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CONTENT

Transfer of Early Maturing Sorghum Technologies through Participatory Evaluation in Eastern Amhara Region of Ethiopia

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Abstract

The low or non-adoption of improved agricultural technologies might be resulted from inadequate participation of farmers at all stages of the process of benefiting farmers. The current study was conducted in the representative sorghum producing areas of Wollo with the objective of assessing farmers' preference towards improved sorghum varieties and providing a menu of sorghum technologies. Both inferential and descriptive statistics was used to analyze the data. Farmers' perception was assessed using preference ranking and narration. Moreover, Agricultural events such as field days and experience sharing were prepared to capture farmers' perception about the technologies. GenStat v.18th was used to analyze the data. Analysis of variance was employed to test the mean difference of yield among varieties. The result of ANOVA showed that improved sorghum varieties Dekeba and ESH1 gave the highest grain yield at respective sites. In kalu and Dawa chefa, farmers preferred Argiti whereas in Raya Kobo, Melkam was the variety preferred by the farmers. From the analysis of Spearman's rank correlation, there was evidence on coincidence of farmers' preference and the actual data. Therefore, the analysis of farmers' preference and yield data jointly confirm that improved varieties Melkam and Argiti can be promoted in the respective districts of the study area.

Introduction

In Ethiopia, agriculture contributes about 42 percent of the GDP, serves about 85 percent of the labor force. About 90 percent of the total export earnings of the country is emanated

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from this sector. The sector is dominated by over 15 million smallholders producing about 95 percent of the national agricultural production (CSA, 2017). Of the total grain crops produced, cereals play a significant role both in terms of land coverage and production (81.39%) for small holder farmers (CSA, 2018).

Sorghum and millets are the most important cereal crops for food security in semi-arid and arid areas of the world due to their high nutritional quality, tolerance to stresses (abiotic and biotic) and their performance in marginal lands with relatively low fertility. (Prasad and Scott, 2009). In this regard, the eastern Amhara area of Ethiopia is characterized by erratic and erosive rