDG) that will drive the nations for the next 15 years are linked with food production (FAO, 2018). Hence, there is a need for balance between the food produce and environmental protection as present agriculture practice involves huge quantities of chemical molecular involvement in the form of fertilisers, pesticides etc.

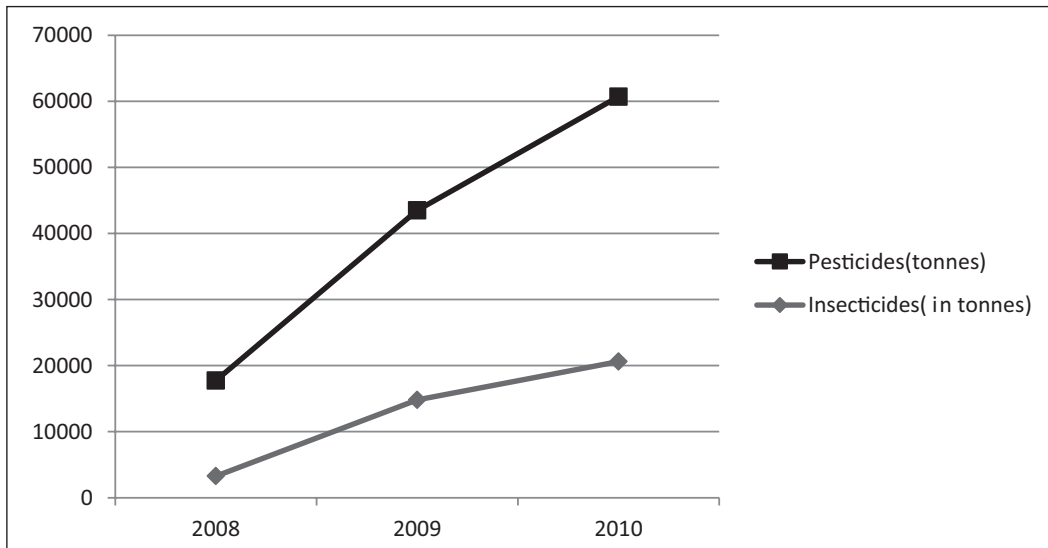


Figure 1. Consumption pattern of pesticides and insecticides in India (Source: FAO)

The usage of chemical inputs such as pesticides and insecticides has been increasing across nations, and India is not an exception. The usage of insecticides in India increased from 3,278 tonnes to 20,618 tonnes from 2008 to 2010, and in the same period, the usage of pesticides also increased (FAO,UN) . This has caused a movement across the world for traditional or organic farming, which is an environmentally sustainable practice. Such practices lead to soil health protection, cost effectiveness, better yield and provide premium value for the produce in the markets.

Behavioural economics and public policies: Behavioural economics is an interdisciplinary field drawing inputs from psychology, economics, anthropology, public administration, public policy and econometrics. The field uses several experimental applications of human cognition based on the basic premise of bounded rational thinking and presents models of behaviour prediction. It is widely prescribed in public policy, and many countries across the globe have successfully applied it to paternalise the behaviour of their citizens without affecting their freedom of their choice - in other words, human behaviour is changed in the desired direction without taking away their choices (Richard Thaler 2017). The behaviour insight team in the United Kingdom and the Social and Behaviour insight team in the United States are some permanent public policy structures that have experts in this field to advise the policymakers to come up with policies congruent to human psychology, due to which a large number of successful public programmes have been implemented in various fields, such as public health, marketing and consumer behaviour, investment behaviour etc.

Farmer Psychology

Mental health is vital to all individual human beings, including cultivators. According to World Health Organization (WHO), holistic health includes psychological wellbeing besides physical and social dimensions. Mental disorders disturb the wellbeing of human beings and have serious implications on the standard of life. In a report on depression and other mental disorders - Global Health Estimates, published by WHO in 2017 - more than 300 million people have been found to be affected by depression, and among them, more than 50 per cent are said to be living in underdeveloped and developing nations. Suicide topped the list for the top 20 causes of death in these countries, implying the close relation between mental health and economic indicators. A similar prevalence of mental

health disorders has been found among Indian farmers. In a study conducted by Gyanmudra in 2010 in the Anantapur district of Andhra Pradesh, behavioural aspects were found to be the leading factor (almost 52%) for death due to suicides by farmers (Deshpande, R. S., & Arora, S, 2010). The study also found that the depression prevalence rate among farmers was quite high (26.24%). This implies that the global findings on psychological wellbeing also reflect among the farmer community, and the economic conditions of farmers contribute to their mental wellbeing.

Behaviour and environment (including economics)

Studies have proved that a disproportionate usage of inorganic matters not only affects the environment, but also human existence. There are direct effects (adverse) as well as non-obvious effects, which can have a grave impact on human lives. Such effects are dormant and not noticed in earlier stages but are felt after the threshold level is crossed. In the field of psycho- physics, it is explained in terms of Just Noticeable Difference (JND), which explains that a threshold needs to be crossed to perceive the change, until which time it is in the incubation stage. In a classic experiment in 19 villages in six states done by Greenpeace in 2004, in the cotton belt areas (where the consumption of pesticides was higher), children in the age ranges of 4-5 years and 9-13 years belonging to agricultural communities were tested with a standardized rapid assessment tool designed to measure memory skills and motor abilities (by controlling other possible variances). It was found that 86 per cent children in the younger age group (4-5 years) and 84.2 per cent in the older age group (9-13 years) performed poorly in mental and motor skills than the control group, and teratogens (environmental factors influencing incidences such as heritable genes) were attributed for that. This noticeable difference may be seen in later stages as poor mental and verbal skills.

Enhanced economic environment and reduced cognitive taxing

Environmental effects on human behaviour, particularly cognitive abilities, are being investigated on a large scale by experts in cognitive psychology who are prime researchers in the field of behavioural economics. In a classic field trial among sugarcane farmers in India, experts found that there was a difference of an astonishing 10 IQ levels in the intelligence levels (tested through standardised fluid intelligence test tools) before and after the harvest, which was not generally

attributed to any other plausible reason than enhanced economic conditions from the sales of their produce. Such results were also found across other cultures, though they may not be equal in strength (Mullainathan et al and Mani and others World Development Report, World Bank Group 2015).

Leveraging behavioural economics in nudging desirable behaviour in farming

Various principles and concepts in the field of behavioural economics have been employed by several countries for promoting desirable citizen behaviour that is beneficial to both the individual and the society. Some of those relevant to this analysis are discussed here.

Employing the endowment effect and associated loss aversion: This concept is widely prescribed by behavioural economists patternalising the environment-friendly behaviour of individuals. This principle says that the materials endowed by an individual are valued more than their market value (Kahneman, D., Knetsch, J. L., & Thaler, R. H. 1990). The individual's subjective value gets added with the objective value, which makes the material subjectively costlier and difficult to part with even when offered a similarly valued material. Hence, taking away this already endowed benefit, which may be an already existing benefit or assistance, is more intensely painful than offering a new equivalent benefit to promote desirable behaviour.

Neighbourhood farming communities that do not have enough motivation to practise environmentally sustainable farming can be encouraged to practise desired behaviour (Low, D. 2011), which can be beneficial to both them and the society. The willingness to accept - another principle closely associated with endowment - is followed by the environmental policymakers collecting compensation from the pollution makers (also known as polluter pay principle). This can also be employed as a compensatory mechanism for not following environmentally sustainable farming to reduce the utilisation of chemical fertilisers.

Such compensation needs to be out of pocket, with a strong endowment perception for long-lasting and early desired effects. In other words, asking non-followers to forgo certain already entitled and received benefits rather than asking them to pay an amount will be the best form of nudging the behaviour in desired directions, as researches have established that the loss is painful compared to equivalent gains, a concept of prospect theory (Edwards, K. D., 1996) explained as follows:

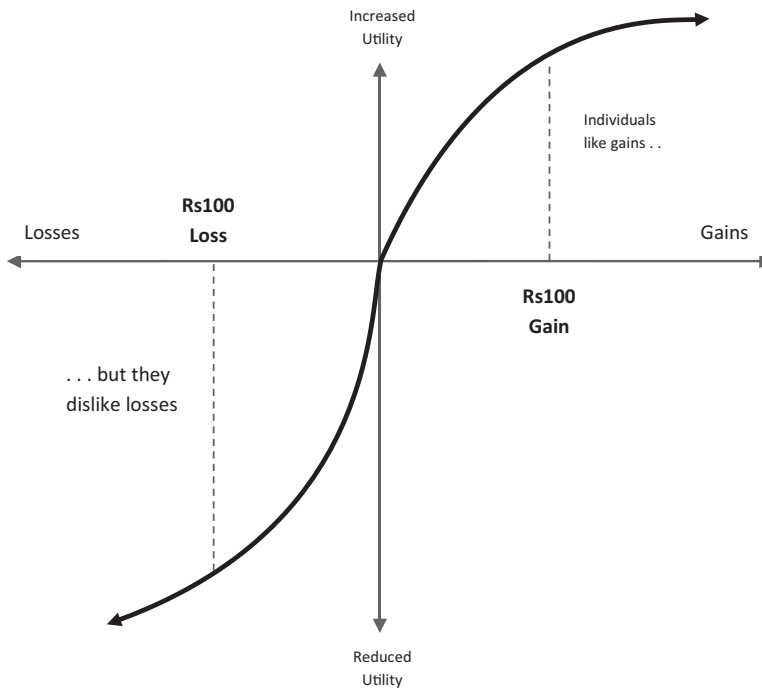


Figure 2. Differential perception of loss and gain for similar quantity

From the preceding graph, it is seen that the utility or the subjective valence for the loss is more than the equivalent gain. This differential individual utility level is attributed to the endowment effect and the human tendency of loss aversion. This loss aversion is also closely related with risk-taking behaviour in a given situation (Thaler, R, 2015). The graph also implies that the sensitivity of discomfort in the loss gets tapered for subsequent losses i.e. the first loss is more painful than the second loss. This will lead the individual, according to psychologists, to accept the risk further, and the undesirable behaviour may continue. Hence, this strategy can be combined with other nudging concepts, which are explained as follows:

Increasing knowledge endowment: Knowledge is an important endowment and can be nurtured through proper nudging principles. In the present context, cultivation is technology-driven and farmers essentially require skills and knowledge in comparison to previous years. The technology adoption facilitates better income and requires skilling of farmers, which has been found to help

the farmers come out of distress (Deshpande, R. S., & Arora, S, 2010). The educational level of farmers in India is not encouraging, and the percentage of non-literate workers engaged in agriculture is more than 50 per cent and has hovered around the same mark over the years. Hence, there is a need to reorient farmer skilling, and digital technology skilling is one of the areas that needs to be leveraged (G.K.Chadha, 2003). Skills are relatively permanent endowments in human beings. They facilitate better decision making in cultivation methods. The World Development Report, brought out in 2015 by the World Bank and titled “Mind, Society and Behaviour”, says that there is a wide variation of labour productivity in farming and that the differences touch a whopping 50 per cent on a steep high compared to differences in aggregate productivity. The most likely reason for this is non-adherence of simple technologies (which aid the production of agricultural farm) by cultivators due to the existing knowledge level of farmers. The application of behavioural economics principles, such as temporal intervention, converting complex agricultural technology into simpler technology for better and easy understanding of the advantages of such technology adoption, information dissemination in accessible places by utilising digital technology tools, can be quite useful in developing skill acquisition in cultivators. It also facilitates environmentally congruent cultivation. CRRID (Centre for Research in Rural and Industrial Development) conducted a field trial from September to October 2017 in Himachal Pradesh and found that farmers who practised protected cultivation were found to have realised farm income returns of around Rs. 3-5 lakh per acre, whereas during the same period, farmers who had not practised protected cultivation were found to have realised only around Rs. 1 lakh per acre. Hence, prompting or nudging the cultivators into practicing non-complex technology, such as protected cultivation methods, can accelerate farm income. Similarly, the adoption of simple post harvest technologies can facilitate farmer income on a large scale (Chakraverty, A., & Singh, R. P, 2016).

As knowledge enables cognitive abilities, it also facilitates farmers taking appropriate cultivation decisions in time and adoption of better technology, which has a close relation with increased farm income. Timely intervention (temporal factor), such as pre-purchase of cultivation inputs immediately after harvest (during this time, the probability of money with farmers is higher), yielded similar results, such as increase in farm productivity with state sponsored subsidy (WDR, 2015).

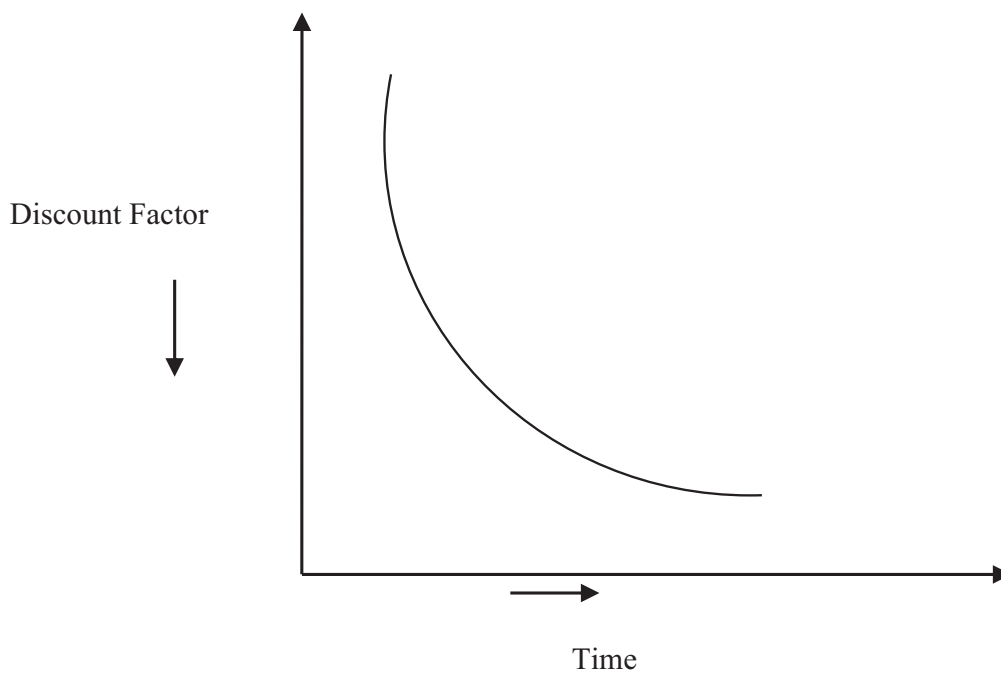
Self-enhancement through identification: This is another principle of behavioural economics for promoting desirable behaviour in individuals. In this, the individual identifies with noble causes for the society due to an enhanced self-image. Symbolic effects of having a non-polluted vehicle led individuals to feel like responsible citizens for green energy promotion, which motivated them to have such vehicles rather than other factors (Heffner 2005). This technique can be employed to promote environmentally sustainable farming by recognising the talents and works of farmers who did excellent work in practising and propagating environmentally sustainable farming. Such accreditations by the states can facilitate individuals in rethinking and identifying themselves with other behaviour that can be recognised socially.

Mental accounting: This is defined as assigning different subjective values for a similar objective. For example, the money given by a mother to a child may not be a big amount but is valued heavily by the child as it was given by a person dear to them. Similarly, some savings are treated sacrosanct - for example, children's education - and kept in a low interest earning instrument, though the high cost debt can be serviced by applying the cost-benefit ratio. The human psyche can be effectively used as a tool for the promotion of environment-friendly cultivation. In this discussion, in order to prevent undesirable cultivation behaviour due to reduced negative sensitivity of subsequent losses i.e. asking the individual to forego certain endowed benefit for practising undesirable cultivation methods, programmes may be designed to utilise the accrued revenue due to the foregone endowment exclusively for the promotion of environment-friendly farming purposes, such as R&D activities for developing technologies for sustainable farming. These practices can be successful in directing the behaviour in the desirable direction. The public good charge in California, where citizens have to pay a small amount in relation to their unit usage of electricity for providing assistance to develop greener technology and energy efficiency, is one such example.

Early and better income from produce and hyperbolic discounting

Humans are found to have differential discounting factors for similar values across time. These differential factors sometimes tend to be rather high. We discount the near future a lot more than the same amount of time far in the future. When asked to choose an option among the following choices, the preferred choice for most individuals was as follows:

- Between ₹ 100 today or ₹ 105 tomorrow? = ₹105
- Between ₹ 100 in one year or ₹ 105 in 1 year + 1 day? = ₹100



Hyperbolic discounting

This is due to the human tendency of applying large discount factors between today and the near future than between two far futures. This tendency is called hyperbolic discounting, whereby the discount factor tends to taper over time. This human tendency can be effectively employed for the promotion of sustainable cultivation behaviour, which can be done by offering an immediate market value to the produce obtained through environmentally sustainable practices, which is something that comes with a smaller discount in the human psyche. Special markets, premium rates, quality certification, direct marketing for the produce obtained through environmentally sustainable cultivation are some of the means to arrive at this end. This will satisfy the human need for gratification at the earliest and motivate one to continue the practice that has assured this productivity. e-NAM (Electronic National Agricultural Market) is one such initiative of Government of India in this direction.

Framing the information: Framing, or the way information is presented, has effects on the behaviour of individuals. Several researchers have explored the profound effects of framing on the behaviour of individuals. This is also known as choice architecture. One of the framing strategies was to make the required information more salient and visible than the non-desired information. Human beings are subjected to availability bias, and information that is more salient and visible is reported and the default options serve for shaping the behaviour of individuals in the desired direction (Johnson, E. J., & Goldstein, D., 2003). In the Lakshadweep islands, there are no outlets selling fertilisers, which may also be one of the factors for coconut growers not adopting chemical-input-based cultivation practices. The non-visibility and the resultant non-available information have helped the island territory become an organic territory. Hence, framing the environment-friendly cultivation information as more salient than non-organic or non-sustainable cultivation information would help shape the behaviour of the cultivators in the desired direction. In a study by the World Bank team in 2014, it has been reported that by making available the crucial information of the relationship between the lengths of pod to the sea weed market value to Indonesian farmers, their revenue realisation has increased manifold.

Nudging global policy towards environmentally sustainable farming

Behavioural economics concepts are found to have a nudging effect on all individuals, including global policymakers. The green fund, carbon trade, energy efficiency rating in appliances etc are some of the policy initiatives followed across countries. Climate change, which is reported to have ramifications on food security, may also be managed through BE concepts. It requires two essential interventions (nudges):

1. Rationalisation of the cost of green technologies to nudge more R&D on green technologies for sustainable farming
2. De-risking and partially guaranteeing the returns of private investment to tap the large availability of private resources

Can the behaviour change?

Human beings' behaviour is influenced both by nature and nurture. Reinforcements in both monetary and non-monetary (such as social recognition) forms have been

found to have changed the behaviour of individuals in the desired direction, as it facilitates the individual's psychological strength, which is an area of study for behavioural scientists. Psychologists have found that a positive relationship exists between mental and material prosperity. This interconnected relationship between economic wellness (by adoption of technology in farming), cognitive resource savings and improved decision making is explained in figure 3.



Figure 3: Interrelated process of behaviour and economic conditions

Results of experiments done by the World Bank group in the year 2015 across nations such as India, Indonesia, United States and African countries proved that economic wellness promotes savings of cognitive energy, which can be used by the individual for better decision making (Mullainathan et al 2015). Due to the adoption of simple and cost-effective technology, farmers additionally benefit with more freely available quality time. This helps in preventing the unnecessary drain of cognitive resources, which can facilitate the thinking process to arrive at better decisions for various challenges, including farming-related problems.

Though it is not possible to change an individual's entrenched behaviour in a sudden stroke, successive approximation can help with the change of behaviour in all creatures. On the other hand, the limitation of the individual thinking process (bounded rationality) propels states to alter their citizen behaviour (without

affecting their choices) in the desired direction to promote both individual and social goods. This is possible by employing various nudging methodologies for the welfare of their citizenry .

The concepts discussed here have utility not only in agriculture, but they can also be applied to other areas with suitable customisation. In the event of the absence of volunteerism, the behavioural economics concepts can be applied to cultivate useful and desirable behaviour among individuals.

Conclusion: Global policymakers are embracing the concepts in the interdisciplinary field of behavioural economics to have a positive impact on their citizen behaviour in various walks of life. Countries such as Singapore, the United Kingdom, United States of America and institutions such as the United Nations and World Bank are now focusing on the usefulness of the findings from the experiments done in this area. These strategies are cost-effective and can enhance mass scale implications without infringing on individuals' rights. Along with nudging skill enhancement in the relevant field, it is essential to sustain the modified and desired behaviour.

References

- Chakraverty, A., & Singh, R. P. (2016). Postharvest technology and food process engineering. CRC Press.
- Deshpande, R. S., & Arora, S. (Eds.). (2010). Agrarian crisis and farmer suicides (Vol. 12). SAGE Publications Ltd.
- Edwards, K. D. (1996). Prospect theory: A literature review. *International Review of financial analysis*, 5(1), 19-38.
- Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of Political Economy*, 98(6), 1325-1348.
- Johnson, E. J., & Goldstein, D. (2003). Do defaults save lives?.
- Low, D. (2011). Behavioural economics and policy design: Examples from Singapore. World Scientific.
- Max Roser and Hannah Ritchie (2017). "Fertilizer and Pesticides". *Published online at OurWorldInData.org*. Retrieved from: <<https://ourworldindata.org/fertilizer-and-pesticides>> [Online Resource]
- Thaler, R. (2015). *The Making of Behavioral Economics: Misbehaving*. New York.
- World Bank. (2015). *World Development Report 2015: Mind, society, and behavior*. World Bank Group.

Analysis of Factors Affecting Economic Empowerment of Rural Women in Ethiopia: A Logistic Regression Model

Almaz Giziew¹ and Assaye Tesemma²

Abstract

Without the participation of women in national activities, the social, economic or political progress of a country will be stagnated. However women are hampered by socio-cultural norms, lack of resources and economic opportunities. Women's economic empowerment helps to insure gender equality and the well being of nations. The purpose of the study was to identify factors influencing economic empowerment of rural women in Bahir Dar Zuria district of Amhara region. The study was conducted using quantitative study design. The total sample size of the study was 120 respondents from four randomly selected kebeles of Bahir Dar Zuria District. The data collection was done through structured interview for quantitative survey and analyzed by using inferential statistics like chi-square test, t-test, Cramer's V, Pearson Correlation Coefficient and regression model. Statistical Package for Social Sciences (SPSS) version 16.0 was used for data analysis. The study found that majority of rural women (75.83%) were illiterate. The researchers found that majority of rural married women (42.4%) were economically dependent on their husbands and this economic dependency affected their decision making power and made them submissive and subordinate. According to binary logistic regression model result: decision making on household matters, credit utilization and participation in non-farm activities affected women's economic dependency positively and significantly; whereas age of the respondents affected rural women's economic independence negatively. Gender responsive programs should recognize that practices such as lack of access to and control over resources, and the absence of decision-making and negotiation power all negatively affect women's economic independence. Special promotion and support have to be given to women during policy formulation and designing women sensitive issues and need based development.*

Key words: Economic dependence, Economic empowerment, Ethiopia, logistic regression, women

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*Kebele refers to the smallest administrative unit/level below a district and consists of a number of villages (i.e. it is a collection of villages). It is part of a district.

Introduction

Economic empowerment is important as a means for guaranteeing families' secure livelihoods and overall well-being. Rural women's economic empowerment can have a positive impact on, and is interconnected with, their social and political empowerment, through their increased respect, status, and self-confidence and increased decision-making power in households, communities, and institutions (Hill, 2011). Women's economic empowerment is the most important factor contributing to equality between women and men. Besides, a specific focus on women is essential as they comprise the majority of economically disadvantaged groups (Bediru, 2011).

Women have substantial contributions both as labor and mentor in the household and outside, but their role is often underestimated and not counted as an economic activity as they suffer from social, cultural and political biases. Traditionally, women's roles are confined to household chores and farming activities, which, in general engage them for longer hours than men (14-16 hours compared to men's 7-9 hours a day) each day (UNDP, 2004; ADB, 2001). This implies that we live in a society in which there is substantial level of gender inequality. The inequality in the provision of education reflects the deep rooted traditions and values within the ideological, political, economic and socio-cultural structure of societies (Lynda, 1991 cited in Bedru, 2011).

In spite of the policy options provided by the Ethiopian Government, there is very little empirical evidence for determinants of rural women's economic dependency to design appropriate policies for the improvement of rural women in Ethiopia. It is, therefore, significant to identify factors affecting economic empowerment of rural women. Recently a few studies have been done (Bedru, 2011 and Mahlet, 2016) on rural women's economic dependency. Moreover, analytical methods employed in both studies were more of a descriptive nature. However this study, unlike the other studies, used econometric analytical model to examine the objective situation in the study area. Therefore, this research activity was initiated to bridge the gaps by focusing on identifying factors contributing to economic empowerment of rural women in the study area.

Research Methodology

The study was conducted at Bahir Dar Zuria district, one of the 168 districts in the Amhara Region of Ethiopia. Administratively the district is divided into 32 rural kebeles and all of the kebeles are rural kebeles.

Sampling techniques and sample size

Rural women were the primary data sources in this study. The rural women from male-headed households and female-headed households were selected for this study because our society is patriarchal and women's roles have been taken into account. Therefore, populations of women from rural households in four kebeles of Bahir Dar Zuria district were used for data collection. Each household was represented by women (from both female-headed household and women in male-headed households (MHHH)). The sampling unit for this study was individual woman household of the district.

According to the district environmental protection and land administration office, kebeles with distance of ten and below kilometers were considered as near kebeles and those kebeles whose distance were more than ten kilometers were considered far kebeles when measured from Bahir Dar.

The district was purposively selected for the study and the 32 kebeles of the district were stratified as near and far based on the distance as distance affects rural women's economic independence. Then by using simple random sampling technique, two kebeles which were far and two which were near were selected. Finally by using probability proportional to size sampling, sample respondents from their respective kebeles were selected.

From a population of 1,200 (sampling frame) from the four kebeles of the district 10 per cent (120) was taken as the sample size purposively as the population of the district was homogenous in its characteristics (similar religion, almost similar educational status, language, living styles, etc) and the researcher believed that it could be representative.

Therefore sample size for each sample kebele was Sebatamit =31; Wondata = 20; Feres Woga= 32 and Kinbaba= 37. Thus, 120 sample respondents/units from four kebeles of the district (Sebatamit, Wondata, Feres Woga and Kinbaba Kebeles) were selected using systematic random sampling method.

Data collection Procedure

The quantitative data was collected by employing eight enumerators.

Data Processing and Analysis

The data was analyzed using the Statistical Package for Social Science (SPSS) version 16. It has been presented using statistical techniques such as, frequency distributions, Tables and simple measures of dispersion specifically ranges using

percentiles and/or counts and inferential statistics such as chi-square, t-test. As women's economic independence is dichotomous, binary logistic regression model was used for data analysis.

Therefore; the operational definition of economic independence is equal to (=) (earning self income in Birr minus (-) income earning from others in Birr) over (/) earning self income plus (+) income earning from others. If the value is greater than or equal to zero, women are economically independent, and if the value is less than zero, they are economically dependent (Greenstein, 2000).

Multicollinearity Diagnosis

Prior to running the logistic regression model, both continuous and discrete explanatory variables were checked for the existence of multicollinearity problems. The problem arises when at least one of the independent variables is a linear combination of others. The existence of multi-collinearity might cause the estimated regression coefficients to have wrong signs and smaller to t- ratios that might lead to wrong conclusions.

To make a decision for existence of multicollinearity among discrete variables, the value of contingency coefficients was also checked. Thus, based on variance inflation factor and tolerance results for continuous variables and contingency coefficient for discrete variables, the data as shown in Table 1 and 2 respectively indicated that the data were found to have no serious multicollinearity problem and therefore, both the continuous and discrete explanatory variables were retained in the model i.e. no independent variables were found to be dropped. Thus, to study factors affecting rural women's economic dependency, data gathered from 120 respondents were subjected to logistic regression analysis.

Table 1. Multicollinearity diagnosis for continuous variables

Variables	Collinearity Statistics	
	Tolerance	VIF
Age	.982	1.018
Landhold	.776	1.289
Toanfain	.964	1.038
Distamark	.977	1.024
Noltlu	.768	1.303

Source: Own computation from survey results, 2016; AGE represents Total years since birth; TOANFAIN=Total on farm income; DISTAMARK= Distance of the respondents' house from the market; LANDHOLD= Land hold of household; NOLTLU=Total livestock owned by the farm household (TLU).

Table 2. Contingency coefficient for discrete explanatory variables

S.No.	1	2	3	4	5	6	7
1	1						
2	.190*	1					
3	.510**	.408**	1				
4	.008	.331**	.293**	1			
5	.111	.511**	.260**	.165	1		
6	.177	.252**	.293**	.122	.127	1	
7	-.075	.089	-.051	.078	.084	.192*	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Own computation from survey results, 2016

Description: 1=Head of a household, 2= Participation in income generating non-farm activities, 3= Decision maker, 4= Utilization of credit, 5= Participation in social organization, 6= Access to media, 7= Education level of a woman

Formulation of empirical model and description of the variables

Women’s economic independence was used as a dependent variable. If a woman can meet her own need as well as of her dependants, it is to be coded 1 and 0 otherwise. The general model of Women’s economic independency is therefore:

$$econid = f(\beta_0 - \beta_1 \text{ age} + \beta_2 \text{ headhh} + \beta_3 \text{ edu} + \beta_4 \text{ dmakr} + \beta_5 \text{ panonain} + \beta_6 \text{ toanfain} + \beta_7 \text{ distamark} + \beta_8 \text{ landhold} + \beta_9 \text{ noltlu} + \beta_{10} \text{ creditut} + \beta_{11} \text{ socialpart} + \beta_{12} \text{ accmed} + \mu)$$

Where the dependent variable women’s economic independence and age, head of household, Education level of a woman, Decision maker, Participation in income generating non-farm activities, Total on farm income, Distance of the respondents’ house from the market, Land hold of household, Total livestock owned by the farm household, Utilization of credit, Participation in social organization and access to media are the determinants of women’s Economic independence and μ is the error term (N 0, 1). Here negative and positive signs of the coefficients $\beta_0, \beta_1, \beta_2, \dots, \beta_{12}$ will reveal that they increase and decrease women’s economic independency. The t-test (p-value) performed to test the significance of each of the explanatory variables at alpha levels of five percent. The statistical criteria like chi square, generalized likelihood ratio test, pseudo R² the overall explanatory power of the (equation) regression, and CC (Coefficient of Contingency) and VIF (variance influencing factor) were used to measure and check whether there is multi-

collinearity or not among the categorical and continuous explanatory variables used in the study, respectively.

Table 3. Summary of variables included in the models

Variable	Variable Type	Variable Description		
Dependent Variable				
1. Women's Economic Independence	Dummy	"1" if independent; "0" otherwise.		
Explanatory variables				
S.No.	Variables	Variable Type	Description and measurement	Expected sign
1	AGE	Continuous	Total years since birth	(-)
2	HEADHH	Dummy	"1" head of a household; "0" otherwise.	(+)
3	EDU	Categorical	Education level of a woman	(+)
4	DMAKR	Dummy	"1" if decision maker and "0" otherwise	(+)
5	PANONAIN	Dummy	"Participation in income generating non-farm activities is a dummy variable. (=1, if yes; =0, Otherwise)	(+)
6	TOANFAIN	Continuous (In birr)	Total on farm income in birr	(+)
7	DISTAMARK	Continuous (In kilometer)	Distance of the respondents' house from the market	(-)
8	LANDHOLD	Continuous (in hectare)	Land hold of household	(+)
9	CREDITUT	Dummy	Utilization of credit (=1, if yes; =0, otherwise)	(+)
10	NOLTLU	Continuous (in TLU)	Total livestock owned by the farm household (TLU).	(+)
11	SOCIALPART	Dummy	Participation in social organization (1= participate in social organization; 0 otherwise)	(+)
12	ACCMED	Dummy	"1" if access to media, "0" otherwise	(+)

Results and Discussions

Relationship between Dependent and Independent Explanatory Variables

Based on the survey result shown in Table 4 below, most of the respondents (73.3%) were women in male-headed households (living with their husbands) and 26.67 per cent of the respondents were women in female-headed households.

When economic independence of rural women was analyzed, 50 per cent of women in female-headed respondents were economically dependent and 50 per cent of them were economically independent. Majority of women in male-headed (65.22%) respondents were economically dependent while 34.78 per cent of them were economically independent.

Table 4. Relationship between economic dependency and women farmers (women in male and female headed households)

Attributes	Economic independence		Total	%	χ^2 results	p-value	Phi
	Dependent	Independent					
Women in Female Headed	16	16	32	26.67	2.513NS	.113	-.145
Women in Male headed	58	30	88	73.33			
Total	74	46	120	100			

Source: Own Computation from survey results, 2016. NS represents non-significant.

The statistical analysis of Phi coefficient revealed that there is no significant association between women in male and female headed households and economic independence ($\chi^2 = 2.513$, $r = -.145$, $p = .113$). The negative association indicates that women in female-headed are better than women in male-headed in terms of economic independence (Table 4). This is due to the fact that women in male-headed have less decision making power in the household as compared to women in female-headed. Moreover, women in male-headed have less mobility and less decision making in large household purchases and sales than women in female-headed households. This finding is consistent with studies conducted by Roomana and Jahanzaib (2013) and Azanaw and Asamnew (2017).

Table 5. Relationship between economic dependency and age of respondents

Variables	Economically dependent N(74)		Economically Independent N(46)		Total		t-value sig.(2-tailed)	Mean difference
	Mean	SD	Mean	SD	Mean	SD		
	Age	30.76	7.680	36.62	11.451	34.38		
Minimum	20		19		19			
Maximum	74		55		74			

Source: Own computation from survey results, 2016. *** represents at 1% level of significance

Table 5 indicates that respondents' age ranged from 19 to 74, i.e. the minimum and maximum age of respondents was 19 and 74, respectively. Mean of economically dependent respondents was found to be 30.76 with standard deviation of 7.680 whereas the mean of economically independent respondents was found to be 36.62 with standard deviation of 11.451. The Mean difference 5.861 showed that there was statistically significant difference between economically dependent and independent sample respondents at 1 per cent level of significance (t-value 3.067, $p=0.003$). Economically dependent respondents were older in age than economically independent respondents (Table 5). This may be because relatively aged women may not decide on household matters, they may not be mobile for different income generating activities. This finding is consistent with the finding of Ahmed (2013).

Table 6. Distribution of respondents by livestock holding

Variables	Economically Independent N(46)		Economically dependent N(74)		Total		t-value sig.(2-tailed)	Mean difference
	Mean	SD	Mean	SD	Mean	SD		
Livestock holding(in TLU)	2.93	2.925	3.97	2.752	3.577	2.853	1.968** (.051)	1.041
Minimum	0		0		0			
Maximum	13.526		12.381		13.526			

*Source: Own computation from survey results, 2016. ** represents 5% level of significance*

As indicated in Table 6, the minimum and maximum livestock size of the sample respondents was 0 and 13.526, respectively by tropical livestock unit. Mean of economically dependent respondents was found to be 3.97 with standard deviation of 2.752 whereas mean of economically independent respondents was found to be 2.93 with standard deviation of 2.925. Mean difference 1.041 showed that there is statistically significant difference between economically dependent and independent respondents at 5 per cent level of significance (t-value 1.968, $p=0.051$). The result showed that there is an association between livestock size and economic independence of sample respondents (Table 6). This is congruent with the report of Akinbode (2017) and Juliet *et al.*(2013). A literature review confirmed that rural women play a key role in the livestock management and household activities. However, it is often argued that their contributions are undermined and their decision making power is highly limited. This result is consistent with Mihiret and Tadesse (2014) and Greenstein (2000).

Moreover, there are differences in access to and control over livestock among women in female and women in male headed households. Mostly large animals were accessed and controlled by husbands whereas small livestock were controlled by wives. This is supported by Damisa and Yohanna, (2007).

Table 7. Relationship between economic dependency and dummy independent variables

Discreet independent variables	Chi-square test		
	χ^2 results/ Fisher's exact test	P-value	Cramer's V/ Phi
Heads of households	2.513NS	0.113	-0.145
Educational status	2.898NS	0.779	0.148
Decision on any household matters in a family	29.109***	0.000	0.493
Access to mass media	5.061**	0.024	0.205
Credit utilization	22.778***	0.000	0.436
Member of any association	25.687***	0.000	0.463
Participation in non-farm activities	88.513***	0.000	0.859

*Source: Own computation from survey results, 2016. *** and ** represent 1% and 5% level of significance, respectively and NS represents non-significant.*

The output of chi-square test/Fisher's exact test in Table 7 revealed that among seven discrete and categorical independent variables, decision on any household matters in a family, access to media, credit utilization, member of any association and participation in non-farm activities showed positive and significant association with the dependent variables at 1 per cent and 5 per cent significance levels, respectively. The other two variables such as head of household and educational status of respondents were non-significantly associated to the dependent variables.

There is a positive ($\chi^2 = 29.109$), strong (Phi = 0.493) and significant relationship ($p = 0.000$) between economic independence and decision making on household matters in a family. In accordance, the survey revealed that economic independence is strongly associated with decision making on household matters in a family positively; as women are free to decide on household matters in a family, they tend to be economically independent. Women become free to spend either when they are non-married and heads of the household, or when they have equal decision making power with their husbands for a given family.

The test of association between the two variables using chi-square also showed that there is positive ($\chi^2 = 5.061$), moderate (Phi = 0.205) and significant relationship ($p = 0.024$) between economic independence and access to media (Table 7).

As indicated in Table 7, the association between credit utilization and economic independence of rural women was also found to be very significant ($\chi^2 = 22.778$, $p < 0.000$); Women who did not have access to credit were found more likely to be economically dependent and those who had utilized credit were economically independent, with an effect size of (Phi=0.436). In accordance, the survey revealed that economic independence is strongly associated with access to credit positively; when women have access to credit they tend to be economically independent. When women have access to credit, they become engaged in different income generating activities. Farmers obtain credit from cooperatives, relatives, friends and local money lenders. Women had high priority in getting access to credit in the study area and another factor was repaying capacity. Most of the respondents did not take credit because of the reason that the interest rate is high followed by fear of inability to pay back the loan/credit.

Data in Table 7 shows that, the test of association between participation in any formal or informal association or organization and economic independence of rural women showed that there is positive ($\chi^2 = 25.687$), strong (Phi = 0.463) and significant relationship ($p = 0.0.000$) at 1 per cent level of significance. As women involve in various formal or informal associations or organizations, they will have access to information related to income generation which might help for their economic independence.

The association between the two variables using chi-square showed that there is a very significant association between economic independence and participation in non-farm activities ($\chi^2 = 88.513$, $p < 0.000$); Women who did not participate in non-farm activities are found more likely to be economically dependent and those who participated are found economically independent, with an effect size of (Phi=0.859). In accordance, the survey revealed that economic dependency is strongly associated with participation in non-farm activities (food for work, daily wage labor, liquor selling and petty trading are the common nonfarm activities in which the respondents of the study are involved) positively; as women participate in non-farm activities; they tend to be economically independent (Table 7). Hence, women should be encouraged to get involved in non-farm activities.

Table 8. Relationship between economic dependency and land ownership

Variable	Attributes	Economic independence		Total	%	χ^2 results/ Fisher's exact test	p-value	Cramer's V/Phi
		Dependent	Independent					
Land ownership	No	4	4	8		.494NS	.482	-.064
	Yes	70	42	112				
Total		74	46	120	100			

*Source: Own computation from survey results, 2015. ** represents 5% level of significance and NS represents non-significant*

With regard to land ownership of respondents, 8(6.9%) of the respondents did not have land access and the remaining 112 (93.3%) of the respondents did have access to land (Table 8). When economic independence was analyzed within land ownership, 50 per cent of the respondents having no access to land were economically dependent and the remaining 50 per cent were independent, 62.5 per cent of the respondents with access to land were economically dependent and the remaining 37.5 per cent were economically independent. The statistical analysis of Phi coefficient also showed that there is no significant association between land ownership and economic independence ($\chi^2 = .494$, $r = .064$, $p = 0.482$) at 1%, 5% and 10% level of significance.

Table 9. Distribution of Respondents by their Landholding size

Variables	Economically Independent		Economically dependent		Total		t-value sig.(2-tailed)	Mean difference
	N (46)		N (74)					
	Mean	SD	Mean	SD	Mean	SD		
Land Size in hectare	0.706	0.460	0.630	0.270	0.659	0.355	-1.132NS (0.260)	-0.075
Minimum	0.25		0.25		0.25			
Maximum	1.25		1.75		1.75			

Source: Own computation from survey results, 2016. NS represents non-significant

With regard to land size of respondents, the data collected on land size in the study area showed that the maximum land size of respondents was 1.75 hectare and the minimum land holding size of respondents was 0.25 hectare (Table 9). Mean of economically dependent respondents was found to be 0.630 with standard deviation of 0.270 whereas mean of economically independent respondents was found to be 0.706 with standard deviation of 0.460. Mean difference -0.075 showed that there is statistically non-significant difference between economically

dependent and independent respondents (t-value -1.132, $p=0.260$) at 1%, 5% and 10% level of significance. The probable reason for non-significant association is that majority of the respondents' land size is below 1.5 hectare and this shows that there is no significant landholding size difference among respondents.

Results of the binary logistic regression model

Women's economic independency: in this study, if women were economically independent 1 point was given and if women are economically dependent 0 point was given. Accordingly, out of the total 120 sample respondents 46 of them were economically independent and the rest 74 of them were economically dependent.

Economic Dependency and associated Factors

Twelve explanatory variables were hypothesized to explain factors affecting economic independence of rural women. Out of these twelve factors, four of the explanatory variables were found to be significant while eight were found to be insignificant in explaining the dependent variable (Table 10).

In order to see the relationship between economic independence and associated factors, binary logistic regression analysis was used. Accordingly, participation in non-farm activities, credit utilization, decision making on HH matters in a family and age of respondents were found to be significantly associated with economic independence of rural women sample respondents. Head of the household, on farm income, land holding size, distance to the nearest market, livestock size, educational status of respondents, access to media and participation in social organization were found to be insignificantly affecting economic independency of rural women (Table 10).

Elaboration on significant explanatory variables

Participation in non-farm activities: It was hypothesized that participation in non-farm activities (daily laborers, liquor seller and petty trading) affects economic independence positively. Thus, results of the model confirmed that participation of women in non-farm activities was found to be positively and significantly affecting women's economic independency at 1 per cent level of significance (Table 10). As participation in non-farm activities increases by one unit keeping other things constant, odds ratio in favor of economic independence increases by 14.90. This is due to the fact that the more women participate in the non-farm activities, the more income they can generate and accordingly the more they become economically

independent. This finding is consistent with a study conducted by Victoria (2007) and Kongolo and Bamgose (2002).

Decision making on household matters: As expected decision making power of rural women on any household matter in a family is supposed to affect economic independence of a woman positively. Accordingly, the result of the logit model indicates that decision making on any household matters in a family affects women's economic independency significantly at 5 per cent level of significance. As decision making on household matters increases by one unit, keeping other things constant, odds ratio in favor of economic independence increases by 6.19. This is due to the fact that when women become decision makers on household matters they will become more confident to participate in farm and non-farm activities to generate income and to become economically independent. This finding is consistent with and supported by a study conducted by Bhutta and Haider (2013).

Credit utilization: it was hypothesized that utilization of credit increase the probability of being economically independent. Thus accordingly, the logit model result indicates that credit utilization of rural women affects women's economic independence positively and significantly at 5 per cent level of significance. This is consistent with the prior expectation. As credit utilization increases by one unit keeping other things constant, odds ratio in favor of economic independence increases by 9.49. This is due to the fact that access to credit and other financial services are necessary to provide low income women with opportunities to increase their incomes and their assets as a result they will become economically independent. This study is also consistent with a study conducted by Hariharan (2014) and Assefa (1989).

Age of respondents: The results of the binary logistic regression model showed that the age of respondents was significantly and negatively affecting women's economic independence at 5 per cent level of significance which is consistent with the general expectation. The negative association of age indicates that as the age of respondents' increases their economic independency decreases and vice versa. As age of respondents' increases by one unit keeping other things constant, odds ratio in favor of economic independence decreases 0.881. This may be for the reason that, at early ages, women as youngsters are relatively free to do their own will and struggle for ways to have their own means of income for self subsistence and beyond. However, as they get older, they will be obliged from the family side

to go outside, to get married, and the hierarchical system in such social bond of a typical rural community, will strap them to move free and earn income as usual. This finding is consistent with the finding of Roomana and Jahanzaib (2013) and Ahmed (2013).

Table 10. Estimates of logistic regression model result

Variables	B	S.E.	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
					Lower	Upper
Age of respondents	-.127*	.076	.095	.881	.759	1.022
Head of the household	-.570	1.919	.767	.566	.013	24.325
Educational status of respondents	.404	.704	.566	1.498	.377	5.949
Participation in non-farm activities	7.222***	1.894	.000	14.90	8.30	56.07
On farm income	-.002	.003	.355	.998	.993	1.003
Land holding size	4.132	2.939	.160	62.293	.196	1,979
Live stock in TLU	-.747	1.429	.601	.474	.029	7.805
Decision making on household matters	4.126**	1.763	.019	6.19	1.953	19.62
Credit utilization	2.970**	1.411	.035	9.49	1.26	30.9.8
Distance to the nearest market	.087	.480	.856	1.091	.426	2.795
Access to media	.927	1.531	.545	.396	.020	7.948
Participation in social organization	1.333	1.261	.290	3.792	.320	44.862
Constant	-4.672	3.269	0.153	0.009		
2log likelihood				27.717		
Omnibus Tests of model coefficients: chi-square(χ^2)				132.044		
Significance				0.000		
Correct model prediction				97.5%		
Correct prediction of economically independents				97.8%		
Correct prediction of economically dependents				97.3%		

***, ** and * represents level of significance at 1%, 5% and 10% , respectively.

Source: Own computation from survey results, 2016

Conclusion and Recommendations

This study has tried to look into the different factors which determine economic independence of rural women in Ethiopia analyzed using Binary Logistic Regression Model and inferential statistics (t-test, X²-test). The study has important policy, education and research implications; because, out of the total 120 sample respondents, majority (74 or 61.7%) of them were economically dependent. Besides, determinants of rural women's economic independence play a substantial role for both women in female headed and women in male headed households' income and livelihood. It is important to understand these factors for the benefit of poor women farmers in particular and in the rural parts of Ethiopia in general. From the findings of the descriptive survey result it can be concluded that decision on any household matters in a family, access to mass media, credit utilization, membership of any association, age of women and livestock holding had relationship with economic independence of rural women. Ethiopian Government in its growth and Transformation Plan (GTP) have taken different measures (legislative, political and socio-economic) to empower women, but, practically they are still more disadvantaged. Therefore, continuous follow up and supervision should be done.

The results of binary logistic regression model show that non-farm activities, credit utilization, decision making on household matters in a family and age of respondents were found to significantly determine economic independence of rural women sample respondents. Decision making on household matters is one of the variables affecting economic independence of rural women positively and significantly, hence it is necessary to empower women for making decision on all economic and income generating activities because the contribution of women in reducing poverty and hunger is as important as men.

As credit utilization is one of the variables affecting women's economic dependency significantly 5 per cent, a loud and clear message should be communicated to the rural women to use financial institutions as sources of credit as credit enables poor rural women to be economically empowered.

It is clear that if roles of men and women are effectively defined they would be empowered equally in their life circles and spheres. Therefore, the real economic empowerment of woman lies in her dignity, regard and respect she deserves. Men should have involvement with women in sharing family responsibilities, particularly parenting and promoting gender equity in the family with focus on

early socialization and youth and to create a positive environment for the effective participation of women.

In general, appropriate intervention strategies are needed to make economic empowerment of rural women effective and to bring about equitable and sustainable changes in the study area. Similar researches should also be carried out in a different set up.

References

- ADB (African Development Bank) (2001). The Gender Policy, OESU
- Ahmed Mohammed (2013). *Microfinance and Rural Women's Empowerment: A Cross-Sectional level Analysis (Evidence from Rural Woreda's of Harari Region)* MSc Thesis, Mekele University, Ethiopia, pp.122
- Akinbode S.O. (2017). Women Asset Ownership and Household Poverty in Rural Nigeria. *Journal of Studies in Social Sciences*, 16(1).
- Assefa Admassie (1989). Some Factors Influencing Agricultural Credit, among Peasant Farmers in Ethiopia: A case study of two districts. *Ethiopian Journal of Development Research*, 11(1): 10.
- Azanaw Abebe and Asamnew Tassew (2017). Gender Equality in Rural Development And Agricultural Extension In Fogera District, Ethiopia: Implementation, Access To And Control Over Resources. *African Journal of Food, Nutrition and Development*, 17(4).
- Bedru Hassen (2011). *Practices and Challenges on economic empowerment of rural women in Halaba special woreda S.N.N.P.R.* MSc thesis, Indira Gandhi Open University, India, pp.96.
- Bhutta, D and Haider, E. (2013). *International Journal of Academic Research in Business and Social Sciences*, Vol. 3, No. 2. Pp. 203-224
- Damisa MA and Yohanna M.(2007). Role of rural women in farm management decision making process: Ordered Probit Analysis. *World Journal of Agricultural Sciences*, 3: 543-546.
- Greenstein Theodoren (2000). Economic dependence, gender, and the division of labor in the Home: A replication and extension. *Journal of marriage and the family*, Volume 62 (May 2000), pp. 322-335.
- Hariharan R. (2014). A study on women farmer's participation in agriculture extension activities in Vavuniya District, Sri Lanka. *International Journal of Novel Research in Civil Structural and Earth Sciences*,1: 1-9.
- Hill,Catherine (2011). Enabling rural women's economic empowerment: Institutions, opportunities, and participation, expert group meeting, Accra, Ghana, 20-23 September 2011, pp. 1-46.
- Juliet Kariuki, Jemimah Njuki, Samuel Mburu and Elizabeth Waithanji (2013). Women, Livestock Ownership and Food Security. International Livestock Research Institute and the International Development Research Centre.

- Kongolo M and Bamgose O. (2002). Participation of Rural Women in Development: A Case Study of Tsheseng, Thintwa and Makhalaneng Villages, South Africa, *Journal of International Women's Studies*, 4:79-92.
- Mahlet Abitew (2016). Gender Dimension of vegetable value chain in Eastern Harerge, Ethiopia. PhD dissertation, Haramaya University.
- Mihiret Mulugata and Tadesse Amsalu (2014). Women's role and their decision making in livestock and household management, *Journal of agricultural extension and rural development*, 6 (11), pp. 347-353.
- Roomana Naz Bhutta and Jahanzaib Haider (2013). Effects of Economic Dependency on Decision Making Power of Women in Rural Areas of Tehsil Dera Ghazi Khan. *International Journal of Academic Research in Business and Social Sciences*, 3(2). 203-224
- United Nations Development Program (2004). *Human Development Report 2004*. New York: Oxford University Press, USA.
- Victoria, M.V. (2007). *Agricultural Technology in Bangladesh: A Study on Non-farm Labor and Adoption by Gender*. MSc Thesis Submitted to the faculty of the Virginia Polytechnic Institute and State University. Pp. 120

Implementation of Household Approach 'Views from Key Informants': Case of Chalwita Model Village, Rumphi, Malawi

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Abstract

Household Approach is one of the extension approaches being advocated in Malawi for promoting the participation of all gender categories in farm planning and management. Adopting an interpretivist's view, this pilot study assessed the implementation of Household Approach in the Rumphi district, Malawi. Data was collected through face-to-face interviews using a checklist. In addition, documents, including reports and farmers' record books, were analysed and focus group discussions were arranged to triangulate data. Household Approach implementation in Mhujju, Rumphi, was carried out by using a model village as a special interest group. The study has established that all stakeholders are aware of the Household Approach, however, many Household Approach tools were not adequately articulated among frontline staff and local facilitators. Joint planning and implementation of farming activities were observed among the targeted population after the implementation of Household Approach. Some resistance was noticed from male partners on women gaining access to and control over resources; however, there is a steady move towards equal access and control of resources across all gender categories.

Key words: Household Approach, peer household, local facilitator, model village

Introduction

Located in the sub-Saharan Africa, Malawi is one of the developing countries, whose economy remains predominantly agro-based despite development of other economic sectors (GoM 2012a, p. xiii). In Malawi, agriculture accounts for 30 per cent of Gross Domestic Product, generates over 80 per cent of national export earnings (Government of Malawi, 2016) and employs 64.1 per cent of the country's workforce (2013 Malawi Labour Force Survey report cited by the Government of

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Malawi, 2016). Women constitute 70 percent of the work force and produce 80 percent of food for home consumption (Government of Malawi, 2012a).

Although agriculture is an important sector in the Malawian economy, gender disparity is a major constraint that affects its contribution to sustainable development in the country (Government of Malawi, 2012b). For instance, despite the fact that women play a crucial role in the economic development of the country, their participation in decision-making processes in the agricultural sector is limited, as these processes are dominated by men (Government of Malawi, 2012b). According to a report, “The cost of the Gender Gap in Agriculture”, Malawi stands to gain if women are involved in the agriculture value chain. There will be an increase in crop production and a USD 100 million increase in Gross Domestic Product, and 238,000 people will be pulled out of poverty if the gender gap is closed (Government of Malawi, 2018).

In an effort to promote active participation of all gender categories in decision-making processes, among others, in 2009, the Ministry of Agriculture and Food Security adopted Household Approach (HHA) from Zambia under the Agriculture Support Programme (ASP). Household Approach is an extension approach that promotes power relations among adult and youth household members in order to promote equitable access to and control over resources, assets and benefits (Government of Malawi, 2015).

Background for implementation of Household Approach in the Malawian Agriculture Extension System

History records of Malawian agriculture extension, Kabuye and Mhango (2006), inform us that in the 1950s, the agriculture extension system in Malawi adopted the master farmer approach in which selected farmers, considered early adopters, were supported with logistical support services and all extension efforts were concentrated on them with the hope that their crop and livestock production would increase, followed by the enhanced prosperity of their families. It was envisaged that in the long run, other small holder farmers would follow suit and adopt improved technologies, resulting in increased overall agricultural production in the country. This was in line with modernisation theory principles.

According to Hopper, (2012), modernisation theories were criticised for persistent and deepening global inequalities that were thought to be supported by modernisation theory principles. The issue of inequality was also noticed with the

master farmer approach in Malawi, as reported by Kabuye and Mhango,(2006). It was observed that as the master farmers became prosperous, non-participating farmers did not follow suit in adopting the improved technologies as they envied and resented the master farmers' prosperity. Criticism against the modernisation theory led to the rise of the dependency theory.

Andre Gunder Frank, (1972) the leading theorist of the dependency theory, argues that colonialism and imperialism impeded the independent development of the Third World. He proposed a radical political transformation and delinking of third world economies from world markets. According to Engel 2010, the dependency theory was criticised for not putting a nation-state-based analysis of class relations at the forefront. These shortcomings led to other perspectives being developed. People were identified as the missing element in development efforts (Egger, 1995, cited in Gack, 2007); hence,there was the emergence of a people-centred development approach, also called a participatory approach.

Following the participatory movement, the agriculture extension system in Malawi adopted the pluralistic, demand-driven agriculture extension policy in the year 2000. This agriculture extension policy advocates community participation in development interventions. In line with these participatory principles, the agriculture extension programme in Malawi, among others, is promoting the use of innovative participatory development approaches and methods to facilitate agricultural development planning, implementation, monitoring and evaluation as one of its strategic objectives (Government of Malawi, 2012a). In the Malawian agriculture extension system, the model village approach is one such participatory method that was adopted; however, it has been criticised for treating communities as homogenous, leaving out some of the adult and youth members of the household who are crucial in the planning and implementation of household and community activities(Government of Malawi, 2012a). Household Approach addresses this gap by promoting the involvement of all household members, including women and youth.In the case of Malawi, Household Approach was adapted to suit local conditions. For instance, apart from incorporating a number of aspects from different Household methodologies into this approach, the participatory extension approach in Malawi is being facilitated by lead farmers, called local facilitators, backstopped by extension workers among peer households. Unlike other participatory approaches, which consider village an entry point for addressing various development issues, including gender, Household Approach considers a

household an entry point to address gender issues (Government of Malawi, 2015). In 2016, Household Approach was implemented across all districts in Malawi. Though the approach is participatory in nature, however Parry et al. (2005), argue that the ability of participatory development in fulfilling its promise rests in part on the manner in which it is undertaken. Therefore, this study assessed views on how Household Approach was implemented in Rumphi.

Theoretical framework

Household Approach uses participatory methodologies to engage with the farming community. In order to understand how Household Approach was implemented, this study was carried out within the framework of the participatory development theory. The key elements of participatory development theory include inclusion and equity, transparency, empowerment and sharing (Simango, 2015). The participatory development theory provided an opportunity to explore how inclusive, transparent and empowering Household Approach processes were. It also allowed us to look into what initiatives were taken to promote sharing and equity among targeted participants in the area under study.

Research paradigm

A qualitative approach guided by an interpretivist paradigm was adopted in this study. Interpretivists' view reality as subjective and think that it differs from person to person (Guba & Lincoln, 1994). Epistemologically, interpretivists believe that knowledge and meaningful reality are constructed in and out of interaction between humans and their world and are developed and transmitted in a social context (Crotty, 1998). Therefore, the social world can only be understood from the standpoint of individuals who are participating in it (Cohen et al., 2007). This is in line with what this study did: understand how Household Approach is implemented from the perspectives of participating stakeholders.

Research design

This was a phenomenological study. Somekh and Lewin (2005) in Ndengu, 2009, define phenomenology as "the study of lived human phenomena within the everyday social context in which the phenomena occur, from the perspective of those who experience them." This research design provided an opportunity to understand the phenomenon of HHA implementation through the experiences of key informants themselves.

Description of study area

This study was conducted in Mhujira Extension Planning Area (EPA), in particular the Chalwita model village, because it has longer experience of implementing Household Approach in the district.

Sampled participants and sampling method

Marshall, (1996) defines a key informant as an expert source of information. To isolate people involved in HHA implementation, purposive sampling was carried out for the extension staff, Model Village Agriculture Committee members, local facilitators and peer households. A total of, 26 participants was purposively sampled.

Data collection methods and tools

In order to get a real and subjective view of the key informants about the implementation of the Household Approach, face-to-face interviews were conducted using a checklist. This enabled an in-depth understanding and sustained experience in the implementation of the approach. In addition, the analysis of documents, including reports and farmers' record books, was carried out and finally, focus group discussions were arranged to triangulate data.

Analysis of data

Narrations from the field regarding how Household Approach was implemented were audio recorded, transcribed verbatim and then thematically analysed. In this regard, the researcher utilised the Tesch (1990) coding technique. Transcripts were read to generate codes that were grouped to form categories, and the categories were further grouped to form themes. Themes were then compared with the guidelines for the implementation of Household Approach. The following discussion is based on the themes that emerged from this exercise.

Results and Discussion

Theme 1: Knowledge of Household Approach among key informants

Rogers (1995) described knowledge as a situation where individuals (or other decision-making units) learn about the existence of an innovation and seek understanding of how it operates. All key informants under study learnt about Household Approach through trainings and briefings, although variations regarding the duration of training were noticed among them, as shown in Table 1 below.

Table 1. Duration of Household Approach Training received by key informants

Key informant	No of respondents	Duration of training	Source of support
Subject Matter Specialist	1	1 week training	Director of Extension
Frontline extension staff	3	1 day training	DADOs office
Local facilitators	2	1 day training	EPA office
Peer households	10	2 -3 hrs training	Local facilitator
Village Agricultural committee	10	A briefing by the local facilitator	Local facilitator

It is only the Subject Matter Specialists who were fully trained on the concept of Household Approach. The rest had trainings that ranged from one-day to a few hours to a few-minutes long briefing on HHA. This may affect the way Household Approach is implemented, as argued by Food and Agriculture Organisation (1981), which says that the degree of completeness or adequacy of knowledge will affect the manner in which a technology is applied. The following extracts narrate the understanding of Household Approach by some key informants:

“HHA is a tool on its own. Basically, it’s a tool that looks at how to bring social justice with respect to how we share roles and responsibilities as well as how we share profit, which is realised in a household so that the profit is shared between everybody in that household. Not only that, in terms of resources to be used, HHA makes sure everybody has equal access to resources. If properly implemented, it’s a wonderful tool for households”. (An extension worker.)

“Inepakuiupulika Household Approach, nkhaipulikakutimunthuukwendelamkaya, mumabanja, kuonakutikandondomekoyaukhalilowawouliuli, ulimiwawoukwenda-wuli, kusatulangamaunononoawowalimiwakusangamaka makakuwamama”. (I understood Household Approach as an extension approach where a lead farmer supervises farming activities, monitoring the livelihood of farming families in terms of their livelihood plan and inquiring about issues they face, specifically focusing on women’s issues). (A local facilitator.)

“Kupangamapulaninakusambiramalusokutitkwaniliskemapulaniyithu”. (HHA is about formulating plans and learning how to fulfil those plans). (A peer household member.)

“Ni ulimiwakhomonakhomouwopakuwakukhalilanapasikwa mama, dada, wanakutivinthuwendengemakola”. (HHA is a door-to-door farming approach

where households sit down together, including husband, wife and children, so that things move along well)". (A model village agriculture committee member.)

It can be concluded that all stakeholders implementing Household Approach in Chalwita model village were educated about how the Approach functioned. However, variations were noted in the understanding of Household Approach among the stakeholders executing it. An outlying case was based on the understanding of HHA as an approach that focuses on women's issues, which is contrary to what HHA advocates. The approach empowers all adult and youth male and female household members with respect to the planning and implementation of the household farming business by building the knowledge and skills of the household members, including decision making, resource mobilisation and utilisation of benefits (Government of Malawi, 2015). This can be attributed to the type of Household Approach training received by these stakeholders. Some participants undergo just a one-day HHA training, while some have a mere 2-3 hours briefing, which is not enough time for one to fully grasp what a particular extension concept is all about.

Household Approach utilises a number of tools. These include visioning, gender balanced tree, action planning and HIV/AIDS timeline, among others. The following section presents sampled extracts from key informants regarding their knowledge of the tools used in HHA.

"In the first place, HHA necessitates each household to have a vision so that they should not just be working anyhow; they should be working towards achieving the vision within a stipulated period of time. Of course, when coming up with household vision, they look at the current situation they are in and what they want to achieve in a certain period, also looking into the opportunities and constraints they have in achieving their vision. They break them down into milestones, such as stipulating what they can achieve in the first year, second year and so forth in regard to the activities they can do in a certain period. Secondly, a gender balanced tree basically looks at the current situation in a household in terms of division of labour by looking at aspects such as who does most of work. It divides these roles into those that bring income duties to help take care of household. It also looks at how phindu (profit) is shared among family members, who uses most of the money or phindu (profit), who enjoys most of phindulijakwambili (profit to a greater extent), whether there is anybody who gets a bigger share than his/her family members. Then, it looks at assets at home and who has the most access to

and control over the assets. So, you check whether the tree is balancing or not. If it is not balancing, you ask them what should be done for the tree to be balanced. You look at aspects such as issue of work, akugwirantchitokwambirindiwina (somebody working more than the others), tipangebwanji (what should we do), Aah!, ntchitoizi, tizithandizana (we should be helping each other in this), zikhonzakukhalabwino (it can be good) and other such things. But most importantly, we should look at how to use phindulijalikapezeka (profits realised) or who is using the most phindu (profit) for personal gains and question what can be changed. Recommendations emanating from consultations in households included: stopping drinking of beer or not necessarily stopping but reducing. We also look at nkhaniza (issues of) HIV/AIDS; Tikuziwammene HIV/AIDS ikupangilandimiyoyoyathuyi (we know what HIV/AIDS does to our lives), so then you look at the HIV/AIDS timeline kwakukulutimawathandizaanthuajakunikilama (in most cases, it helps people to look at stages of HIV/AIDS) kuchokela pamenemunthualibekufikilapamenewamwalira (from the time they are infected to the time they die). We also look at which interventions we can conduct at each stage, ndicholinga choti ngati munthuujalibekachilombo, kuti asakatenge ,atani (what one should do if they are not infected) or ngatialindi kachilombo, atanikutiasayambekudwala, kapena gantiakudwal kale apangebwanjikutiasabwelele back ku (or if they are infected , what they should do so that they don't get sick, or if they are sick, what they should do to not go back to) an asymptomatic stage cholingakutiazithakupangantchitozawobwinobwino (so that they remain productive). Finally, ndinkhaniya (there is the issue of) the action plan". (An extension worker.)

As derived from conversations with the frontline extension staff and local facilitators, planning and visioning seem to be the only tools that were briefly mentioned; details regarding how these were implemented were not adequately articulated. This implies that frontline extension workers and local facilitators have inadequate knowledge of Household Approach.

Theme 2: Household Approach implementation model

According to the frontline extension staff under study, they were taught that Household Approach has to be promoted among participants who are within the same locality; hence, *mindandandas* (green belts) or model villages were targeted. As a model village already existed, Household Approach in Mhuju EPA was implemented in the Chalwita model village. The other aspect that was considered

with this village was the good receptivity of the people from past experience of working with them. This was followed by briefing the village head and the committee that was running the activities of this model village, called Model Village Agriculture Committee (MVAC). What HHA is and the lead farmer concept used in this approach were covered, followed by a selection of local facilitators who were trained on HHA at the EPA day training centre. It was also reported that some people volunteered to be local facilitators. The program started with 7 local facilitators (5 females, 2 males), who in turn trained 32 peer households, of which 21 were females and 11 were males.

As part of on-going activities, local farmers are now teaching fellow farmers, indicating a form of sharing information on HHA among targeted farming families, extension workers periodically supervise participants to appreciate their progress and monitor the challenges they faced with HHA. This is important as Rogers, 1995, reports that in the implementation stage, the implementer may need technical assistance from change agents and others to reduce the degree of uncertainty about the consequences, which increases the chance of the adoption of an innovation.

As a whole, in the Rumphi district, it was reported that the concept of Household Approach was well received in 2015. One agriculture extension officer in Katowo, Mwazisi and Bolero Extension Planning Areas, respectively, started with the implementation of Household Approach, but not much is happening in these areas now. Two agriculture extension officers have also been implementing Household Approach from the last year in Mphompha and Ntchenachena EPAs. The rest of the EPAs are not implementing it, which was attributed to inadequate knowledge of the staff there. This is what one respondent had to say:

“Most of them started 2 to 3 years ago but you find that they have just managed to implement household visioning or not even get the baseline data of farming families they are working with, and there’s no gender balanced tree”. (An extension worker.)

In total, the district has 60 local facilitators for Household Approach.

Theme 3: Opportunities and Challenges

Regarding opportunities available to upscale HHA in Rumphi, Farm Income Diversification Project (FIDP), for example, was a window of opportunity. However, it only allowed farmers in the impacted areas to be trained and not

the staff. According to the researcher's experience, this is the trend among most NGOs and projects. When they have trainings, in most cases, they target farmers in the project impact areas and not the staff, the understanding being that it is the responsibility of government line ministries to train the staff.

From the viewpoint of the frontline staff, the training received was an opportunity to upscale HHA. The zeal and interest of the participants increased after the training and was seen to help implement HHA. This is in line with what Rogers, 1995, reports in relation to the perception an individual holds about the innovation being more relevant in determining his or her passage through the innovation-decision process (Rogers, 1995).

Mobility issues were highlighted with regard to challenges with the implementation of Household Approach. Frontline line staff use push bikes, and it is not easy to note the distances covered. The other challenge reported was resistance, especially from male partners about allowing their chosen local facilitator who happens to be their partner for participation fearing that they may end up in a relationship with the extension workers. Thirdly, there was the challenge of lack of confidence among lead farmers regarding their ability to share training messages with other households. Fourthly, it was also reported that local facilitators sometimes give several excuses, including that they are too busy to upscale the HHA concept. Also, the need for constant supervisory visits for HHA was emphasised by one of the extension workers. Inadequate resources was another issue reported to affect the implementation of Household Approach. In particular, resources for training and supervision are conveyed in the following extract, "*it is fuel for joint supervision that is found but as an officer to find fuel and supervise my activities is a problem*". (An extension worker).

Theme 4: Impact of Household Approach

The following observations were made regarding the impact of HHA among targeted households:

Through supervisory visits, it has been noticed that farmers are moving from one milestone to the other. It was also observed that there is an improvement on sharing of roles and responsibilities. However, the men are not much in favour of equal access to and control over resources, but we are working in that direction. (An extension worker.)

Increased involvement of women in extension activities was also reported, as mentioned in the following extract:

“I am an experienced extension worker, and in past extension systems, most of our clients were men and women were left behind. However, this household system makes sure that involvement of all genders should be promoted and you will discover that in the data I have provided, most members are women. This is in stark contrast to the past, when there were very few women because they were shy and not too confident, but now, aah, they participate fully (tone increases). It is rare for a woman to talk in a group: they don't raise their hands to talk and when you ask them to talk, they respond by saying they agree with the other speakers. The women are usually very shy, but in the household, they participate fully.” (An extension worker.)

That said, the issue of men still dominating access to and control over resources, as reported by one of the extension workers, show compromised equity for effective participation of women and children in development activities.

Conclusion and Recommendations

It can safely be said that most of the staff and participating farmers are aware of Household Approach, however, many HHA tools were not adequately articulated among frontline and local facilitators. This translates into gaps in the implementation of this concept; for example, according to the local facilitators in the area under study, Household Approach is for women and when they were following up, they could focus on women issues, which is contrary to what HHA advocates. This study recommends that funds be lobbied from agriculture stakeholders in order to comprehensively train implementers (frontline staff and local facilitators who can be trained together).

Being a supervisor of the frontline staff does not automatically translate into one having the opportunity to be trained in all the specialties one's juniors will be trained in. This study recommends that supervisors at all levels who have had no opportunity be trained in Household Approach but have somebody under them who is implementing Household Approach, has a keen interest in the concept and learns from them until an opportunity arises for them to be trained on it.

At the time of piloting this study, a number of staff members implementing the Household Approach have just been transferred into, within and out of the district; in some cases, they have been replaced with staff with no knowledge

of HHA. This study recommends the adoption of the plant-wise project style of transferring staff, where a plant doctor cannot be transferred from their duty station unless they cross-transfer with somebody who is also a plant doctor. This would ensure continuity in the implementation of the plant-wise project activities. This recommendation has been made because in most places in Rumphi where HHA had taken shape, staff was transferred and replaced with staff not trained in HHA, which, along with poor institutional memory, creates a lag in HHA activity implementation, as is the case with Mzotokoto, which is one area in Mhuju Extension Planning Area, Rumphi district where an extension worker, trained in HHA was transferred out without a replacement.

Considering that HHA has been welcomed among staff and farming family members who adopted this concept, the staff can take advantage of this zeal to upscale this concept to all farming families.

References

- Andre Gunder Frank, (1972) “*The Development of Underdevelopment*,” in James D. Cockcroft, Andre Gunder Frank, and Dale Johnson, eds., *Dependence and Underdevelopment*. Garden City, New York: Anchor Books, p. 3.
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th Edition). London: Routledge.
- Crotty, M (1998). *The foundation of social research: Meaning and perspective in the research process*. Thousand Oaks, CA: Sage
- Gack, N.G., (2007). *Participatory Approaches to Development: An analysis of the Experiences of Development Projects in Sudan*. PhD Thesis in Development Studies, Massey University, New Zealand, viewed on 12 August 2017 from www.massey.ac.nz/massey/fms/.../Development/DevelopmentStudiesBrochure.pdf
- Government of Malawi (2012a). *Guide to Agricultural Production and Natural Resource Management*, Lilongwe, Malawi: Ministry of Agriculture and Food Security.
- Government of Malawi (2012b). *Agriculture Sector Gender, HIV and AIDS strategy (2012-2017)* Lilongwe, Malawi: Ministry of Agriculture and Food Security.
- Government of Malawi (2015). *Household Implementation Manual for Extension Workers and Local Facilitators*, Department of Agriculture Extension Services. Lilongwe, Malawi: Ministry of Agriculture, Irrigation and Water Development.
- Government of Malawi (2016). *National Agricultural Policy*, Lilongwe, Malawi: Ministry of Agriculture, Irrigation and Water Development.

- Government of Malawi (2018). *National Agricultural Investment Programme*, Lilongwe, Malawi: Ministry of Agriculture, Irrigation and Water Development.
- Guba, E and Y.S., Lincoln, (1994). "Competing Paradigms in Qualitative Research. In *Handbook of Qualitative Research*, Thousand Oaks: Sage Publications, 105–177.
- Food and Agriculture Organization of the United Nations (1981). *World agriculture: towards 2015/2030*. Rome. Available at: <http://www.fao.org/3/a-y4252e.pdf> [Accessed on 29 April 2018].
- Hopper P.(2012). *Understanding Development. Issues and Debates*. Cambridge, UK; Maiden USA: Polity Press
- Kabuye E.S., & Mhango, J.A., (2006). *A Brief History of Agricultural Extension in Malawi 1948 -2000*, An outline of the Organization, Policies, Systems and Methodologies. Lilongwe: Ministry of Agriculture.
- Marshall M.N., (1996). The key informant technique. *Family practice* 1996; 13: 92-97. Available at: <https://pdfs.semanticscholar.org/df18/f52ec42d1fef4a149f474aeaad3cc51a4244.pdf> [Accessed on 5/6/18]
- Ndengu D.M., (2009). *Speaking their minds: Adolescents' Understanding of their vulnerability to HIV/AIDS in the context of existing interventions programme in Malawi*. PhD thesis, University of KwaZulu-Natal. Available at: https://researchspace.ukzn.ac.za/.../bitstream/.../Ndengu_Dominic_Mapopa_2009.pdf [Accessed on 12 March 2017].
- Parry et al., (2005). *Have Participatory Approaches Increased Capabilities?* International Institute for Sustainable Development, Canada. Available at: https://www.iisd.org/pdf/2005/economics_participatory_approaches.pdf [Accessed on 11/02/18]
- Rogers, E. M. (1995). *Diffusion of innovations*. New York: Free Press.
- Simango, P M (2015). "An assessment of Women's Participation in Agricultural Production," Master's thesis, University of Western Cape. South Africa. Available at: https://etd.uwc.ac.za/bitstream/handle/11394/.../Simango_pm_ma_ems_2015.pdf?...[viewed 22 February, 2017].
- Tesch R (1990). *Qualitative Research Analysis types and software tools*. New York, Falmer.

Constraints of Agri-Allied Sectors in Convergence of Extension Services in Four Major Indian States

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Abstract

Extension efforts in the Agri-Allied sectors are lacking effectiveness as these sectors viz, Sericulture, Fisheries, Animal Husbandry and Horticulture are not converging in their efforts. The present study was conducted in four major Indian states from four regions of the country. All the four allied sector departments were present and functioning in these states. The study was carried out to explore the constraints of allied sectors in convergence of extension services. The results from the study revealed that the major constraint in convergence was that, extension personnel were not trained to work in broad based extension and there was lack of understanding about why convergence is required. Lack of awareness, knowledge and understanding of broad based extension and absence of training in convergence were ranked the second major constraint in convergence faced by the officers followed by lack of policy guidelines, lack of interface for exchange of ideas, information and opinions. It was also found that frequent transfers and political compulsion were the least ranked constraints by the allied department staff. Wide spread awareness and effective capacity building of the officers of agri-allied departments, formulation of clear policy guidelines and timely communication of information through modern Information and Communication Technology (ICT) with sufficient allocation of budget and other resources will facilitate the convergence process in delivering extension services of agri-allied departments.

Keywords: Agri-Allied sector, Broad based extension, Convergence, Extension Services

Introduction

Indian farmers live in an ecosystem, where they have agricultural land along with subsidiary farming in combination with livestock, fisheries, sericulture and horticulture. When it comes to providing extension services to such farmers, the traditional general extension approach does not always help. Convergence is a

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process that brings shared values and responsibilities, acts as a supplementary and complementary mode to achieve common objectives and mutual benefits to converging partners around targeted programmes. Convergence of line departments in service delivery would accelerate the development processes and can contribute towards rapid productive, economic growth and poverty alleviation. However, the issue of convergence has assumed urgency due to substantial increase in outlay on various programmes related to agriculture and rural development in recent years. Convergence is an evolving process and while broad principles can be laid out at the national level, the actual contours of convergence would be determined by resources at the state, district and grass-root level. A number of measures have already been taken at the national level for convergence of programmes of Ministry of Agriculture and Ministry of Rural Development. Convergence is one of the key guiding principles considered in operationalizing extension reforms, wherein, Agricultural Technology Management Agency (ATMA) shall be the platform for convergence and service delivery of all agri-allied sector schemes and programmes at the district level and below.

The Strategic Research and Extension Plan (SREP) and State Extension Work Plan (SEWP) are the instruments that promote convergence of extension activities between line departments and research institutions at the district and state levels, respectively. (Planning Commission 2017).

The Working Group on Agricultural Extension constituted by the Planning Commission, Govt. of India (2007) mentioned that, there is duplication of efforts with multiple agencies doing extension work without convergence. There should be coordinated effort to synergise and converge these efforts at the district level and below to improve the performance of various stake holders. It is essential to route all the State and Central Government extension fund through a single agency like ATMA. It is recommended that convergence and synergy would be the key principles in operationalising extension reforms by channelizing extension fund of agriculture and line departments through the ATMAs. (Planning Commission 2007).

It is evident from the initial experience that convergence has not taken place at various levels satisfactorily. The earlier studies on farmer perception regarding convergence of line departments have pointed out that farmers have a favourable attitude towards extension officers who advise him about seeds and fertilizers

along with livestock, fisheries, sericulture, horticulture and government schemes which is possible through convergence of line departments. The National Institute of Agricultural Extension Management (MANAGE) explicitly promotes the convergence of line departments and has been actively involved in suggesting policy measures through research and capacity building of agri-allied sector officers in this direction. In this context, to explore the constraints of line departments in convergence of extension services and to suggest appropriate measures, the Centre for Extension in Agri-Allied Sectors (EAAS), MANAGE, Hyderabad planned an in-depth study for the “Analysis of Extension Approaches in the Allied Sector Departments”.

Methodology

Locale of the study

The present study was conducted using an ex post facto research design. The country was divided into four regions i.e. North, East, West and South and four major Indian states viz., Uttar Pradesh, Odisha, Maharashtra and Karnataka were selected for the study. The above states as well as the districts were selected purposively wherein, all the allied sectors viz., Animal Husbandry, Horticulture, Sericulture and Fisheries were present and operational.

Selection of Respondents

A total 240 Government Officers were selected from two districts of each state. The duration of the study was 1.5 years. The details of sampling areas follows;

Table 1. Selection of respondents

State		Uttar Pradesh		Odisha		Maharashtra		Karnataka	
District		Basti	Faiz-abad	Sone-pur	Bargarh	Ahmed-nagar	Aurang-abad	Kolar	Chikka-ballapur
Department	Animal Husbandry	10	10	10	10	10	10	10	10
	Horticulture	10	10	10	10	10	10	10	10
	Sericulture	05	05	05	05	05	05	05	05
	Fisheries	05	05	05	05	05	05	05	05
Total		30	30	30	30	30	30	30	30
Gross Total		240							

Total sample Size: 240 Officers

In view of the immenseness of the research, it is difficult to discuss all the research findings comprehensively, in a single research paper. One of the specific objectives of the research was “To explore the constraints of allied sectors in convergence of extension services” in selected four states. Therefore, the present paper focusses on research findings pertaining to the above mentioned specific objective. The sample size is 240 officers of agri-allied departments in four states.

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 for collection of data from the agri-allied department officers.

In the present study, constraints were operationalised as problems experienced by the department officers in convergence of extension services. In order to identify the constraints encountered, the following procedure was adopted.

A list of possible constraints that might hinder in convergence of extension services was prepared after consulting with non-sample trainees. More possible constraints were added after a review of literature and information available from different sources. Finally, after discussing with allied department experts, important constraints were identified. The selected constraints were presented in the pre-tested schedule and the respondents were asked to respond on a three point continuum for constraints in convergence of extension services (Agree, Undecided and Disagree).

Statistical Analysis

The data collected from the officers were scored, tabulated and analysed using Statistical Package for Social Sciences (SPSS). In view of the specific objective discussed in this paper statistical tools like mean and ranking were used for analysing the data.

The results are presented in the table with mean score and ranking of the constraints perceived by the officers of agri-allied department, which are self-explanatory. To maintain preciseness of the paper, discussion is limited to preferences i.e. rank of constraints and only the top three major constraints faced by each of the four

departments in all the four studied states are discussed in the paper. However, while concluding the paper comprehensive recommendations are drawn in view of all the constraints enlisted in the paper.

Table 2. Constraints in Convergence of Extension Services by the Officers in the State of Maharashtra N=60

Sl. No	Constraints in Convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
1	Awareness, Knowledge and understanding of broad based extension is lacking	2.8	2	3.0	1	2.3	4	1.1	2
2	Extension personnel are not trained to work in broad based extension	3.0	1	3.0	1	2.7	1	1.2	1
3	Lack of understanding between different organizations engaged in allied activities	1.9	6	1.6	5	2.4	3	1.1	2
4	Lack of understanding about why convergence is required and important	3.0	1	3.0	1	2.5	2	1.1	2
5	Lack of interface for exchange of knowledge, ideas, information and opinions	2.2	4	2.4	3	2.3	4	1.0	3
6	Communication gap	1.2	7	2.0	4	1.5	7	1.0	3
7	Attitudinal barriers	1.2	7	1.4	6	1.2	9	1.1	2
8	Ego problem / mind set of the officers	1.2	7	1.4	6	1.2	9	1.0	3
9	Organization enforces strict rules which will slow down the convergence	1.0	8	1.2	7	1.1	10	1.0	3

Sl. No	Constraints in Convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
10	Work overload/lack of time	1.0	8	1.4	6	1.1	10	1.0	3
11	I do not get timely information/budget/other resources needed for convergence meetings	2.0	5	2.0	4	2.4	3	1.0	3
12	Superiors at job are merely interested in getting work done and are unconcerned about convergence	1.0	8	1.4	6	1.2	9	1.0	3
13	Credible leadership is lacking	1.0	8	1.2	7	1.2	9	1.0	3
14	Required freedom is not given for execution of certain projects in coordination	1.2	7	1.2	7	1.2	8	1.0	3
15	Fear of emergence of conflicts	1.0	8	1.2	7	1.1	10	1.0	3
16	Lack of policy guidelines	2.6	3	2.6	2	2.1	6	1.2	1
17	Training related to convergence is absent	2.8	2	2.4	3	2.2	5	1.2	1
18	Frequent transfers	1.0	8	1.2	7	1.0	11	1.0	3
19	Political compulsion/vested interests are creating hindrance	1.0	8	1.2	7	1.0	11	1.0	3

Table 2 indicates mean score and ranking of the constraints faced by the officers of agri-allied sector departments of Maharashtra state.

Maharashtra is a nontraditional sericulture state producing Mulberry and Tasar silk. The specialty of the state is that, it undertakes 98 per cent of bivoltine sericulture and stood first among nontraditional states and is one of the potential

States in India for silk production. The top three constraints of the Sericulture department were; First, extension personnel are not trained to work in broad based extension and there is lack of understanding about why convergence is required and important. Second, awareness, knowledge and understanding of broad based extension is lacking and training related to convergence is absent and the third constraint is lack of policy guidelines.

Maharashtra has 720 km. of coastline with continental shelf area of 111512 sq. km. The fisheries department mentioned top three constraints as follows: the first is lack of awareness, knowledge and understanding of broad based extension and there is lack of understanding about why convergence is required and important. The second constraint is lack of policy guidelines while the third is lack of interface for exchange of knowledge, ideas, information and opinions and training related to convergence is absent.

During the last two decades, total bovine milk production in Maharashtra has doubled from 39 lakh tones in 1992-93 to 88 lakh tones in 2013-14 and the contribution of local cows, cross-bred cows and buffaloes was about 15 per cent, 42 per cent, 43 per cent respectively. Though the sector is growing rapidly it faces some constraints. The three major constraints identified were; extension personnel are not trained to work in broad based extension; there is lack of understanding about why convergence is required and important and the third constraint was lack of understanding between different organizations engaged in allied activities as well as lack of timely information/budget/other resources needed for convergence meetings.

Horticulture holds a significant share of on an average 30 per cent in Gross State Value Added (GSVA) of crop sector. During 2017-18, the area under horticulture crops was 15.22 lakh ha and production was expected to be 207.54 lakh MT as against an area of 16.73 lakh ha and production of 219.93 lakh MT during 2016-17. The Horticulture department had constraints such as: extension personnel are not trained to work in broad based extension, lack of policy guidelines and training related to convergence is absent. Secondly, there is lack of awareness, knowledge and understanding of broad based extension; lack of understanding between different organizations engaged in allied activities as well as lack of understanding about why convergence is required and important and also attitudinal barriers. The third major constraints are communication gap; ego problem / mind set of the

officers; organization enforces strict rules which slow down convergence; work overload/lack of time; lack of timely information/budget/other resources needed for convergence meetings; superiors at job are merely interested in getting work done and are unconcerned about convergence; credible leadership is lacking; required freedom is not given for execution of certain projects in coordination; fear of emergence of conflicts; frequent transfers; political compulsion/vested interests are creating hindrance.

There is duplication of efforts with multiplicity of agents attending extension work without convergence (Ujjwal Kumar et.al.2012)

Yoga N and Philip H (2017) studied the process of convergence activity of the line departments under different stages in preparation and execution of Strategic Research and Extension Plan (SREP). He reported that, in Anantapur and East Godavari districts all the respondents professed that convergence was achieved during strategic scanning and planning stage of SREP preparation and execution.

Table 3. Constraints in Convergence of Extension Services by the Officers in the State of Odisha **N=60**

Sl. No	Constraints in convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
1	Awareness, Knowledge and understanding of Broad based extension is lacking	2.8	1	1.8	1	2.4	2	2.0	3
2	Extension personnel are not trained to work in broad based extension	2.8	1	1.8	1	2.4	2	2.1	2
3	Lack of understanding between different organizations engaged in allied activities	1.4	4	1.0	5	2.5	1	1.1	8
4	Lack of understanding about why convergence is required and important	2.6	2	1.4	3	2.1	5	1.6	5

Sl. No	Constraints in convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
5	Lack of interface for exchange of knowledge, ideas, information and opinions	2.6	2	1.6	2	2.3	3	2.2	1
6	Communication gap	1.4	4	1.4	3	1.6	6	1.8	4
7	Attitudinal barriers	1.4	4	1.0	5	1.3	8	1.3	7
8	Ego problem / mind set of the officers	1.4	4	1.0	5	1.3	8	1.3	7
9	Organization enforces strict rules which will slow down the convergence	1.2	5	1.2	4	1.1	9	1.0	9
10	Work overload/lack of time	1.2	5	1.6	2	1.5	7	1.4	6
11	I do not get timely information/budget/other resources needed for convergence meetings	1.4	4	1.2	4	1.5	7	1.3	7
12	Superiors at job are merely interested in getting work done and are unconcerned about convergence	1.0	6	1.2	4	1.3	8	1.0	9
13	Credible leadership is lacking	1.2	5	1.0	5	1.3	8	1.0	9
14	Required freedom is not given for execution of certain projects in coordination	1.8	3	1.0	5	1.5	7	1.0	9
15	Fear of emergence of conflicts	1.4	4	1.0	5	1.3	8	1.1	8
16	Lack of policy guidelines	2.8	1	1.6	2	2.4	2	2.0	3

Sl. No	Constraints in convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
17	Training related to convergence is absent	2.6	2	1.2	4	2.2	4	1.6	5
18	Frequent transfers	1.4	4	1.0	5	1.0	10	1.0	9
19	Political compulsion/ vested interests are creating hindrance	1.0	6	1.0	5	1.0	10	1.0	9

Table-3 shows mean score and ranking of the constraints faced by the officers of agri- allied sector departments of Odisha state.

Sericulture is a livelihood activity that goes around the year and provides remunerative income to the farmers. About 15,000 traditional families are involved in silk rearing and one lakh people actively practice sericulture in Odisha. The Sericulture department faced top three constraints as; First, awareness, knowledge and understanding of broad based extension is lacking; extension personnel are not trained to work in broad based extension; lack of policy guidelines. Secondly, there is lack of interface for exchange of knowledge, ideas, information and opinions; lack of understanding about why convergence is required and important; Training related to convergence is absent, while thirdly, the constraint was that, required freedom is not given for execution of certain projects in coordination.

Odisha is an agro-maritime state on the East Coast with 480 KMs long coastline and the coastal plains (MOFPI, 2017). The State has a gift of six major rivers namely, the Subarnarekha, the Budhabalanga, the Baitarani, the Brahmani, the Mahanadi, the Rusikulya and a number of small rivers. Fish catching is a flourishing industry in Odisha. The world's largest brackish water lake Chilika is famous for fishing. All the rivers meet the Bay of Bengal on the East. Nearly 80 per cent of the people of the state are habituated to eating fish. (Mohanty and Panda, 2017). Quite large number of people belong to the fishing community. The state is endowed with small/big ponds, small/medium and major reservoirs, a large coastal belt suitable for brackish water aqua-culture and deep sea fishing. The Fishery department mentioned the top three constraints as; firstly, lack of awareness, knowledge and

understanding of broad based extension; extension personnel are not trained to work in broad based extension; secondly, lack of interface for exchange of knowledge, ideas, information and opinions; work overload/lack of time; lack of policy guidelines and thirdly, constraints were lack of understanding about why convergence is required and important and communication gap.

Next to agriculture, animal husbandry is the most important economic activity in rural Odisha, which is significantly contributing around 4 per cent to Gross State Domestic Product (GSDP). Odisha exhibited increasing production and productivity of milk, meat and egg during 2016-17. The per capita availability of milk, meat and egg of Odisha improved notably to 120 gms/day, 3.86 kg/annum and 46/annum, respectively during 2016-17 as compared to 2015-16. The Department of Animal husbandry faced top three constraints as; first, lack of understanding between different organizations engaged in allied activities; second, lack of awareness, knowledge and understanding of broad based extension; lack of policy guidelines; extension personnel are not trained to work in broad based extension and third, lack of interface for exchange of knowledge, ideas, information and opinions.

Odisha has over 40 per cent of its total land area under cultivation. It is one of the leading vegetables, plantation crops and rice producing States of the country. The State produces 11.7 Million Tonnes of horticulture products. The department of Horticulture's constraints were firstly, lack of interface for exchange of knowledge, ideas, information and opinions. The second was, extension personnel are not trained to work in broad based extension and the third was lack of awareness, knowledge and understanding of broad based extension; lack of policy guidelines.

Ujjwal Kumar et. al. (2012) reported that, the existing agricultural system is suffering from constraints like – multiplicity of technology transfer system, narrow focus on agricultural extension system, lack of farmer focus and feedback, inadequate technical capacity, lack of local capacity to validate and adopt technology, weak research-extension linkage, poor communication capacity, inadequate operating and financial sustainability etc.

Yoga N and Philip H (2017) reported that, 76.67 per cent of the respondents opined that financing stage in preparation and execution of SREP was also one of the important stages in achieving convergence among the stakeholders.

Table 4. Constraints in Convergence of Extension Services by the Officers in the State of Karnataka **N=60**

Sl. No	Constraints in Convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
1	Awareness, Knowledge and understanding of broad based extension is lacking	2.6	3	2.6	1	2.9	1	2.8	2
2	Extension personnel are not trained to work in broad based extension	2.8	2	2.6	1	2.9	1	2.9	1
3	Lack of understanding between different organizations engaged in allied activities	1.3	13	1.4	6	1.5	7	2.0	9
4	Lack of understanding about why convergence is required and important	2.3	5	2.6	1	2.6	3	2.6	4
5	Lack of interface for exchange of knowledge, ideas, information and opinions	2.6	3	1.8	4	2.4	4	2.6	4
6	Communication gap	1.8	8	1.2	7	1.6	6	1.6	10
7	Attitudinal barriers	1.6	10	1.6	5	1.3	8	1.3	13
8	Ego problem / mind set of the officers	2.0	7	1.6	5	1.3	8	1.6	10
9	Organization enforces strict rules which will slow down the convergence	1.8	8	1.4	6	1.1	10	1.6	10
10	Work overload/lack of time	2.4	4	1.0	8	2.4	4	2.3	6
11	I do not get timely information/budget/other resources needed for convergence meetings	2.1	6	1.0	8	2.1	5	2.2	7

Sl. No	Constraints in Convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
12	Superiors at job are merely interested in getting work done and are unconcerned about convergence	1.8	8	1.2	7	1.2	9	1.5	11
13	Credible leadership is lacking	1.6	12	1.2	7	1.0	12	1.4	12
14	Required freedom is not given for execution of certain projects in coordination	1.8	8	1.6	5	1.2	9	1.5	11
15	Fear of emergence of conflicts	1.4	13	1.6	5	1.1	10	1.4	12
16	Lack of policy guidelines	2.4	4	1.9	3	2.6	3	2.4	5
17	Training related to convergence is absent	3.0	1	2.2	2	2.7	2	2.7	3
18	Frequent transfers	1.7	9	1.2	7	1.0	11	1.2	14
19	Political compulsion/ vested interests are creating hindrance	1.4	11	1.0	8	1.1	10	1.2	14

Table 4 shows mean score and ranking of the constraints faced by the officers of agri-allied sector departments of Karnataka State.

Karnataka is the largest producer of silk in the country and accounts for nearly 30 per cent of the country’s exports, i.e. over Rs. 1,000 crore (Rajendran, 2016). Still the Sericulture department was observed to face some constraints viz; firstly, training related to convergence is absent; secondly, extension personnel are not trained to work in broad based extension while thirdly, there is lack of awareness, knowledge and understanding of broad based extension; there is lack of interface for exchange of knowledge, ideas, information and opinions.

The Fisheries officers in Karnataka expressed their opinion about major constraints as; first, lack of awareness, knowledge and understanding of broad based extension; extension personnel are not trained to work in broad based extension; lack of

understanding about why convergence is required and important. Secondly, training related to convergence is absent and third was lack of policy guidelines.

In Animal husbandry the major constraints were first, awareness, knowledge and understanding of broad based extension is lacking and extension personnel are not trained to work in broad based extension. Secondly, training related to convergence is absent and third was lack of understanding about why convergence is required and important and lack of policy guidelines.

Karnataka occupies a prominent place on the Horticulture map of the Country. Horticultural crops occupy an area of 18.00 lakh ha., with a production of 136.38 lakh tonnes. Although the area comprises only 14.44 per cent of the net cultivated area in the state, the total income generated from the horticulture sector accounts for over 40 per cent of the total income derived from the combined agriculture sector. This accounts for 17 per cent of the Gross Domestic Product (GDP) of the state. The officers of the Horticulture department felt that, the constraint that extension personnel are not trained to work in broad based extension ranked first, followed by lack of awareness, knowledge and understanding of broad based extension which ranked second, while absence of training related to convergence was the third major hurdle in convergence of extension services.

Yoga N and Philip H (2017) reported that, majority (73.33 %) of the respondents discussed about the monitoring of the convergence activity and its importance in effective implementation of ATMA programs.

Table 5. Constraints in Convergence of Extension Services by the Officers in the State of Uttar Pradesh **N=60**

Sl. No	Constraints in Convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
1	Awareness, Knowledge and understanding of broad based extension is lacking	2.6	1	1.6	2	1.9	2	2.3	2
2	Extension personnel are not trained to work in broad based extension	2.6	1	1.6	2	2.0	1	2.5	1

Sl. No	Constraints in Convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
3	Lack of understanding between different organizations engaged in allied activities	1.2	7	1.2	4	1.6	5	1.7	6
4	Lack of understanding about why convergence is required and important	2.0	4	1.2	4	1.7	4	2.0	5
5	Lack of interface for exchange of knowledge, ideas, information and opinions	1.8	5	1.8	1	1.9	2	2.5	1
6	Communication gap	1.4	6	1.2	4	1.4	6	1.5	7
7	Attitudinal barriers	1.0	8	1.2	4	1.2	7	1.0	10
8	Ego problem / mind set of the officers	1.0	8	1.2	4	1.0	8	1.1	9
9	Organization enforces strict rules which will slow down the convergence	1.0	8	1.0	5	1.0	8	1.0	10
10	Work overload/lack of time	1.2	7	1.0	5	1.2	7	1.2	8
11	I do not get timely information/budget/other resources needed for convergence meetings	2.4	2	1.4	3	2.0	1	2.1	4
12	Superiors at job are merely interested in getting work done and are unconcerned about convergence	1.2	7	1.0	5	1.0	8	1.0	10
13	Credible leadership is lacking	1.0	8	1.0	5	1.0	8	1.1	9
14	Required freedom is not given for execution of certain projects in coordination	1.0	8	1.0	5	1.0	8	1.0	10

Sl. No	Constraints in Convergence	Sericulture Officers (n=10)		Fisheries Officers (n=10)		Animal Husbandry Officers (n=20)		Horticulture Officers (n=20)	
		Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
15	Fear of emergence of conflicts	1.0	8	1.0	5	1.0	8	1.0	10
16	Lack of policy guidelines	2.2	3	1.6	2	1.9	2	2.2	3
17	Training related to convergence is absent	2.4	2	1.8	1	1.8	3	2.3	2
18	Frequent transfers	1.0	8	1.0	5	1.0	8	1.0	10
19	Political compulsion/ vested interests are creating hindrance	1.0	8	1.0	5	0.9	9	1.0	10

Table -5 reveals the major constraints faced by the agri-allied sector departments of Uttar Pradesh State.

It is observed from the rank and mean score, that the major constraints of the department of Sericulture of Uttar Pradesh are firstly, lack of awareness, knowledge and understanding of broad based extension; extension personnel are not trained to work in broad based extension; secondly, lack of timely information/budget/ other resources needed for convergence meetings; training related to convergence is absent and the third major constraint found is lack of policy guidelines.

Uttar Pradesh is India's most populous state with enough fisheries resources in the form of community ponds, tanks with dominance of rivers and man-made reservoirs. Fish production in the state was only 0.62 million tonnes (2016-17). (Maurya et al. 2018). The major constraints faced by the Department of Fisheries are, firstly lack of interface for exchange of knowledge, ideas, information and opinions; training related to convergence is absent. Secondly, awareness, knowledge and understanding of broad based extension is lacking; extension personnel are not trained to work in broad based extension; lack of policy guidelines and the third constraint was lack of timely information/budget/other resources needed for convergence meetings.

Uttar Pradesh state has emerged as the major exporter of buffalo meat. Its share in total Meat Production in India is 18.23 per cent. The share of Uttar Pradesh in total Milk Production in India is 16.8 per cent. (19th Livestock

Census, 2012). The Department of Animal husbandry faced the first major constraint as; extension personnel are not trained to work in broad based extension; lack of timely information/budget/other resources needed for convergence meetings; secondly, lack of awareness, knowledge and understanding of broad based extension; lack of interface for exchange of knowledge, ideas, information and opinions; lack of policy guidelines and third constraint was found as training related to convergence is absent. These were the major constraints for converging extension services in agri-allied departments.

Uttar Pradesh is the first state in the country to declare those areas as fruit belts where concentrated specific fruit growing areas exist. Major mango and guava fruit producing areas have been declared as fruit belts by the state. The share of Uttar Pradesh in horticulture production in the country is approximately 26 per cent. U.P ranks third in fruits, second in vegetables and first in potato production among all states. The Department of Horticulture is facing many constraints; the top three among them being, extension personnel are not trained to work in broad based extension, there is lack of interface for exchange of knowledge, ideas, information and opinions as the first hurdle for convergence;secondly,there is lack of awareness, knowledge and understanding of broad based extension,training related to convergence is absent and thirdly,lack of policy guidelines are the major constraints.

Yoga N and Philip H (2017) concluded in their study that, the extension reform ATMA was intended to bring convergence between extension and research systems for the effective delivery of extension services. The process flow of convergence activity at different stages as followed by line departments and research institutions was clearly witnessed. But a well-established monitoring system with better convergence of the stakeholders was lacking and standardized evaluation procedures or techniques were not developed or adopted for evaluating convergence of ATMA.

Conclusion

It can be concluded from the research findings of the present study that more or less similar constraints were identified by the officials of allied departments of all four states in converging extension services. It can also be observed that, in all four states, attitudinal barriers, ego problem / mind set of the officers, lack of credible leadership, political compulsion/vested interests, frequent transfers,

fear of emergence of conflicts, organizational barrier and individual freedom for execution of certain projects in coordination were the least ranked constraints by the allied department officers, which indicates that, there is a platform already available at individual as well as organizational level for convergence of extension services. However, among all the constraints, the major constraints identified which were related to extension officers of agri-allied departments were lack of awareness, knowledge and understanding of broad based extension, the officers are not trained to work in broad based extension system, moreover, lack of understanding about why convergence is required were major issues, which need to be handled through creating awareness and effective capacity building of the officers of agri-allied departments. Similarly, formulation of clear policy guidelines and timely communication of information through modern Information and Communication Technology (ICT) with sufficient allocation of budget and other resources will facilitate the convergence process in delivering extension services of agri-allied departments.

References

- Annual Performance Report (2015) Scheme implemented by Department of Horticulture and Food Processing under RKVY. Pp 5, Available at: http://uphorticulture.gov.in/pdf/annual-performance-report_14112016.pdf
- Dash L. K. et al, (2018). "Sericulture and its prospect in promoting development of rural people of Odisha". International Journal of Agricultural Science and Research (IJASR). ISSN (P): 2250-0057; ISSN (E): 2321-0087, Vol. 8, Issue 2. 163-170.
- Deepak Shah (2005). "Lessons from Fisheries Development in Maharashtra," Others 0512005, University Library of Munich, Germany.
- Economic Survey of Maharashtra 2017-18. Govt. of Maharashtra. Available at: https://mahades.maharashtra.gov.in/files/publication/ESM_17_18_eng.pdf.
- Hiware C. J (2016). Scenario of sericulture industry in Maharashtra State, India. Journal of Entomology and Zoology Studies; 4(1): 601-605.
- Kochewad S. (2017). Meat Production in India-A Review. International Journal of Animal and Veterinary Sciences. BOOK. Vol 4.
- Maurya, Ak, et al. (2018) Trend analysis of fish production in Uttar Pradesh, India. Journal of entomology and Zoology Studies 6 (4) 2018. Retrieved <http://www.entomoljournal.com/archives/2018/vol6issue4/PartD/6-2-234-493.pdf>

- MOFPI, GoI (2017). Investment Environment & Opportunities in Food Processing, Odisha. Retrieved <http://foodprocessingindia.co.in/state-profile-pdf/odisha.pdf>
- Mohanty, SK and Panda T (2017). Impact of Technology on Fish Farmers of Odisha. *Odisha Review* September-October 2017. Retrieved <http://magazines.odisha.gov.in/Orissareview/2017/Sep-Oct/engpdf/95-97.pdf>
- NDDDB (2015). Dairying in Maharashtra. A Statistical Profile 2015. National Dairy Development Board. <https://www.nddb.coop/sites/default/files/NDDDB%20Maharashtra%20dairy%20Digest.pdf>
- Odisha Economic Survey 2017 – 18. Available at: (http://pc.odisha.gov.in/Download/Economic_Survey_2017-18.pdf)
- Planning Commission (2012-17). Report of the Working Group on Agricultural Extension for Agriculture and Allied Sectors for the Twelfth Five Year Plan available on; http://planningcommission.gov.in/aboutus/committee/wrkgrp12/agri/wg_agriextn.pdf
- Rajendran, S (2016). New Plans for State's Sericulture Sector. *The Hindu* updated May 23, 2016. Retrieved <https://www.thehindu.com/news/national/karnataka/new-plans-for-states-sericulture-sector/article6492121.ece>
- Sericulture - Statistical Year Book India 2017. Available on: <http://mospi.nic.in/statistical-year-book-india/2017/180>.
- Ujjwal Kumar, Abhay Kumar and P. K. Thakur (2012). Status and Constraints of Extension Services, Research gate available at: <https://www.researchgate.net/publication/260491180>
- Veerabhadraswamy H.P. (2017). "A study on production and marketing of horticultural crops in Karnataka". University Grants Commission. Ref. No: 1515 - MRP/14 - 15/ KATU008/UGC – SWRO. Available at: <http://www.sscwtumkur.org/ugcproj/21112017/Minor%20Project%20of%20HP%20Veerabhadraswamy.pdf>
- Yoga N and Philip H (2017). Process Flow of Convergence Activity of Agricultural Technology Management Agency. *International Journal of Agriculture Sciences*, Volume 9, Issue 35, 2017, pp.-4524-4527. Available at: <http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217>

Adoption of Climate Resilient Agricultural Technologies by Farmers

Balasubramani Nanjappan¹

Abstract

Climate change affects the livelihood of farmers and hence there is a need for adaptation. The present study was conducted in two States from northern and southern parts of India, viz., Uttarakhand and Karnataka respectively, to find out the adaptation strategies followed by the respondents and various constraints involved in adopting climate resilient agriculture practices. The study reveals that a majority of the respondents (80.00%) have replaced long duration varieties with short duration varieties and adopted water conservation through Contour/ Graded bunds formation (75.56%). In addition they have also adopted improved agronomic practices such as crop rotation (88.88%), mulching (78.00%) and disease management of animals through regular vaccination (73.33%). A majority of the respondents (64.44%) have used custom hiring centers for undertaking timely operations. Meanwhile, they were facing various constraints in adopting climate resilient agricultural practices due to limited knowledge on climate resilient adaptation measures, inadequate number of extension functionaries at grass root level, and inadequate weather based farm advisories. Hence it is suggested that capacity building of farmers on several climate smart practices may be undertaken through various extension approaches for strengthening the farmers' ability to tackle the ill effects of climate change.

Keywords: Climate Change; Climate Resilient Technologies; Agriculture; Farmers

Introduction

India is a large emerging economy with a variety of geographical regions, biodiversity, and natural resources. The natural resources and environment however, are already under pressure as a result of rapid urbanization, industrialization and economic development. Climate change is projected to exacerbate these pressures furthermore. Climate change with its associated variability is a concern to developing countries, especially for India where about 700 million people in the rural areas depend on climate-sensitive sectors like agriculture, forestry, fisheries and animal husbandry for their livelihood. The Maplecroft Climate Change Vulnerability Index (2011) ranks India as the world's most vulnerable country.

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Among the various efforts being undertaken by public and private organizations to combat climate-related risks and uncertainties in agriculture, adaptation is identified as one of the policy options to reduce the negative impact of climate change.

Several studies in different countries show that without adaptation, climate change is generally detrimental to the agriculture sector; while with adaptation, the vulnerability can be reduced to the large extent. The present study was undertaken to find out the adoption of climate resilient agriculture and animal husbandry practices by the farmers and the constraints involved in the adoption with the following specific objectives:

- 1 To document the climate resilient technologies adopted by the farmers
- 2 To ascertain the constraints faced by the farmers in adopting the climate resilient technologies.

Research Methodology

The study was carried out in two States of India, namely, Uttarakhand and Karnataka which were most frequently exposed to climate vagaries namely floods and drought respectively. These two States were adopted under the National Innovations on Climate Resilient Agriculture (NICRA) project of Government of India based on the vulnerability index. Dunda village of Uttarkashi district in Uttarakhand State and Nagenahalli village of Tumkur district in Karnataka State were purposively selected. A total of 45 farmers who were the beneficiaries of the NICRA project were selected randomly as respondents. The primary data were collected using both structured and semi-structured interview schedule and focus group discussion was also conducted to collect qualitative data from the farmers. The quantitative data were analyzed using statistical tools like percentage, frequency, and Garret Ranking technique to interpret and draw meaningful results.

Garret Ranking Technique

The collected data were tabulated and analysed statistically using the Garret Ranking technique. The values obtained were transformed into scores by using the formula:

Percent position =

Where,

R_{ij} = Rank given by i^{th} factor and j^{th} individual

N_j = Number of factors ranked by j^{th} individual

The percent position was calculated for the ranks as well as their corresponding Garrets table value. The respondents were asked to rank each item according to the severity of the constraints faced by them. The collected data were arranged in factor (constraints) and rank wise, later Garret Value was multiplied with Garret table value. The total score was calculated by multiplying Garret Value with the rank assigned by the respondents. Further, Garret score was calculated by dividing the total score by the number of respondents and the rank was assigned according to Garret score.

Results and Discussion

Table 1. Adoption of Climate Resilient Technologies by Respondents

n = 45

S.No.	Particulars	Adopted	Not Adopted
1	Change in the cropping system	29 (64.44)	16 (35.56)
2	Change in planting time	19 (42.22)	26 (57.78)
3	Replacing long duration varieties with short duration varieties	36 (80.00)	9 (20.00)
4	Adoption of improved varieties	32 (71.11)	13 (28.89)
5	Adoption of improved agronomic practices		
	a) Summer ploughing	20 (44.44)	25 (55.66)
	b) Crop rotation	40 (88.88)	5 (11.12)
	c) Inter cropping	35 (76.00)	10 (24.00)
	d) Adjusting spacing	17 (56.00)	28 (48.00)
	e) Mulching	22 (78.00)	23 (32.00)
	f) Application of FYM	40 (88.00)	5 (12.00)
	g) Application of vermi compost	20 (24.00)	23 (76.00)
	h) Use of in-Situ/ Green Manure	8 (17.78)	37 (82.22)

S.No.	Particulars	Adopted	Not Adopted
6	Timely application of pesticides	26 (57.78)	19 (42.22)
7	Water conservation methods		
	a) Bunds (Contour/graded)	34 (75.56)	11 (24.44)
	b) Farm pond	28 (62.22)	17 (37.78)
	c) Micro irrigation systems	16 (35.56)	29 (64.44)
8	Application of balanced fertilizer based on soil test	29 (64.44)	18 (35.56)
9	Application of micronutrients	22 (48.89)	23 (51.11)
10	Usage of bio control agents/bio pesticides	15 (33.33)	30 (66.67)
11	Adoption of IFS (Integrated Farming System)	8 (17.78)	37 (82.22)
12	Use of Green House/shade net/protected cultivation	5 (11.11)	40 (88.89)
13	Feed management practices		
	a) Improved fodder varieties	32 (71.11)	13 (28.89)
	b) Silage making	12 (26.67)	33 (73.33)
	c) Mineral mixture	22 (48.89)	23 (51.11)
	d) Concentrated feed mixture	21 (46.67)	24 (53.33)
14	Disease management of animals		
	a) Regular vaccination	33 (73.33)	12 (26.67)
	b) Deworming	29 (64.44)	16 (35.56)
	c) Calf register	6 (13.33)	39 (86.67)
15	Shed management		
	a) Shade	26 (57.78)	19 (42.22)
	b) Flooring	27 (60.00)	18 (40.00)

S.No.	Particulars	Adopted	Not Adopted
	c) Cooling system (Sprinkler, fan, gunny bag)	12 (26.67)	33 (73.33)
	d) Regular cleaning of the shed	32 (71.11)	13 (28.89)
16	Adoption of additional enterprises		
	a) Fisheries	1 2.22	44 (97.78)
	b) Goatery	11 (24.44)	34 (75.56)
	c) Poultry (backyard)	21 (46.67)	24 (53.33)
17	Usage of custom hiring centres	29 (64.44)	16 (35.56)

Adaptation to climate change is considered as an important response option worthy of research and assessment, not simply to guide the selection of the best mitigation policies, but rather to reduce the vulnerability of farmers to the impact of climate change. In the study area, the majority of the respondents (64.44%) have changed their cropping system from paddy and wheat to millets, vegetable crops and other commercial crops, mono-cropping to diversified cropping. Nearly half of the respondents (42.22%) have changed their planting dates such as delayed sowing in the crops like vegetable pea and barnyard millet.

When it comes to adoption of improved varieties, 71.11 per cent of the respondents have adopted short duration paddy and finger millet crops to effectively manage drought and 80.00 per cent of the respondents have adopted drought resistant fodder varieties like Napier Co-3 and African Tall (Maize crop), fodder sorghum (CoFS - 29) and Ragi (ML-365).

Climate-smart agronomic practices adopted by the respondents are crop rotation (88.88%) (Ragi to Vegetable Pea, Paddy to Wheat) and intercropping (76.00%) (*Ragi+ Pigeon pea, Wheat+ Vegetable pea*), mulching in vegetable crops such as tomato, chillies (78.00%), application of Farm Yard Manure (88.00%), application of vermi composting (24.00%). These agronomic practices help the farmers to manage climate change effectively besides getting assured income. As the irrigation water source and groundwater are dwindling rapidly, farmers of Uttarakhand state have adopted farm ponds (65.00%) and micro irrigation (60.00%) such as sprinklers, drip irrigation etc., as a part of water conservation practices/techniques. Majority of the respondents (65.00%) have started applying micronutrients to the fields based on the soil health card recommendation to supplement all the necessary

nutrients to the crop as a way of reducing the expenditure on fertilizers and it is also helpful in reducing the indiscriminate use of fertilisers in the cultivation of crops. About 30.00 per cent of the respondents adopted Integrated Farming System (IFS) to sustain the farming against the backdrop of climate change.

As far as the animal husbandry practices are concerned, the respondents have adopted improved practices in the field of livestock such as regular vaccination of animals (73.33%), shade protection to animals (57.78%), deworming of animals (64.44%), cleaning of animal shed on a daily basis (71.11%). Around 65 per cent of the respondents have enrolled as members of Custom Hiring Centre (CHC) initiated by NICRA enabling the small and marginal farmers to make use of seed drillers, harvesters, levellers, weed cutter, trencher, land leveller, disc harrows, power weeder etc.

However, in both the States the respondents have not adopted silage making practices due to lack of awareness. Necessary efforts may therefore be taken by NICRA to impart training and capacity building on the preparation of silage for the preservation of green fodder for the lean season to cope with the fodder shortage during extreme climatic vagaries. The findings were in line with the finding of Maiti *et al*, 2015, Nhemachena, C. and Hassan, R. 2007. Parameswaranaiik *et al*, 2016 and Arora, 2006.

Table 2. Constraints faced by Respondents in adopting Climate Resilient Technologies

n=45			
S. No.	Constraints	Garret Mean Score	Rank
1	Limited knowledge on climate resilient adaptation measures	52.98	I
2	Inadequate number of extension functionaries at grass root level	47.68	II
3	Inadequate weather based farm advisories	44.68	III
4	Lack of knowledge about climate change	42.21	IV
5	Inadequate training regarding climate resilient practices	41.08	V
6	Lack of feedback/reporting system (between extension, research and clients/end-users)	38.54	VI
7	Lack of access to timely information on climate vagaries	31.25	VII
8	Inadequate number of automatic weather stations	30.72	VIII
9	Lack of access to climate resilient crop varieties & other inputs (Drought / Heat resistance etc.)	28.80	IX
10	Less expertise of field staff on climate change and its management practices	24.88	X

The information on the constraints experienced by the respondents is depicted in Table 2. To reduce the vulnerability and negative impact of climate change on agriculture the farmers have to play an important role to overcome the adverse effects by implementing many alternate strategies in agriculture and allied activities. Under such circumstances farmers were facing various constraints to take up adaptation measures to overcome ill effects of climate change.

Limited knowledge on climate resilient adaptation measures was perceived as the most severe constraint with Garret Mean Score (GMS) 52.98. This may be due to the fact that all the climate resilient technologies might not have been given to individual respondents, rather they might have been given a single climate resilient technology either water harvesting (farm ponds) or demonstration of improved varieties etc. The inadequate number of extension functionaries at grass root level was another major constraint (GMS 47.68). Due to this reason, the respondents might have felt that the contact with extension functionaries was very less. Inadequate weather based crop advisories (GMS 44.68) was the third most severe constraint felt by the respondents. The respondents felt that some more weather based crop advisories would have helped them to cope up with the changing climate.

Lack of knowledge about climate change (GMS 42.21), inadequate training regarding climate resilient practices (GMS 41.08), lack of access to improved crop varieties and other inputs and less expertise of field staff on climate change and its management practices were the least perceived constraints by the respondents with a GMS score 28.80 and 24.88, respectively. This might be due to the fact that Krishi Vigyan Kendra (KVK) of respective areas were providing seeds of High Yielding Varieties and planting materials free of cost, constructed farm ponds, check dams, in the study area. The farmers were very satisfied with the work of KVKs as well as NICRA Project.

Conclusion

Climate change has a direct effect on agriculture affecting the most vulnerable segment of small and marginal farmers of India. From the above study, it can be concluded that beneficiaries of NICRA have adopted various climate resilient agricultural practices such as change in cropping/planting system and making use of custom hiring centres etc. The respondents were also perceiving various constraints like limited knowledge on adaptation measures, inadequate weather based farm advisories etc. In this context the capacity building of farmers on several climate smart practices may be undertaken through various extension approaches and techniques to make the villages more climate resilient.

References

- Arora A S. (2006). Socio-Economic and communication variables associated with level of knowledge and degree of adoption of improved dairy husbandry practiced in Uttaranchal. *Indian Journal of Dairy Science* 59(5): pp 337–43.
- Arya, D. (2010). Climate change influence on phonological events and socioeconomic status of village communities in Garhwal Himalaya, Reflections of Climate Change Leaders from the Himalayas, Leadership for Environment and Development (LEAD) report, India, New Delhi.
- IPCC. (2007). Climate Change 2007: Synthesis Report: Contribution of Working Groups I, II and III. *Fourth Assessment report of the Intergovernmental Panel on Climate Change*. Core Writing Team, Pachauri R K and Reisinger A, IPCC, Geneva, 2008: pp 45-78
- Garrett, H. E. and Woodworth, R. S. (1969) Statistics in Psychology and Education. Vakils, Feffer and Simons Pvt. Ltd., Bombay.p 329.
- Maiti Sanjit, Jha Sujeet Kumar, Garai Sanchita, Nag Arindam, Chakravarty R, Kadian K S, Chandel B S, Datta K and Upadhyay R C. (2014). Adaptation strategies followed by livestock rearers of coastal Odisha and West Bengal to cope up with climate change. *Indian journal of Animal Sciences* 84(6): pp 652–59.
- Nhemachena, C. and Hassan, R. (2007). Micro-level analysis of farmers' adaptation to climate change in Southern Africa. *IFPRI Discussion Paper No. 00714*, International Food Policy Research Institute, Washington DC.
- Parameswaranaik J, R. Senthil Kumar, R. S. Bhawar, N.P. Darshan and Diksha Patel. (2016). Factors influencing adaptation strategies by livestock owners to combat climate variability in Karnataka state: Application of ordered logistic regression model. *Indian journal of Animal Sciences*, 86(9):pp74-78.
- Ravi Shankar K., Nagasree. K., Venkateswarlu.B and Maraty Pochaiiah. (2011). Constraints and Suggestions in Adopting Seasonal Climate Forecasts by Farmers in South India. *Journal of Agricultural Education and Extension*, 17(2): pp 153-163.

National Agricultural Market (e-NAM) – A Case of its Implementation in Rajasthan

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Abstract

The concept of National Agricultural Market has made an impressive progress since its launch on 14th April 2016. A total of 585 markets from 18 states/UTs so far have been integrated with the common platform. In this paper an attempt has been made to assess the performance of the concept at the national and state level. The performance at national level has been evaluated using secondary information on the number of markets integrated, volume of trade and registration of stakeholders on the portal. An attempt has also been made to assess the impact of the initiative on aspects like price discovery though with special focus on the state of Rajasthan. The analysis at the national level suggests encouraging balanced spread of states as nearly two-third of the markets are participating in the Scheme from just five states. There is a need for creation of awareness among farmers and other stakeholders to help them understand the benefits and procedure of eNAM. They are also required to be trained on preparing the produce as per the requirements of such a market. In order to reap benefits of the initiative, it is required to adopt different means like capacity building of stakeholders and creation of requisite support infrastructure to improve trade on the e-portal. A commodity-focused approach in place of a wide range of commodities may yield better result. The concept has the potential to provide a solution to various problems prevailing in agricultural marketing as has been suggested by the response of the stakeholders and positive influence of the initiative on scientific price discovery.

Keywords : National Agricultural Market, eNAM, Impact, Prices, Performance

Introduction

Any dynamic system will undergo transformation with the changes experienced in the surrounding environment. The same has been the case with agricultural marketing in India. The system experienced the introduction of regulations during 1960s. The public control (or regulations) introduced through establishment of regulated markets helped in getting rid of several malpractices and imperfections

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prevailing in the agricultural market and safeguarding the interest of the farmers (Acharya, 2004). The participation of private players and investment in agricultural marketing led to the introduction of reforms in agricultural marketing as regulations were considered to be relevant only when private trade was underdeveloped, exploitative and controlled by mercantile power (Chand, 2012). Reforms helped in improving the agricultural marketing system but could not attract private investment at the pace the changes were being observed on the production front. The un-integrated and distortion ridden agricultural markets, is one of the leading factors hindering the growth of agriculture in the country (Economic Survey, 2015). Accordingly, the Government of India emphasized on the need for having a common agricultural market at the national level. The concept of National Agricultural Market introduced by the Government as a Scheme envisages networking of selected markets of the country to a common electronic platform. It also speaks about integrating other services like storage, banking, assaying and logistic arrangement considering market complete conglomerate portfolio of activities (Chattopadhyay, 1981) encompassing rents, fees, storage, transportation, processing, etc.

The concept of National Agricultural Market, which was launched as a Scheme on pilot basis in India on 14th April 2016 in 21 selected markets from 8 states covering 22 commodities has successfully expanded to more than 400 markets by March 2017 covering 69 commodities across different categories of crops. The concept has registered impressive success in terms of the number of markets integrated with the common platform. However, the impact of the initiatives in the light of objectives envisaged to be achieved through the National Agricultural Market in terms of its influence on improved inter-state trade, higher degree of competition, scientific discovery of prices and integration of services like banking and storage is yet to be analyzed.

The task is curtailed by limited availability of trade related information mainly on arrivals and prices as the scheme is just into its second year of launch. It may take more time to undertake comprehensive research covering its impact on interstate trade, arrivals, price discovery, settlements, price stabilization, etc. However, an attempt has been made in the present paper to analyze the performance of the Scheme by capturing the journey of the Concept made at the national level so far. The market and commodity based analysis suggesting markets with better performance and commodities showing preference has also been done for Rajasthan state where 25 markets have so far been integrated. An attempt has been made to capture the impact of the initiative on quality of prices along with status of infrastructure created.

Methodology

The paper primarily relies on secondary information culled out from agmarknet.gov.in, eNAM.gov.in and other published sources to capture the performance made by the initiative. The performance of the NAM at national level has been assessed in terms of number of markets integrated with the portal, trade taking place through the electronic platform and stakeholders registered using simple descriptive statistics.

The paucity of information for the scheme being only into its second year limits the scope for detailed analysis, however the paper attempts to analyse the performance of the Scheme not only in terms of markets covered and infrastructure developed but also its impact on prices through a snapshot of Rajasthan. A total of 25 markets have been integrated with the portal over two phases in the state having 134 Principal Regulated Yard and 312 Sub-yards. The performance of the scheme in Rajasthan reflected through the number of markets integrated, infrastructure created and the status of market-wise and commodity-wise trade in value and arrival terms has been assessed by applying descriptive statistical tools to the information culled out from sources mainly Agmarknet and state office of strategic partners identified by SFAC for implementation of the Scheme.

The paper also attempts to capture the impact, if any, of the initiative on trade related aspects like arrivals and prices. However, due to paucity of information, only limited aspects of price quality could be covered. One crop from each category of crops i.e. pulses, oilseed and spices cultivated in the Rabi season has been considered for analysis. The market considered for analysis is based on the arrivals and availability of information. Cereals were not included in the analysis considering the volume of trade and procurement facility available under MSP. The period considered for the analysis is January to June 2017 and January to June 2016 assuming that there must have been some gestation period. It is also assumed that trade sufficient to create an impact have started taking place in recent months only. The price quality was assessed only for three crop-market combinations by comparing month-wise variation in daily prices (minimum, maximum and modal) over time i.e. January - June 2017 with January - June 2016 and quality of price assessed through an index developed for the purpose.

The price quality has been assessed by working out an index for the same. It is assumed that with the increase in transparency in the pricing and trading mechanism in the market through trade on electronic platform, there will be an

improvement in the price realized reflected by a higher proportion of transactions taking place near the maximum prices. The modal price is the price at which the maximum number of transactions has taken place. Thus, it was assumed that with trade taking place on the electronic platform, the modal price will move towards maximum price. Based on this assumption, an index¹ (Saleth, 1993, Saleth, R. M. and S. Swamina than, 1992 and 1993) was developed to capture the impact on quality of price discovered in the market. The index basically measures the degree of closeness of the prevailing modal price to the maximum price. The decrease in index value after introduction of e-NAM is expected as per the assumption stated above. The index takes into account the distance of modal price (P_{mod}) from maximum price (P_{max}) with respect to the total variation in the prices i.e. difference between maximum (P_{max}) and minimum price (P_{min}). The index so developed is unit free and is defined below:

$$Index = \frac{P_{Max} - P_{Mod}}{P_{Max} - P_{Min}}$$

Where

P_{Max} = Prevailing Maximum Price of commodity

P_{Mod} = Prevailing Modal Price of commodity

P_{Min} = Prevailing Minimum Price of commodity

Progress of National Agricultural Market

The Scheme has made a remarkable progress in terms of markets getting integrated with National Agricultural Market (eNAM) Portal. As on March 2017, 421 markets have got integrated with the electronic portal developed by SFAC through its Strategic Partner with trade taking place on 417 markets as reflected by the number of online markets (Table 1). Uttar Pradesh, Madhya Pradesh, Haryana, Maharashtra and Telangana are the leading States in same order with nearly two-third of the markets coming from these five states out of 13 states that have so far participated in the National Agricultural Market Scheme of the Ministry of Agriculture and Farmers Welfare.

In terms of value of trade performed on eNAM Platform across all commodities during the agriculture year July 2016 to June 2017, Haryana has been the leading state accounting for nearly 55 percent of the total value of trade, followed by Telangana (22.55 percent) and Gujarat (14.03 percent).

Participation of more number of traders/buyers to ensure competitive prices has been envisaged under eNAM. It has also been the focus to encourage participation of farmers on the platform. Nearly one lakh traders have been registered against 421 markets which makes 208 traders available in each eNAM market. The highest number of traders available per market are in Rajasthan (558) followed by Uttar Pradesh (369) and Madhya Pradesh (304).

On an average 9000 farmers per eNAM market have been registered while this number is more than 10000 farmers per eNAM market in states like Uttar Pradesh, Haryana and Telangana. Overall 3.80 million farmers have been registered across 421 eNAM markets from 13 states.

States have shown varying trends in terms of number of commodities considered for trade on the electronic platform. A State like Telangana has all the commodities registered on eNAM while Haryana has shown a contrasting approach by focusing on just 11 commodities. It may be their focused approach leading to nearly 55 percent of the trade in value terms of total trade performed on eNAM during the last agriculture year coming from Haryana only.

The progress of eNAM indicates that 417 markets have so far been connected from 13 states participating in the Scheme. However, it is equally important to see the coverage of markets under eNAM vis-a-vis the number of principal yards operating in respective states under regulation. This will help in assessing the potential of these markets together in establishing a state market and gradually to a national market. Figure 1 suggests that Jharkhand and Haryana are the only two states having more than 50 percent of their wholesale principal yards covered under the Scheme. It is assumed that these are important markets in a particular state for defining the agricultural trade and issuing price signals for rest of the markets operating in the state. Himachal Pradesh (not covered in Figure) is the only state that has extended its reach beyond Principal yards to Sub-yards as well. Overall, more than 76 percent of the markets are yet to be integrated with the portal. This limited coverage under the scheme may eventually emerge as one of the major factors hindering establishment of state and national market.

Considering both the parameters i.e. proportion of wholesale principal yards covered under the Scheme and trade taking place on eNAM Portal, Haryana seems to be emerging as the leader. Gujarat and Telangana have also done reasonably well on both the parameters but for the remaining states a lot remains to be done.

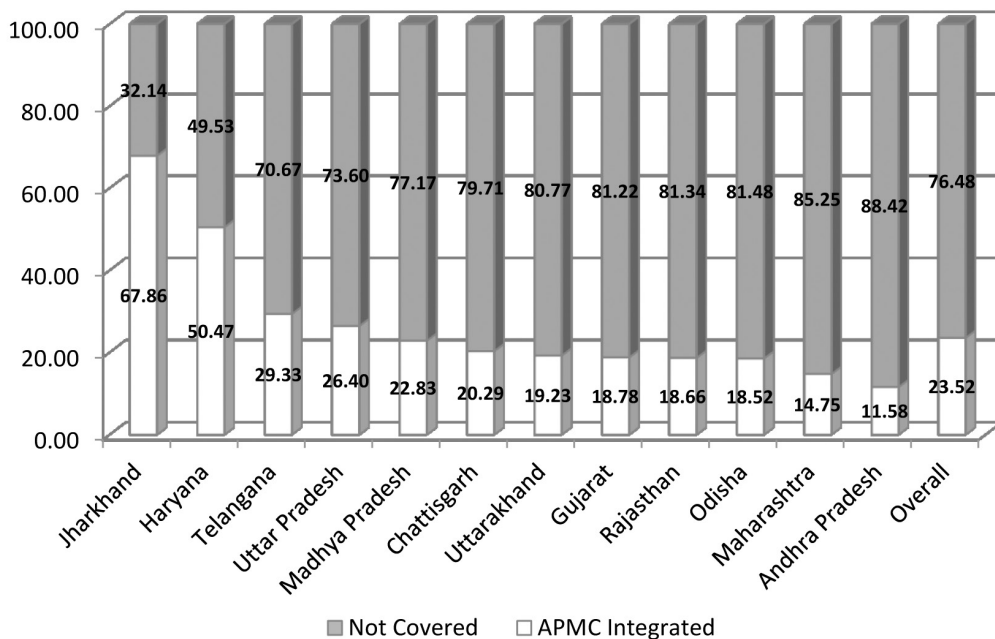


Figure 1. Gap in the Market covered under eNAM vis-a-vis total principal markets in the State

Snapshot of Rajasthan

In order to have a better insight on the progress of eNAM in terms of trade, a detailed market-wise (over all commodities) and commodity-wise (across all markets integrated with e-portal) analysis was performed. A total of 25 markets from the State have been integrated with the portal having focus on only 16 commodities.

Market-wise Trade on National Agricultural Market

The status of trade in different eNAM markets from Rajasthan covering all commodities is presented in Table 2. The table reveals that only 4.7 percent of the total arrival of different commodities taken together in eNAM markets was traded through the electronic portal. However, markets like Fatehnagar (67 percent), Gangapora (35 percent) and Bandikui (32 percent) have done fairly well. Out of 25 markets connected to eNAM portal, only five markets have been able to shift more than 25 percent of the arrivals to the platform of the national market, another 9 markets have this figure in double digits ranging from 11.98 to 24.69 percent.

The remaining 11 markets have to improve proportion of arrivals getting traded on eNAM platform to help establish a true state level market for agricultural commodities.

Considering the type of commodities arriving in these markets will have different trade importance, accordingly an assessment of trade taking place on eNAM in value terms has also been made (Table 2). The table reveals that nearly 50 percent of the total trade performed on eNAM in 25 markets from Rajasthan during the agricultural year 2016-17 has come only from 5 markets namely Merta City, Nagour, Kota, Ramganj Mandi and Padampur in the same order. Some of the markets have to speed up their task as suggested by their share in total trade performed on eNAM of less than one percent like Mandawari, Nokha, Kaman, Keshoraipatan and Niwai.

Commodity-wise Trade on National Agricultural Market

In order to assess any preference for commodities by the system, the commodity-wise analysis on arrivals across all eNAM markets in the State has been made and results are presented in Table 3.

The table suggests encouraging results for some commodities with reasonable arrivals like Bengal Gram, Bengal Gram (Desi), Soya Seeds (White) and Black Gram with more than 30 percent arrival being captured through the electronic portal followed by Bengal Gram (Dollar), Masoor, Maize, Bajra, Soybean, Wheat and Green Gram.

In terms of value of trade, nearly 90 percent of value of total commodities traded on the electronic portal across all markets during agricultural year 2016-17 has come from only five crops namely Mustard, Bengal Gram, Green Gram, Wheat and Black Gram. This suggests a kind of suitability of the portal for pulses and oilseeds with wheat being the only exception.

The Group-wise analysis of commodities in terms of arrivals and value of trade as a proportion of total arrival and value of trade taking place on eNAM Portal, suggests preference for oilseeds and pulses followed by coarse cereals and cereals. Results are not very encouraging for crops like spices and medicinal plants. It may be for reasons that either their marketing system is highly established or a market of importance for these crops has so far not been covered under the scheme (Fig 2 & 3).

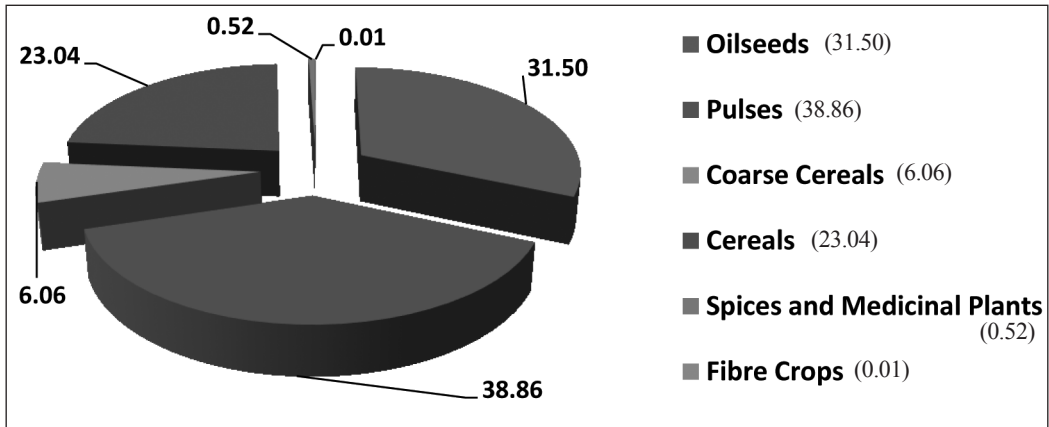


Figure 2. Proportion of total arrivals of different group of commodities traded on electronic portal across all eNAM markets

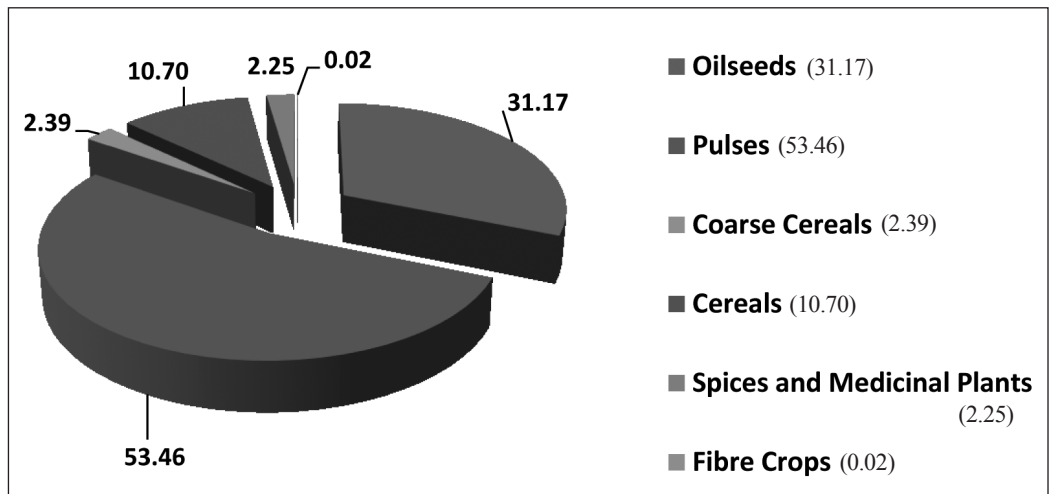


Figure 3. Proportion of total value of trade of different group of commodities performed on electronic portal across all eNAM markets

Table 1. Status of Performance of eNAM at All India Level - March 2017

State	APMC Integrated ¹	No of Mandies Live	No of Regulated Principal Yards	No of Traders Registered ²	No of Farmers Registered ²	No of Commodities	Value Traded Rs Lakh ³
Andhra Pradesh	22 (5.23)	22	190	1072 (49)	30450 (1384)	19	41215 (1.64)
Chhattisgarh	14 (3.33)	14	69	2646 (189)	17486 (1249)	7	15087 (0.60)
Gujarat	40 (9.50)	40	213	7229 (181)	233727 (5843)	46	352932 (14.03)
Haryana	54 (12.83)	54	107	6558 (121)	686673 (12716)	11	1374068 (54.62)
Himachal Pradesh	19 (4.51)	17	10	1166 (61)	10947 (576)	10	3743 (0.15)
Jharkhand	19 (4.51)	19	28	997 (52)	2069 (109)	3	75 (0.00)
Madhya Pradesh	58 (13.78)	58	254	17656 (304)	100181 (1727)	28	29884 (1.19)
Maharashtra	45 (10.69)	44	305	5275 (117)	40742 (905)	--	56 (0.00)
Odisha	10 (2.38)	9	54	331 (33)	10105 (1011)	--	395 (0.02)
Rajasthan	25 (5.94)	25	134	13956 (558)	80026 (3201)	16	14316 (0.57)
Telangana	44 (10.45)	44	150	4907 (112)	481532 (10944)	69	567297 (22.55)
Uttar Pradesh	66 (15.68)	66	250	24352 (369)	2102435 (31855)	48	113604 (4.52)
Uttarakhand	5 (1.19)	5	26	1343 (269)	481 (96)	--	3043 (0.12)
Total	421 (100.00)	417	1790	87488 (208)	3796854 (9019)	--	2515714 (100.00)

Source: enam.gov.in

¹Figure in parenthesis shows the percentage of total markets integrated with the portal, ²Figure in parenthesis shows traders/farmers per market in respective state and ³Figure in parenthesis shows the share of respective state in the total value of trade performed on eNAM

Table 2. Status of market-wise trade during Agricultural Year 2016-17 for markets covered under eNAM in Rajasthan

Market	Commodities Traded on eNAM (in Quintals)			Value of Commodities Traded on eNAM (Rs Lakhs)			
	Commodity Arrivals (Quintal)	Commodity Traded (Quintal)	Trade on eNAM (%)	Commodity Traded (Rs Lakhs)	Share of Total Trade on eNAM	Cumulative Share	Markets
Fatehnagar	35538	23960	67.42	1683.92	14.33	14.33	Merta City
Gangapura	59642	21014	35.23	1129.85	9.62	23.95	Nagour
Bandikui	29968	9450	31.53	085.93	9.24	33.19	Kota
Nagar	23189	6037	26.03	1040.98	8.86	42.05	Ramganj Mandi
Atru	35560	8978	25.25	809.38	6.89	48.93	Padampur
Nadbai	30950	7643	24.69	735.39	6.26	55.19	Baran
Bikaner Grain	48456	10459	21.59	661.61	5.63	60.82	Gangapura
Mandawari	16831	3024	17.97	651.71	5.55	66.37	Hindoun
Nagour	157054	26023	16.57	514.59	4.38	70.75	Bundi
Sri Madhopur	17035	2729	16.02	511.26	4.35	75.10	Bikaner Grain
Hindoun	183202	29059	15.86	453.46	3.86	78.96	Sri Ganganagar Grain
Keshoraipatan	29536	4391	14.87	375.21	3.19	82.15	Fatehnagar
Kaman	18241	2633	14.44	309.94	2.64	84.79	Jodhpur Grain
Ramganj Mandi	200183	23981	11.98	306.02	2.60	87.39	Atru
Sri Ganganagar Grain	186653	16770	8.98	277.14	2.36	89.75	Sumerpur
Sumerpur	153369	12621	8.23	229.01	1.95	91.70	Nadbai
Merta City	634602	44087	6.95	221.86	1.89	93.59	Bandikui
Padampur	472791	26065	5.51	180.62	1.54	95.12	Nagar
Deoli	97312	4807	4.94	136.43	1.16	96.29	Deoli
Kota	595675	26379	4.43	94.94	0.81	97.09	Mandawari
Baran	347980	15339	4.41	82.94	0.71	97.80	Nokha
Bundi	364816	15866	4.35	75.83	0.65	98.45	Kaman
Nokha	118560	2625	2.21	73.57	0.63	99.07	Keshoraipatan
Jodhpur Grain	175747	3234	1.84	66.36	0.56	99.64	Sri Madhopur
Niwai	3395561	1664	0.05	42.79	0.36	100.00	Niwai
Grand Total	7428449	348836	4.70	11750.72	100.00	200.00	Grand Total

Source: enam.gov.in

Table 3. Status of commodity-wise trade during Agricultural Year 2016-17 for markets covered under eNAM in Rajasthan

Commodities	Commodities Traded on eNAM (in Quintals)		Value of Commodities Traded on eNAM (Rs Lakhs)	
	Commodity Arrivals (Quintal)	Commodity Traded (Quintal)	Commodity Traded (Rs Lakhs)	Share of Total Trade on eNAM
Gingelly (Sesame Seed) - White	4	3	3294.81	28.04
Urad Dal	209	119	3125.04	26.59
Chana (Bengal Gram)-Desi	4023	1705	2111.18	17.97
Soya Seeds (White)	3599	1512	1256.82	10.70
Bajra-Hybrid	930	355	651.92	5.55
Arhar Whole / Tur (Red Gram)	442	165	221.17	1.88
Ground Nut	3	1	180.33	1.53
Urad (Black Gram)	39872	13653	118.25	1.01
Chana (Bengal Gram)	211656	62978	113.75	0.97
Chana (Bengal Gram)- Dollar	3884	1121	97.74	0.83
Mustard White Seeds	654	186	86.44	0.74
Masoor	4738	1141	83.77	0.71
Sesame Seed	642	155	72.06	0.61
Maize	37724	8465	60.79	0.52
Tur/Arhar	62	12	19.35	0.49
Bajra	46014	7759	51.72	0.44
Soyabeans	46313	6412	43.52	0.37
Wheat	645838	80348	42.95	0.37
Moong Whole (Green Gram)	411722	48688	20.22	0.17
Castor Seed	31208	2067	18.36	0.16
Ground Nut New	9306	597	9.23	0.08
Taramira	2347	137	6.09	0.05
Guar Seeds	77482	3540	5.49	0.05
Barley (Jau)	146925	4548	4.81	0.04
Moth	86157	2329	4.61	0.04
Green Gram	2237	59	4.48	0.04
Mustard	3981097	98210	2.73	0.02
Isabgol (Psyllium Husk)	23591	451	2.08	0.02
Cumin	75985	1363	2.08	0.02
Soya-Yellow	46454	649	1.40	0.01
Sounf	3409	46	1.35	0.01
Fenugreek (Hari Methi)	441	5	1.13	0.01
Coriander Whole	664	3	0.50	0.00
Gingelly (Sesame Seed)- Black	779	3	0.38	0.00
American-Cotton	15205	48	0.32	0.00
Paddy	42928	4	0.07	0.00
Grand Total	6004541	348836	11750.72	100.00

Source: enam.gov.in

Impact of eNAM on Prices

An attempt has been made in this section to analyze the impact of eNAM, if any, on quality of prices. The price quality was assessed for three crops i.e. Mustard from Oilseeds, Gram from Pulses and Coriander from Spices by comparing month-wise variation in daily prices over time i.e. January - June 2017 with January - June 2016 and through an index developed for the purpose.

Mustard (Kota)

The mustard from Kota market has been taken to represent oilseeds. Kota is the second most important market for mustard in the state after Alwar (not covered under eNAM) capturing more than 5 percent of the total arrival coming to wholesale markets of Rajasthan. The analysis for the crop has been presented in Figure 4. Figure (a)-(c) depicts inter-day variation in prices for a particular month in 2017 and their comparison with the corresponding figures from year 2016 while in Figure (d) a lower index value indicates that more number of transactions have taken place near maximum price leading to better realization by farmers. The analysis reveals that the month-wise variation in daily prices (minimum, maximum and modal) prices has come down in almost all the months considered for the year 2017 in comparison to 2016 with some cases of reverse trend in the months of March, April and May. It may be due to the inability of the portal to respond during months of higher arrivals. Index value also suggests that the quality of prices has improved in all the months except March reflecting higher realization of prices by farmers.

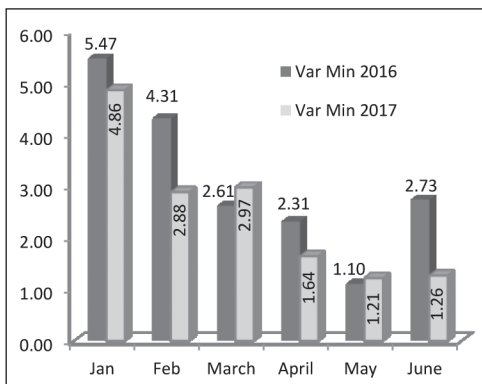


Figure 4 (a). Month-wise variation in Minimum daily prices of Mustard

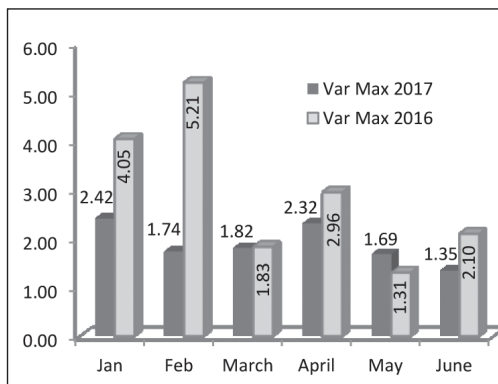


Figure 4 (b). Month-wise variation in Maximum daily prices of Mustard

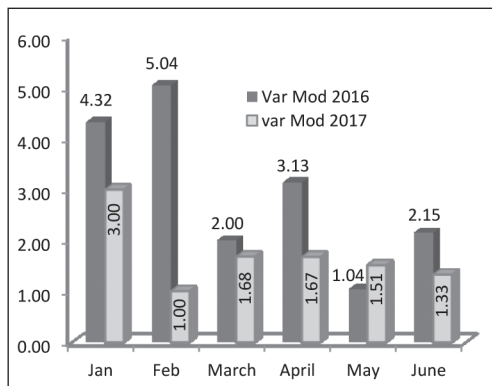


Figure 4 (c). Month-wise variation in Modal daily prices of Mustard

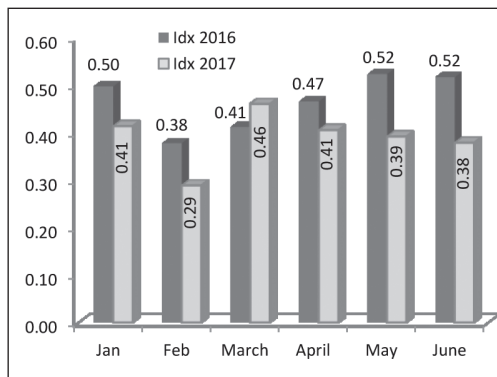


Figure 4 (d). Comparison of Monthly Price Index of Mustard

Bengal Gram-Bikaner

Bengal Gram has been taken from the Pulses group of crops. Bikaner is the leading wholesale market in Rajasthan representing nearly one-fourth of the total arrivals of Gram coming to wholesale markets of Rajasthan. The information on prices for the period January to March 2017 was not available, however, the analysis for the rest of the period is presented in Figure 5. The figure suggests that the month-wise variation in daily prices (minimum, maximum and modal) has come down in all the months considered for year 2017 in comparison to 2016. The same has been reflected by favorable Index values also suggesting an improvement though marginal in the quality of prices.

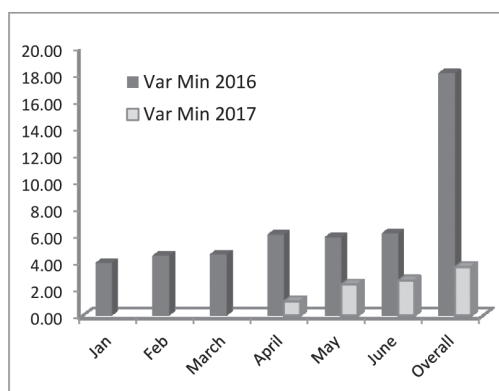


Figure 5 (a). Month-wise variation in Minimum daily prices of Gram

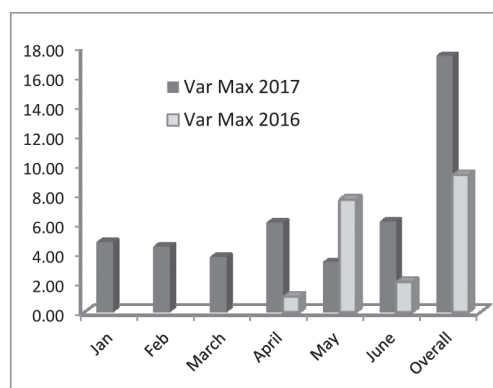


Figure 5 (b). Month-wise variation in Maximum daily prices of Gram

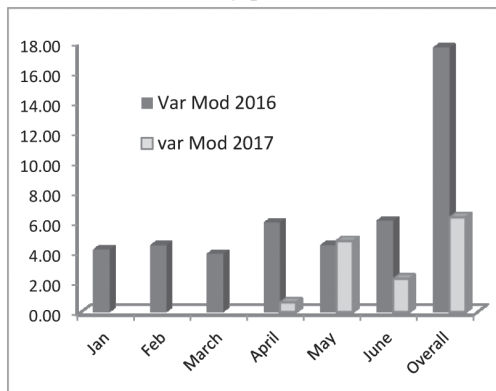


Figure 5 (c). Month-wise variation in Modal daily prices of Gram

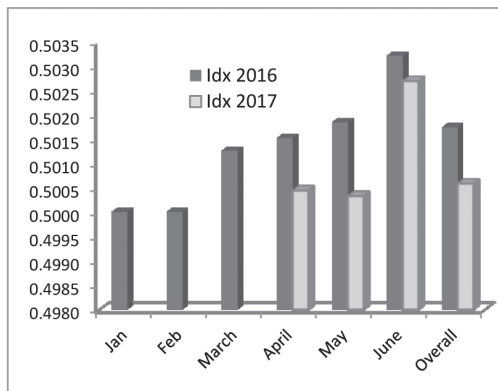


Figure 5 (d). Comparison of Monthly Price Index of Gram

Coriander- Ramganj Mandi

The Coriander arriving in Ramganj Mandi has been considered for drawing a rough picture for spices. More than one-fourth of the total arrivals in wholesale markets in Rajasthan is being catered by Ramganj Mandi. The analysis is presented in Figure 6. The figure for Corriander indicates mixed result for all the parameters considered under analysis except for minimum prices where reduction in variation has been observed. This calls for further detailed analysis to work out the suitability of such markets, if any, for any specific crops.

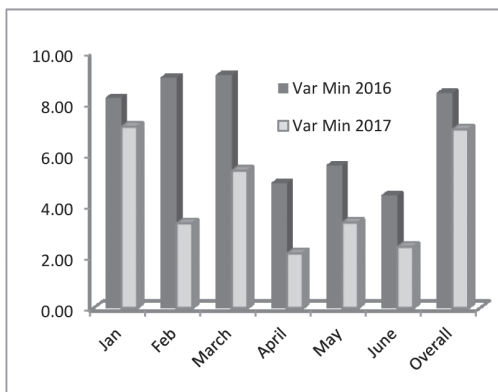


Figure 6 (a). Month-wise variation in Minimum daily prices of Coriander

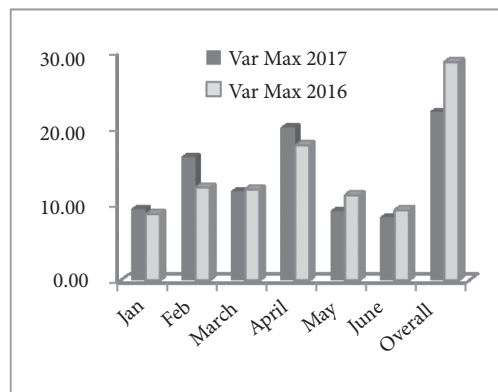


Figure 6 (b). Month-wise variation in Maximum daily prices of Coriander

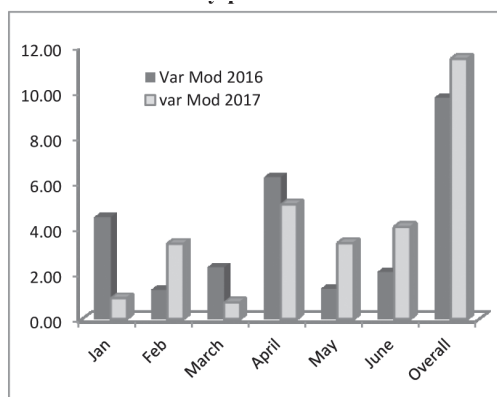


Figure 6 (c). Month-wise variation in Modal daily prices of Coriander

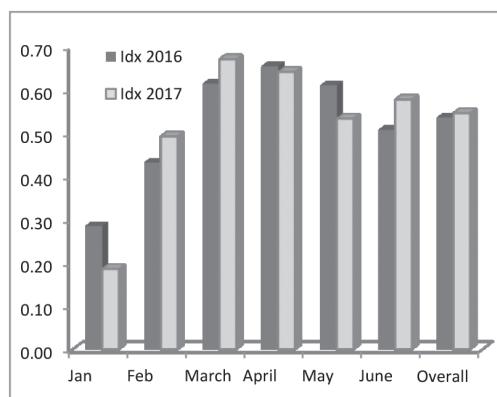


Figure 6 (d). Comparison of Monthly Price Index of Coriander

Conclusion & Suggestions

The study suggests that the coverage of states under eNAM is restricted to limited number of states. A total of 421 markets are coming just from 13 states. Within these states as well, the distribution is highly skewed as nearly two-third of the total of 421 markets covered under eNAM is coming just from five states. Such a spread may act as a dampener for the objective of the Scheme to achieve a true national market for agricultural commodities. There is need to enhance balanced spread of states under the Scheme including northeastern region. Reforms may be one of the major factors limiting states from coming forward. The Government needs to sensitize states on adoption of the provisions suggested under the recently introduced revised Model Act namely Model Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act 2017 enabling them to participate.

Integrating farmers with the portal is important for making the initiative successful and inclusive as awareness amongst farming community has been observed to be low (Shalendra et al., 2013). Though, over 3.80 million farmers have been registered across 421 markets but it is equally important to educate them on benefits and procedure of eNAM and preparation of produce for such markets to ensure their inclusion.

The National Agricultural Market covers only 23.52 percent of the regulated markets (principal yards) of the participating states. This may limit the scope of scheme in establishing agricultural marketing operating at state and gradually at national level. There is need to enhance the coverage to have sufficient price signals and attract trade. A more focused and scientific approach in terms of identification of markets may also help in enhancing the impact.

The shift in trade to eNAM platform has been lukewarm as suggested by figures from Rajasthan. Only 14 markets have been able to shift more than 10 percent of the arrivals to the electronic platform. The number viewed in the light of total regulated wholesale markets (Principal yards only) seems to be insignificant. These markets need to adopt different means like education of stakeholders and creating sufficient support infrastructure to improve trade on the e-portal.

Commodity-wise analysis suggest that more than 90 percent of the trade in value terms in Rajasthan (of the total trade on eNAM Portal) comes only from five commodities mainly pulses and oilseeds. It suggests that such a market may work good for a specific group of crops. States need to identify their potential crops in place of focusing on a wide range of commodities. This will help them in developing support infrastructure, providing human resources and educating stakeholders.

The scheme has shown positive influence on quality of prices but failed to do so during high arrival months. This suggests that markets are finding it difficult to handle high level of arrivals during the time of harvest. Markets may overcome such issues over time with development of infrastructure and expertise. The Government needs to have a long-term policy for development of such a concept having potential to resolve numerous problems prevailing in agricultural marketing.

Refinance

- Acharya, S S (2004). State of the Indian Farmer: A Millennium Study, Agricultural Marketing, Department of Agricultural and Cooperation, Ministry of Agriculture and Academic Foundation, New Delhi
- Chand, Ramesh (2012). Development Policies and Agricultural Market. Economic and Political Weekly, XLVII (52): 53-63 (December 29, 2012)
- Economic Survey (2015). *indiabudget.nic.in*
- NIAM (2012). Impact Assessment of e-Tendering of Agricultural Commodities IN Karnataka, CCS National Institute of Agricultural Marketing, MOAFW, GOI, Jaipur
- NIAM (2015). Unified Common Market: A Concept Note, National Institute of Agricultural Marketing, viewed on 24 August 2015
- Saleth, R. M. (1993). Agricultural Sustainability Status of the Agro-climatic Sub-zones of India: Empirical Illustration of an Indexing Approach, Indian Journal of Agricultural Economics, 48(03): 543-550
- Saleth, R. M. and S. Swaminathan (1992). Sustainable Livelihood Security Index: A litmus Test for Sustainable Development, Discussion Paper, M. S. Swaminathan Research Foundation, Madras

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- Saleth, R. M. and S. Swaminathan (1993). Sustainable Livelihood Security Index towards a Welfare Concept and Robust Indicator for Sustainability, *Eco-tech: The Industrial Ecology Concept towards Sustainability*, Elsevier Science, Amsterdam (Ed. Anton Moser)
- SFAC (2016). Presentation on the Central Sector Scheme on National Agricultural Market, SFAC, New Delhi
- Shalendra, HemaYadav, M S Jairath, K C Gummagolmath, Purushottam Sharma (2016). Conceptualizing a National Market for Agri-produce, *Leading Issues in Agribusiness*, (eds: M V SrinivasaGowda and B M Ramachandra Reddy)
- Shalendra, Purushottam Sharma and K C Gummagolmath (2013). Application of ICT for Efficient and Transparent Price Discovery: An Analysis of e-Tendering of Agricultural Commodities in Karnataka. *Journal of Agricultural Extension Management*, Vol XIV No. 2 July - December, 2013

Impact Assessment of Climate Change Knowledge Network in Indian Agriculture (CCKN-IA) of selected blocks of Jharkhand, Maharashtra and Odisha States

G. Bhaskar¹

Abstract

The study on Impact Assessment of Climate Change Knowledge Network in Indian Agriculture (CCKN-IA) is an ex-post impact evaluation study that intended to establish comparative learnings such that the CCKN-IA approach could be easily replicated across blocks of the entire state. The CCKN project was implemented in three states namely Jharkhand, Odisha and Maharashtra during 2015 – 2017. The study focuses on the extent of access to climate adaptive advisories, from the responses of the project and control farmers. It is found that the project farmers had higher access to climate adaptive advisories than control village farmers in crop production practices. As far as the adoption of climate adaptive advisories are concerned, the farmers of project villages in all the three states reported a higher adoption of climate adaptive advisories in crop production than that of the control villages. Assuming the project benefits in the pilot blocks, the same concept of CCKN-IA project can be upscaled. Accordingly the cost of implementation has been worked out and presented in this paper; so that the respective State Governments can adopt the CCKN-IA project in the entire state.

Key words: climate change, agriculture, knowledge network, CCKN, climate adaptive advisory

Introduction

Agriculture in India, continues to provide livelihood to more than half of the country's population and has been transforming itself from being a mere way of life to "Smart", with improved precision across the supply chain operations. However, the sector continues to be characterized inherently "risky" and typical due to multiple reasons including fragmentation of landholdings, associated high risk production conditions, perishability of produce, output price variations, etc. In addition to the commonly cited risks, Climate Change plays a major deterrent

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impacting the food and fodder production activities across the globe, seeking the attention of policy makers, researchers and development organizations. It is known that “Climate Smart Agriculture (CSA)” is one of the key focus areas of research for the scientists and academicians, world-wide.

Information Technology (IT) enabled delivery of agricultural information and advisory services to the farmers is being widely talked about and piloted in various forms in the country. It is in the fitness of things to integrate climate change knowledge delivery with such existing networks. “Effective engagement of stakeholders and management of knowledge for adaptation is vital in supporting all adaptation activities, at each step in the process” (United Nations Framework Convention on Climate Change). Communication and capacity building have significant roles in fostering large scale and effective adaptation to climate change. While creation of such knowledge and building capacities of the stakeholders is a demanding task, sustaining the process of creation and knowledge delivery is of equal and paramount importance.

Climate Change Knowledge Network in Indian Agriculture (CCKN-IA)

The project, “Climate Change Knowledge Network in Indian Agriculture” (CCKN – IA) was implemented by the National Institute of Agricultural Extension Management (MANAGE), Ministry of Agriculture and Farmers Welfare (MoAFW), Government of India (GoI) with technical cooperation of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), an enterprise owned by the German Government. The project is described to be one of its kind and innovative in addressing the knowledge and information needs of the farmers in adopting agricultural and allied production practices for effective adaptation towards climate change and its adverse impacts. The project was grounded and reached out to the farmers from 2015 through 2017. The CCKN-IA project was implemented in three states of Jharkhand, Maharashtra and Odisha, covered 12 blocks and 96 villages. Project districts included Pune and Ahmednagar of Maharashtra, East Singhbhum and Ranchi of Jharkhand and Ganjam and Dhenkanal of Odisha.

The primary objective of the CCKN-IA programme was to develop a robust network of information exchange systems to effectively share knowledge across the gamut of stakeholders in the project area. This is to ensure improved access to updated, timely, authentic and location specific information that enables the farmers, extension service providers and policy makers get better equipped to

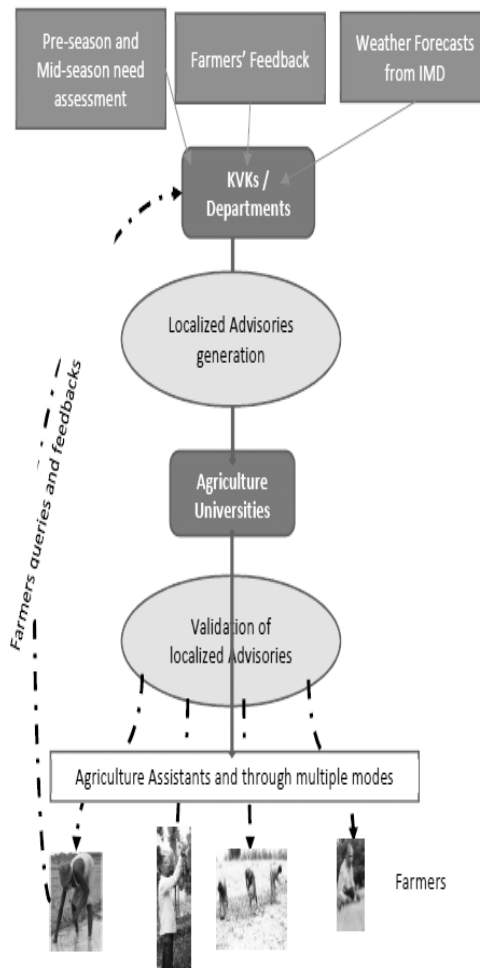
adapt to climate change. Such collaborative efforts contribute towards innovative ways to meet the real-time farmers' needs and providing a multi-modal two-way exchange process.

GIZ and MANAGE have been successfully implementing the network based localized advisory processes using the digital tool called NICE (Network for Information on Climate Exchange) System. The project Climate Change Knowledge Network in Indian Agriculture (CCKN-IA) was successfully piloted in the select locations in the states of Jharkhand, Maharashtra and Odisha. The quality advisory generation, validation and delivery processes are anchored and institutionally supported by MANAGE in partnership with State Agricultural Universities (SAUs) and Krishi Vigyan Kendras (KVKs).

NICE System

The Network for information on Climate (EX) change (NICE) is a web-based open source platform, that allows a multimodal approach and enables two-way communication to link farmers' needs to knowledge experts on a real time basis. The farmers receive the advisories through SMS, field agents also use tablets to disseminate advisories to farmers thereby creating a more personal link. NICE has some remarkable features for successful collation, validation and dissemination of advisory information. The modular structure of NICE allows a peer-review mechanism from content aggregation, expert validation and subsequent translation and dissemination of the content. Finally the content created on NICE is disseminated to the farmers. The NICE system has the facility to capture the farmer's basic and socio-economic details including, land details, crops grown for the season etc.

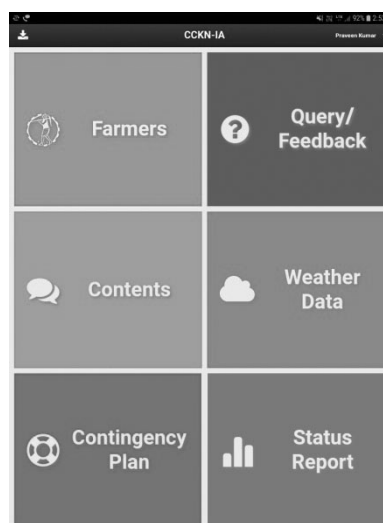
Using NICE system, the expert can send advisory to the farmers in multi-modal approach i.e. not only in the form of SMS but also through Posters, Video URL, documents etc. The content other than SMS will be delivered to the Tablet of Field Agents. This content is further disseminated to the farmers by the Field Agents in the village. The farmers get timely, authentic advisory messages and the content is generated based on their local needs i.e. fully localized content is generated by the experts. This helps the farmers to adopt the advisories sent by the experts. The field agents also play an important role in disseminating the advisories to the farmers using mobile app on TAB. The posters, video URL, and documents helped the farmers to know more details of the advisory.



Knowledge Management process under CCKN-IA

The NICE+ mobile was developed under CCKN-IA project for the Field. This mobile app works only in combination with a specific web solution developed for the project and is only accessible for registered Field Agents. Relevant information is collected in a decentralised process, through this app and the backend system. The Mobile App enables Field Agents in creating and updating farmer profiles, land details and crop details from the village itself. The farmers can also access the information related to weather forecasting, the advisory content (SMS/Posters/Video links etc) and contingency plans uploaded for their blocks. The Field Agents can upload the farmers’ field query with crop photos to the domain expert and can also see the expert advice on the farmers query.

The key players involved in content generation, validation and dissemination process are State University Scientists, KVK scientists, and the field functionary. The feedback from the field level functionary is assessed and based on the need and requirement, the content is generated by the KVK subject matter experts. The generated content is validated by the university scientists of the same knowledge domain division and the content is approved. The validated content is disseminated to the farmers and field agents in the form of SMS service. The farmer queries, which are received from the field agents for a specific farmer or the entire village, are taken up by the subject experts and the query is resolved.



The resolved query advise is sent to the farmer and also to the field agents.

Impact Assessment

The study on Impact Assessment of Climate Change Knowledge Network in Indian Agriculture (CCKN-IA) is an ex-post impact evaluation study that intended to establish comparative learning such that the CCKN – IA approach can be easily replicated across blocks and locations of all the states in the country.

Objectives of the study

- To conduct a comparative analysis in the project blocks, comparing the project villages with nearby non-project villages in the blocks.
- To share the findings on key promoting factors as well as gaps and challenges that are needed to be addressed to use CCKN-IA approach in the non-project villages and thus recommend needed adaptations and inputs for scale-up.

Research Methodology

The impact assessment had primarily employed quasi-experimental method; Propensity Score Matching (PSM) to compare the beneficiaries or project farmers and non-beneficiaries or control farmers on various production related variables. It is believed that the beneficiaries and the non-beneficiaries will have the same level of access to the other development programs of the state and central governments

while choosing the method. Propensity score matching technique employed in the selection of sample ensures that the impacts of CCKN-IA are delineated, in other words, the method leads to assessment of the impact of CCKN-IA alone.

Sampling

The survey design was formulated such that random selection of project villages in the 12 project blocks across 6 districts was carried out. The control villages were chosen such that they have similar agro-climatic conditions, socio economic condition of living, cropping patterns, access to agricultural inputs, markets, extension systems etc. as that of the project villages, and are not impacted with any spill-over benefits from the project. Accordingly, 12 project villages and 12 control villages across the 12 project blocks of 6 districts of three states were chosen for the survey. The details of the sample project and control villages are shown in the Table 1.

Table 1. Details of sample Project and Control Villages under each Block of CCKN-IA Project Area

States (3)	Districts (6)	Blocks (12)	Project Villages (12)	No.of farm-ers - Proj-ect village	Control Villages (12)	No.of farm-ers -Control village
Jharkhand	East Singhbhum	Patamda	Beldih	18	Dogrigora	5
		Boram	Muchidih	18	Chimti	5
	Ranchi	Angara	Navagarh	18	Maheshpur	5
		Ormanjhi	Hendebilli-Kulhi	18	Dhakjiban	5
Maharashtra	Pune	Velha	Ambavane	18	Karan jawane	5
		Junnar	Agar	18	Alu	5
	Ahmednagar	Nagar	Khandala	18	TakaliKhat-gaon	5
		Rahata	PimpriLokai	18	Adgon Bk	5
Odisha	Ganjam	Chhatrapur	Kanamana	18	Laxmipur	5
		Sanakhemundi	Pattapur	18	Balia	5
	Dhenkanal	Dhenkanal Sadar	Harekrush-napur	18	Fatkei	5
		Kankadahad	Tariniposi	18	Chandapur	5
			TOTAL	216	TOTAL	60

Beneficiary farmers for the study were chosen randomly from the project villages. Assuming that the beneficiary farmers constitute a simple random sample of a population of similar subjects, a sample of 216 beneficiary farmers were chosen randomly from the project villages for the survey (total registered farmers under the project are 24,162). In case of control farmers, 28 per cent (60 farmers) of the project sample were interviewed from control villages. Thus a total of 276 farmers were surveyed in the project and non-project villages. The above sample was uniformly distributed across the project states, districts and villages.

Results and Discussion

Demographic profile of the respondents

Among the beneficiary and non-beneficiary farmers, 53 per cent of the respondents belong to the middle age group of 31 to 50, 32 per cent of them are more than 50 and 15 per cent of them belong to the age group of 21-30. The mean age of the farmers interviewed was 45.1. The age of the respondents from project and control villages is shown below.

Table 2. Age Group of Respondents

S.No.	Age Group	Farmers Interviewed (%)
1.	21 – 30 years	15%
2	31- 50 years	53%
3.	Above 50 years	32%

Landholding

Among the farmers interviewed, 37 per cent are marginal farmers with landholding below 2.5 acres, 43 per cent are small with landholding between 2.5 acres and 5 acres and 16 per cent are large farmers with landholding of above 5 acres. Data on landholding wise farmers interviewed for the study is shown below.

Table 3. Land holding wise farmers interviewed

S.No.	Land holding	Farmers Interviewed (%)
1.	Marginal (below 2.5 acres)	37%
2	Small (2.5 – 5.0 acres)	43%
3.	Large (above 5 acres)	16%

Access to Crop Advisories by Farmers

1. Extent of access to Climate Adaptive Advisories on Crop Production

The farmers of the project villages and control villages were required to give their responses on their access to climate change advisories pertaining to crop production on a five-point continuum ranging from ‘Very high’ access to ‘Very Low’ access [Very High denoting 5, High is 4, Medium is 3, Low is 2 and Very Low indicating 1]. Land Preparation, Selection of Crops and Varieties, Time of Sowing, Seed rate, Nursery Management, Transplanting, Water Management, Nutrient Management, Pest and Disease Control, Preventive Advisories on Crop Pests and Diseases, Harvesting and Post-Harvest Management are the advisories on which the data was enumerated as part of the field survey.

The data in Table 4 below shows the impact of CCKN on the access to climate change advisories on different aspects of crop cultivation from land preparation to post harvest management.

Table 4. Extent of Access to Climate Adaptive Advisories – Crop Production – Mean Access Score

Components of Crop Cultivation	Control / Project	States (maximum possible score =5)			
		Jharkhand	Maharashtra	Odisha	Total
		Mean	Mean	Mean	Mean
Land Preparation	Control	2.71	2.33	2.18	2.43
	Project	3.34	3.61	3.30	3.40
Selection of Crop / Variety	Control	2.90	2.40	2.35	2.58
	Project	3.42	3.69	3.20	3.41
Time of Sowing	Control	2.33	2.33	2.41	2.36
	Project	3.44	3.56	3.41	3.46
Seed Rate	Control	2.24	2.20	2.06	2.17
	Project	2.87	3.33	3.06	3.07
Nursery Management	Control	2.43	2.27	1.94	2.23
	Project	2.94	3.39	3.01	3.09
Transplanting	Control	2.52	2.27	2.12	2.32
	Project	3.03	3.23	2.93	3.05
Water Management	Control	2.52	1.73	2.00	2.13
	Project	2.99	3.25	3.03	3.07
Nutrient Management	Control	2.29	1.67	1.82	1.96
	Project	3.14	3.54	2.70	3.09

Components of Crop Cultivation	Control / Project	States (maximum possible score =5)			
		Jharkhand	Maharashtra	Odisha	Total
		Mean	Mean	Mean	Mean
Pest and DiseaseControl	Control	2.19	1.40	1.94	1.89
	Project	3.34	3.56	2.98	3.27
Preventive advisories on crop pests and diseases	Control	1.86	1.27	1.65	1.62
	Project	3.04	3.38	2.76	3.03
Harvesting and post-harvest	Control	2.00	1.40	1.76	1.75
	Project	2.84	3.05	2.83	2.89

The data shows that the farmers of project villages in all the three states; Jharkhand, Maharashtra and Odisha have reported a higher access to climate adaptive advisories than that of control villages. The project villagers had received their advisories through multimedia such as SMS, one page leaflet, village notice boards and farmer meetings.

The mean advisory access score for different aspects of crop cultivation ranged from 2.89 to 3.4 (out of a maximum score of 5.00) in case of project villages of three states pooled together and the range was 1.62 to 2.43 in case of control villages.

The study further revealed that in case of project villages (pooled), the access to advisories was highest in case of time of sowing (score 3.46) followed by selection of crops and varieties (3.41), land preparation (3.40), control of pests and diseases (3.27), plant nutrient management (3.09), nursery management (3.09), seed rate (3.07), water management (3.07), transplanting (3.05), preventive advisories (3.03) and harvesting (2.89).

2. Institutional Support

In CCKN-IA project villages, the network of institutions has been established with scientists of KVK, State Agricultural Universities and Extension functionaries very strongly. The field level problems are accessed by the extension functionary with the help of Field Agents at the village level and reported to the KVK scientists for the advisory on field problems. The advisory content is generated by KVK scientists and validated by SAU scientists. The validated advisories are disseminated to the farmers.

The farmers of project villages and control villages were required to give their responses on their access to institutional support for climate adaptive advisories on a five-point continuum ranging from ‘Very high’ access to ‘Very Low’ access [Very High denoting 5, High is 4, Medium is 3, Low is 2 and Very Low indicating 1]. CCKN -IA, Extension Agents, Self Help Groups (SHGs)/ Farmer Producer Organizations (FPOs), Financial support, Market information, Weather information, Crop/ Animal Insurance are the types of institutional support on which the data was enumerated as part of the field survey. The data in Table 5 below shows the impact of CCKN on the access to institutional support and services.

Table 5. Impact of CCKN on the Access to Institutional Support and Services

Institutional Support and Services	Control / Project	States (maximum possible score =5)			
		Jharkhand	Maharashtra	Odisha	Total
		Mean	Mean	Mean	Mean
CCKN IA	Project	4.22	3.56	3.69	3.84
	Control	1.38	1.27	1.24	1.3
Extension Agents	Project	3.05	3.93	3.41	3.43
	Control	2.95	2.47	3.06	2.85
SHG/ FPO	Project	2.67	3.15	2.7	2.81
	Control	2.29	1.53	1.76	1.91
Financial Support	Project	2.7	2.52	2.45	2.56
	Control	2.29	1.27	1.76	1.83
Market Information	Project	3.09	3.31	2.43	2.91
	Control	2.48	1.53	2.12	2.09
Weather Information	Project	3.09	3.72	2.69	3.12
	Control	2.48	1.8	1.65	2.02
Crop/ Animal Insurance	Project	2.4	3.26	2.33	2.61
	Control	2.29	1.87	1.88	2.04

The data show that the farmers of project villages in all the three states namely Jharkhand, Maharashtra and Odisha have reported a higher access to institutional support and services than that of control villages.

The mean advisory access score for different aspects of institutional support ranged from 2.56 to 3.84 (out of a maximum score of 5.00) in case of project villages of three states pooled together and the range was 1.3 to 2.85 in case of control villages.

Futuristic Perspective – Replication

The study result shows that the project benefits would sustain moderately given that the climate adaptive practices recommended by the project are profitable to the beneficiary farmers. The study also shows that the adoption of advisory services by farmers in the CCKN-IA project was high. When farmers experienced significant yield improvement, it is likely that they would adapt the farm management practices in a continuous manner and also refer to fellow farmers in their vicinity. Hence, it can be inferred that the sustainability of the project depends on the commercial performance of the climate adaptive practices disseminated at the farm level.

It is important to look at the project benefits if the same concept is replicated in similar geographies. The CCKN-IA project can be upscaled based on its successful implementation in the selected blocks of the three states. One of the crucial assumptions is that the NICE portal developed under the CCKN-IA project would continue to anchor the knowledge dissemination activity in the newly replicated locations also. If the project is to be replicated in similar geographies across the country, estimated cost at the block level is shown in Table 6.

Table 6. Estimated Costs for replication in a block (1) – CCKN IA

Component	Indicative Budget for a block- Recurring costs per annum (Rs)
Salaries of Project Staff (A)	
Engagement of Extension Officer at the block level @ Rs. 15,000 per month	180000.00
Engagement of village level extension officers at the village level (5 officers @ Rs. 8,000 per month)	480000.00
Engagement of KVK resources for preparation of climate adaptive advisories (consolidated)	50000.00
Travel and Related costs (B)	
Travel costs @ Rs. 3,000 per month for Block level officer	36000.00
Travel costs (for 5 officers @ Rs. 2,000 per month) for village level extension officer	120000.00
Communication costs (C)	
Cost of Tablets (6 Nos @ Rs. 7000 per device)	42000.00
Mobile allowance along with data packs for 6 people (@ Rs. 300 per month)	21600.00

Component	Indicative Budget for a block- Recurring costs per annum (Rs)
Other operational expenses (D)	
Farmer meetings	20000.00
Exposure Visits	20000.00
Grand Total (A+B+C+D)	969600.00

Based on the assumptions from the field, the total estimated cost of replication of the project (operational cost) in similar blocks is Rs. 9.69 lakhs (Table 6). However, to keep the costs nominal, the existing resources of the public extension systems in the States could be leveraged. The project could only absorb the costs towards travel, communication and promotional expenditure including farmer meetings and exposure visits. Accordingly, the total estimated cost of replication is Rs. 2.59 lakhs per block, as detailed in Table 7.

Table 7. Estimated costs for replication in a block (2) – CCKN IA (using existing resources of the public extension systems in the States)

Component	Indicative Budget for a block- Recurring costs per annum (Rs)
Travel and Related costs (A)	
Travel costs @ Rs. 3,000 per month for Block level officer	36,000.00
Travel costs (for 5 officers @ Rs. 2,000 per month) for village level extension officer	120,000.00
Communication costs (B)	
Cost of Tablets (6 Nos @ Rs. 7000 per device)	42,000.00
Mobile allowance along with data packs for 6 people (@ Rs. 300 per month)	21,600.00
Other operational expenses (C)	
Farmer meetings	20,000.00
Exposure Visits	20,000.00
Grand Total (A+B+C)	259,600.00

Limitations of the Study

The impact study on Climate Change Knowledge Network in Indian Agriculture (CCKN-IA) has certain limitations; 1. As the implementation of CCKN-IA project in the selected pilot blocks was completed, the personnel associated at the project locations were moved out of the project activities. The availability of detailed

information was limited. 2. Quantification of impact on yield and returns was not simple as the respondents were reluctant. 3. In certain cases, especially in responding to questions on crop yields, gross returns and net returns, it has been observed that there is a general tendency to under report.

Conclusion

The overall picture regarding access to climate change advisories on crop cultivation shows that the CCKN project has resulted in increased diffusion of climate change advisories among the farmers of the project area as compared to farmers of control villages who had significantly lower level of access. Thus, it can be concluded that the extension efforts of CCKN project have a significant impact on diffusion of climate change advisories on crop cultivation among the farmers of the project area. The results of institutional support and services of CCKN IA project interventions show that the project farmers had increased access to the support and services that led to dissemination of knowledge on climate change. It can be inferred that the functioning of these support systems and services were more effective in case of project villages as compared to the control villages.

Given that the project farmers had distinctly benefitted from the project interventions as compared to the control farmers and climate adaptation is a continuous process, it is strongly suggested that the project efforts are sustained and scaled up across the three states namely Jharkhand, Maharashtra and Odisha for realizing long term benefits. In order to realize benefits at an aggregate level, replication can be undertaken across similar regions and geographies where the climate change adaptation is essential and challenging. Priority programs by the agriculture departments of states can draw synergies with the project architecture in general and NICE portal in particular, suitably.

References

- Balaji, V., Ganapuram, S., &Devakumar, C. (2015). Communication and capacity building to advance adaptation strategies in agriculture in the context of climate change in India. *Decision*, 42(2), 147158.
- Khatri-Chhetri, A., Aggarwal, P. K., Joshi, P. K., & Vyas, S. (2017). Farmers' prioritization of climatesmart agriculture (CSA) technologies. *Agricultural Systems*, 151, 184-191

<http://nicessm.org>

<https://www.gopa.de/en/projects/climate-change-knowledge-network-indian-agriculture-cckn-ia>

Push and Pull Factors underlying Agri Enterprise Development in Andhra Pradesh

V Deepthi¹, P Rambabu² and T Gopikrishna³

Abstract

The study endeavored to identify the factors which motivated or compelled agripreneurs to establish business enterprises. To this end, 240 agripreneurs comprising both male and female processors, manufacturers, and traders from Chitoor, Krishna and Visakhapatnam districts of Andhra Pradesh were interviewed personally using a pretested interview schedule. The statistics employed for data analysis were Henry Garrett's ranking method. The findings revealed unemployment at rank I, followed by availability of raw material and marketing facilities for the product, insufficient family income and dissatisfaction with salaried job etc. as the push factors. The ability to use previous experience at rank I, followed by family business tradition, desire to be independent and earning more income etc. were identified as the pull factors.

Key words: pull factors, push factors, agrienterprise development

Introduction

Agripreneurs are a new breed of entrepreneurs combining their love of farming and agriculture with business. The factors contributing to the development of entrepreneurship in agriculture can be broadly divided into 'pull' and 'push' factors (Turner 1993; Epstein 1993). Pull factors include all those reasons that emphasize entrepreneurship as a positive and desirable alternative that pull the entrepreneurs to their choice. The pull or ambitious factors motivate the entrepreneurs to initiate the ventures. It is needless to say that ambitions differ among individuals on the basis of their personal characteristics. The ambitious factors do not always influence an individual to undertake an activity. Sometimes other factors compel or push one to take the initiative to start a business. The factors which force people to start business enterprises are termed as push or compelling factors. It is very difficult to draw

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a dividing line between entrepreneurs' pull(ambitions) and push (compulsions). What seems to be an ambition for one entrepreneur may be a compulsion for another. Various push and pull factors that can motivate agripreneurs to start their own business as perceived and reported by the agripreneurs are presented in the Tables 1 to 2.1.

In this context, a study was planned with the following specific objective:

1. To study the pull and push factors underlying agri enterprise development in Andhra Pradesh.

Material and Methods

The study was conducted using ex-post facto research design. The state of Andhra Pradesh was selected for an indepth study through personal observation and interview. One district was selected from each region of Andhra Pradesh based on highest number of agro based enterprises i.e. Visakhapatnam from north coastal, Chitoor from Rayalaseema and Krishna from southern region of Andhra Pradesh. From each of the selected districts, 80 agripreneurs were selected using proportionate random sampling. Thus a total of 240 agripreneurs were included in the study. The primary data were collected through personal interview using a pre-tested structured interview schedule. Data was tabulated, classified and analyzed using Henry Garrett's ranking technique. Under this percentage position is calculated by using the following formula:

$$\text{Percentage Position} = 100 (R_{ij} - 0.5) / N_j$$

Where R_i = Rank given for i^{th} factor by j^{th} respondent.

$$N_j = \text{Total Number of factors ranked}$$

Results and Discussion

The nature of the push and pull factors underlying agri enterprise development as perceived by the Agripreneurs, and their ranking position of push & pull factors are measured based on Henry Garrett ranking method.

Push Factors

It is clearly depicted from Table 1 and Table 1.1 that there are various push factors which induce the agripreneurs to start their own business. Among them, the prime factor expressed by the majority of agripreneurs was unemployment which was

assigned rank I. The probable reason might be the rise in unemployment rate which is the result of increasing proportion of educated individuals seeking paid work. Thus, the rising unemployment has pushed a growing number of people into creating their own jobs through setting up their own business. Availability of raw material and marketing facilities for the product was rank II *i.e.*, surplus availability of raw material and good market demand for the product helps in setting up the business. This was followed by insufficient family income at rank III *i.e.* economic necessity of the family pushing to start a business, dissatisfaction with salaried job (IV rank) *i.e.* due to their dissatisfaction with earlier occupations they were compelled to undertake their present business.

The need for flexible work schedule was at rank V, *i.e.* to balance their work and family obligations, to maintain personal freedom (rank VI), *i.e.* setting up their own business for gaining more flexibility in their personal life, lack of proper education to get the job (rank VII) *i.e.* agripreneurs' educational qualifications were not enough to have gainful private or public jobs and hence they were consequently, compelled to commence a business, family hardship or pressure (rank VIII) *i.e.*, family related reasons compelled to start business, staying closer to family was ranked IX *i.e.*, most of the salaried jobs are away from the family but in case of self-employment, business is closer to the family.

The results are in accordance with the findings of Carter and Silva (2010) and Serazul (2012).

Distribution of Agripreneurs according to their push factors

Table1. Percentage Positions and their corresponding Garrett's Table Values

Rank	Percentage positions	Garrett's table value
1	5.56	81
2	16.67	69
3	27.78	62
4	38.89	56
5	50.00	50
6	61.11	45
7	72.22	38
8	83.33	31
9	94.44	19

Table 1.1 Ranking position of each Push Factor according to corresponding Garrets Table values

S. No.	Factor	Rank									No. of Agripreneurs	Total Score	Mean Score	Rank
		1	2	3	4	5	6	7	8	9				
1	Lack of proper education to get the job	1	4	5	2	50	60	1	32	85	240	8624	35.93	7
2	Dissatisfaction with salaried job	20	45	30	75	50	14	4	1	1	240	14117	58.82	4
3	To stay closer to family	1	2	4	3	9	4	67	86	64	240	7693	32.05	9
4	Insufficient family income	60	25	85	42	10	3	10	4	1	240	15365	64.02	3
5	Unemployment	90	60	35	22	13	11	6	2	1	240	16286	67.86	1
6	To maintain personal freedom	2	1	4	6	11	96	80	30	10	240	9845	41.02	6
7	Need for flexible work schedule	10	20	15	38	75	42	32	5	3	240	12316	51.32	5
8	Family hardship or pressure	5	3	2	7	18	10	40	80	75	240	7903	32.93	8
9	Availability of raw material and marketing facilities for the product	51	80	60	45	4	0	0	0	0	240	16091	67.05	2

Pull Factors

It is clearly depicted from Table 2 and 2.1 that there are various pull factors which induce the agripreneurs to start their own business. These are, to be able to use previous experience that was assigned rank I. The probable reason might be that, business experience provides confidence to the entrepreneur which helps to reduce the element of uncertainty regarding demand for the product, technology, raw material, etc. This was followed by family business tradition (rank II) *i.e.*, the business activity transferred from generation to generation within the family, desire to be independent was ranked III *i.e.*, agripreneurs want to be their own boss and feel in control of their own destiny. Independence is a strong driver for people who want to set up their own businesses and pursue their dreams. Earning more income (IV rank) *i.e.* earning more money for the family by doing business with freedom to undertake risky ventures was found to be important in

the minds of most of the agripreneurs. To fulfill own ambition in the interested field/job (rank V) *i.e.*, interest in the specific area leads to job satisfaction this inturn being linked to productivity, motivation, absenteeism/tardiness, mental/physical health, and general life satisfaction, to ensure job security (rank VI) *i.e.*, self-employment in business provides greater job assurance that helps to work in your own job as long as you want. Educational background was at rank VII *i.e.*, most of the technically qualified persons had established enterprises in the fields of their specialization which shows that such agripreneurs were prompted by their qualification or specialization to undertake the business activity. Influence of family, friends and business partners was ranked VIII *i.e.*, encouragement of family members, friends, and relatives, etc. serve as facilitating factors for starting the business. To get social recognition was at rank IX, to contribute to the welfare of the community was at rank X -, agripreneurs create employment for a large number of people. Assistance from government and financial institutions was ranked XI *i.e.*, favorable government policy for business and financial institutions provides loan to the business without which the agripreneurs cannot solve their financial problems.

The results are in accordance with the findings of Amarendrapratap (2013).

Distribution of Agripreneurs according to their Pull Factors

Table 2. Percentage Positions and their corresponding Garrett's Table Values

Rank	Percentage Positions	Garrett's Table Value
1	4.55	83
2	13.63	72
3	22.72	65
4	31.81	60
5	40.90	55
6	50.00	50
7	59.09	45
8	68.18	41
9	77.27	35
10	86.36	28
11	95.45	17

Table 2.1 Shows the ranking position of Pull Factors according to corresponding Garrets Table values

S No.	Factor	Rank											Agri-preneurs	Total Score	Mean Score	Rank
		1	2	3	4	5	6	7	8	9	10	11				
1	Influence of family and friends	29	23	21	16	14	18	20	76	11	4	8	240	12707	52.94	8
2	Earning more income	30	39	21	90	16	9	5	8	7	6	9	240	14512	60.46	4
3	Family business tradition	51	80	52	45	4	8	0	0	0	0	0	240	16693	69.55	2
4	Educational background	32	21	25	26	12	13	78	17	6	7	3	240	13489	56.20	7
5	To get social recognition	21	24	30	19	21	17	15	14	74	5	0	240	12545	52.27	9
6	To ensure job security	26	32	25	25	16	82	10	6	6	7	5	240	13754	57.30	6
7	To be able to use previous work experience	90	60	35	22	13	11	6	2	1	0	0	240	17037	70.98	1
8	To fulfill own ambition on interested field/job	34	21	38	19	86	12	14	4	6	3	3	240	14413	60.05	5
9	Assistance from government and financial institution	20	34	15	17	16	19	8	9	10	73	19	240	11379	47.41	11
10	Desire to be independent	55	25	85	42	10	3	8	2	3	5	2	240	15831	65.96	3
11	To contribute to the welfare of the community	34	36	22	16	18	8	9	7	11	9	70	240	11713	48.80	10

Conclusion

The main objective of the study was to identify the factors that motivated and/or compelled the entrepreneurs to take risky ventures. The findings of the study help to conclude that entrepreneurship development in agriculture is influenced by different factors including the entrepreneurs' personal traits, socio-economic conditions, etc. However ability to use previous experience, followed by family business tradition were identified as the important pull factors, while unemployment, followed by availability of raw material and marketing facilities

for the product were identified as the important push factors. Though it is very difficult to distinguish between pull and push factors, it can, however, from the preceding findings and analysis, be concluded that entrepreneurs' psychological characteristics and socio-economic conditions played a motivational role for them to undertake risky ventures.

References

- Amarendrapratap, M. (2013). Factors influencing entrepreneurship among farming community in Uttar Pradesh. *Journal of Arts, Science and Commerce*. 4 (3): 114-121.
- Epstein, C. (1993). Female petty entrepreneurs and their multiple roles. In S, Allen and C, Truman (Eds.), *Women in business: Perspectives on women entrepreneurs*. London and New York: Routledge.
- Carter, N.M and Silva, L. (2010). Women in management: Delusions of progress. *Harvard Business Review*. 24 July 2010. <http://www.hbr.org>.
- Serazul, I. (2012). Pull and push factors towards small entrepreneurship development in Bangladesh. *Journal of Research in International Business Management*. 2(3): 65-72.
- Turner, C. (1993). Women's businesses in Europe: EEC initiatives. In S, Allen and C, Truman (Eds.), *Women in business: Perspectives on women entrepreneurs*. London and New York: Routledge.

Women Empowerment through Food Processing - a Case Study

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Abstract

A sample of 25 women respondents involved in food processing activities was selected proportionately to study the socio-economic profile before and after the start of an enterprise. The study revealed that 64 per cent of the women food processors had improved their standard of living followed by better saving (60%) and knowledge and attitude (52%). Some of these women trainees have emerged as successful entrepreneurs in food processing and their success stories are further reported in the study. The key issues for development of entrepreneurship in food processing were also identified through a structured schedule by personal interview with the respondents. Further, the identified issues were analysed and their mitigation strategies were also discussed. Mutually beneficial relationship between a processor and producer can solve the problem of poor quality raw material. Cost of production can be reduced by mechanization and economic size of production say the authors.

Key words: women, food processing, key issues, success stories

Introduction

Growth of the food processing sector will lead to employment opportunities, raising agricultural yields, increased productivity and enhanced standard of living of people across the country, especially for those who are in rural areas. India is the second largest producer of food after China in the world and has the potential to become a leader. It can play a vital role in diversification and commercialization, ensure value addition, enhance shelf life of the agriculture produce, create a market for export of processed food, generate employment, enhance income of farmers and overall development of rural areas. There are many opportunities for entrepreneurship in food processing.

Empowerment of women means to have the necessary ability to undertake a number of tasks either individually or in groups, so that they have further access to

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and control of society resources. The World Bank has suggested that empowerment of women should be a key aspect of all social development programmes (Sridhar et al 2013).

Concept of Krishi Vigyan Kendra

It is an innovative institution providing for (i) effective linkage among researchers, farmers and extension workers (ii) practical approach to training through “Learning by doing” (iii) flexible syllabi based on survey and needs of farmers and location specific requirements. By the year 2011, there were 600 KVKs sanctioned under the administrative control of ICAR institutions, State Agricultural Universities and voluntary organizations (NGOs). It is now a policy of the government to establish more KVKs to fulfill the target of two KVKs in each district in Agriculture, Horticulture and Animal Husbandry. A Krishi Vigyan Kendra is a grass root level village institute for transfer of technology, conducting various programs for socio-economic upliftment of farm women i.e. trainings, demonstrations etc. Keeping the above aspects in consideration, this study was carried out with the following objectives.

- To study the socio economic profile of the rural women before and after the start of enterprise.
- To document success stories of women entrepreneurs in food processing.
- To identify the key issues and mitigation strategies for development of women entrepreneurship in food processing

Materials and Methods

The Krishi Vigyan Kendra, Patiala of Punjab State had conducted vocational training courses on food processing for farm women continuously from 2013 to 2016. From the 76 participants of these trainings, a sample of 25 women respondents, those involved in food processing activities commercially, was selected to study the socio-economic profile before and after the start of enterprise. A Proforma was developed comprising general information, background of participants such as their age, education, caste, family size and type of activity etc. Krishi Vigyan Kendra, Patiala with its continuous efforts has succeeded in developing some entrepreneurship in food processing. Success stories of some of these women trainees are discussed.

The key issues for development of entrepreneurship in food processing were also identified through a structured schedule by personally interviewing the respondents. Further, the identified issues were analysed and their mitigation strategies were also discussed.

Results and Discussion

The results of the study are presented under the following major heads:

Socio-Economic Profile

Majority of farm women were within the age group of 26-45 years (56%) and illiterate (76%). Most of them were from SC/ST class (44%) and were living in a small family. Their mode of operation was individual (80%)(Table 1).

Table 1. Socio-Economic Profile of the Respondents (n= 25)

S. No.	Variables	Frequency	Percentage
1.	Age		
	Young (up to 25)	8	32
	Middle (25-45)	14	56
	Old (above 45)	3	12
2.	Education		
	Illiterate	19	76
	Primary	3	12
	Middle	2	8
	Matriculate	1	4
	Higher secondary	-	-
	Graduation and above	-	-
3.	Caste		
	SC/ST	11	44
	OBC	9	36
	General	5	20
4.	Family size		
	Small	13	52
	Medium	8	32
	Large	4	16
5.	Mode of operation		
	Group (SHG)	5	20
	Individual	20	80

Impact on Socio-Economic Condition of the Respondents after the Enterprise

The impact studies on socio-economic status of respondents showed that 72 per cent of the women food processors had improved their standard of living followed by increase in saving (60%), knowledge and favorable attitude (52%). Improvement in social status was recorded the least (24%).

Table 2. Impact Assessment of Food Processing Enterprise on the Socio-Economic Condition of the Respondents

Parameters	Frequency	Percentage	Rank
Improvement in standard of living	16	64	I
Better saving	15	60	II
Improvement in knowledge & attitude	13	52	III
Better food, clothing and shelter	13	52	III
Creation of employment	8	32	IV
Improvement in social status	6	24	V

Success Stories in Food Processing

Smt. Gurdeep Kaur

Smt. Gurdeep Kaur is a 50 year old lady who lives in village Alhoran Kalan, Block Nabha, district Patiala. A humble, God-fearing lady Smt. Gurdeep Kaur has hardly attended school. She is an introvert, mostly homebound with her two daughters and a son. But she was desperate to become self-dependent and educate her daughters. Neither illiteracy nor domestic problems could stop her from making her way to success. After discussion with KVK scientists, it was decided to train her in processing and preservation of fruits and vegetables. First step being learning, she attended various short duration and vocational training courses at KVK Patiala. Over the years, she learned about new products, improved preservation methods and know-how about commercial level processing. She not only learned to express herself at public gatherings but her confidence level also improved through regular interactions with scientists and other trainees. She was also guided in purchase of raw materials, source of equipment, packaging and labelling of products etc. She is regularly preparing different squashes, jams and pickles from seasonal and locally available fruits and vegetables. She established a soy processing plant in 2010 in which soy milk, tofu, soy atta and soy nuts were produced and sold under the brand name of "Protein Shakti". Later her family realized her efforts

and her husband Shri. S. Chamkaur Singh too joined her in this venture. Her unit is registered under FSSAI (Food Safety & Standards Act of India). A sales outlet named “ATMA KISAN HUT” has also been provided to her by the Department of Agriculture at Nabha town, district Patiala which has substantially improved the daily sale of her products. She has successfully prepared natural vinegar from sugarcane and grapes. She has also adopted mushroom cultivation in which her whole family is involved. She earns approximately Rs. 80,000/- per season from cultivation of dhangri and button mushroom. She received “Best Entrepreneur Award” during PAU Kisan Mela in the year 2011. The Government of Punjab has conferred her with “State Award” on 26th January 2013 on the eve of Republic day. She has also delivered many radio talks and is invited as a resource person on several occasions.

Smt. Dhanwanti Devi

Smt. Dhanwantidevi is a 52 year old lady from village Inderpura, Patiala, Punjab. She has formed a Self Help Group named “Kashish SHG”. Her group members are daily wagers so she had to work hard to convince them to form a group. With the help of KVK scientists, she opened a bank account in the name of the group and started food processing activities. She attended a training programme at KVK Patiala way back in 2012, where she got an opportunity to interact with KVK scientists. She expressed her desire to do something fruitful so that she could add to her family income. After gaining the expertise, she prepared bael squash on a commercial scale, as this fruit was underutilized and locally available. Now, she is regularly preparing various squashes, jams and pickles from seasonal and locally available fruits and vegetables. The next step towards her success was marketing of the products. This was taken up by the KVK scientists by providing her sale platforms during regional and State level Kisan Melas organized by PAU, Ludhiana. She got a good response from consumers which increased her confidence. She further widened her basket of products by adding tomato and mango chutneys, moong and mash daalbadis, rice papad, ready to serve beverages (RTS) and hand-made sevian(vermicelli) etc. The regional Kisan Melas held at KVK Patiala earned recognition to her in the area. Now, people have started approaching her directly for purchasing the products. Initially, the average monthly earning was very meagre, approximately Rs. 3000/- per month but her aspirations were high. For Smt. Dhanwanti Devi, learning is a continuous

process. She regularly participated in various Kisan Melas and public gatherings organised by PAU, ATMA, Dept. of Horticulture, NGOs and KVIC etc. Krishi Vigyan Kendra, Patiala also provided her support from NABARD for attending SARAS fairs at Patiala and CII fairs at Chandigarh. Smt. Dhanwanti Devi is a regular participant in various exhibitions and competitions organized by PAU, Ludhiana where she has received many prizes for her quality products. She has received “Best Entrepreneur Award” during PAU Kisan Mela in the year 2015. She has also delivered many radio talks and is invited as a resource person on several occasions.

Key issues and their Mitigation Strategies in Food Processing Entrepreneurship

Traditions in rural areas do not prevent women from engaging with men, working side by side in agricultural activities. However, gender inequality does exist in the social order. Women lack inclusion in decision making. Men tend to dominate the decisions. These social constraints have an impact on the enterprise. Furthermore, women do have domestic responsibilities, in addition to their work in the enterprise.

Rural women entrepreneurs of KVK, Patiala faced many difficulties in marketing their products. They faced difficulty in establishing linkage to the market in cities. Innovation and knowledge on product development, design and quality were not taken into account. Difficulties in getting the business license/registration of food processing units were also crucial bottlenecks for the respondents.

Table 3. Key issues and their Mitigation Strategies in Food Processing Entrepreneurship

Issues	Mitigation Strategies
Poor Quality of Raw Materials	Mutually beneficial relationship between processor and producer can improve the situation
Lack of technical know-how	Communication should be effective between extension/research/academic institutions and rural entrepreneurs
Inability to compete with urban-based industries	Communication of modern technologies & marketing knowledge through seminars and exhibitions.
Cost of Production	Can be reduced by mechanization and economic size of production
Difficulty in borrowing fund	To provide credit facilities on time, there is a need to strengthen the network of the financial institutions.
Designing of Package/Labeling	Knowledge support from institutions regarding labeling and food laws for packaging.

Issues	Mitigation Strategies
Marketing	Direct selling. International trade fairs. Exhibitions. Strengthening linkages between producer, processor and consumer.
Multiple responsibility of entrepreneurs	Delegation of authorities
Lack of Specialized skills among the entrepreneurs	Entrepreneurship Development Programme. Knowledge support from institutions
Long and complicated procedures to avail institutional help	Elimination of unnecessary formalities
Post-harvest losses	Post- harvest facilities. Establishment of semi processing unit in major production area.

Training and education is an important aspect that needs to be addressed to cope up with the problems faced in food processing sector (Awasthi,2011).According to a study conducted by (Shehrawat, 2006), entrepreneurs are encountering a number of constraints in running their food processing units related to technology, marketing, export and finance. The study covered four industrial districts of Haryana State to determine the specific training needs of entrepreneurs, problems encountered by entrepreneurs in setting up of units and challenges in agro processing. Two main challenges that the entrepreneurs face are innovation and opportunity challenges (Shahidi and Smagulova, 2008).

Conclusion

Indian food processing is a growing industry and presents a large opportunity to the entrepreneurs for the development of rural areas. However there are many challenges for women entrepreneurship in food processing. The study indicated that lack of government support, quality and quantity of raw material, seasonality, inadequate infrastructure,access to latest technology, poor access to credit, lack of trained manpower, inadequate training practices, post - harvest losses and cost of production are serious challenges for women entrepreneurship in food processing which are affecting rural development. To overcome these challenges,Government need to adequately address and take necessary steps for development of women entrepreneurs in food processing like training programmes, favorable policies, favorable initiatives/schemes, financial support, infrastructure development in rural areas etc. There should be product development incubation centres for potential women entrepreneurs in food processing in every local government area.

References

- Awasthi, D. (2011). Approaches to Entrepreneurship Development: The Indian Experience. *Journal of Global Entrepreneurship Research*, 1 (1), 107-124.
- Shahidi, M. and Smagulova, A. (2008). The Challenges of Entrepreneurship in Dynamic society, *Central Asia Business*, 1 (1), 34-45.
- Shehrawat, P. S. (2006). Agro Processing Industries-A Challenging Entrepreneurship For Rural Development, *The International Indigenous Journal of Entrepreneurship, Advancement, Strategy and Education*.
- Sridhar, G., Srihari Rao, B., Malleswara Rao S.S.N and Patil D.V. (2013). Empowering rural community with improvement in knowledge level and livelihood through KVKs: Impact and cases. *Int. J. Scientific Engineering and Research*, 2(1): 13-20.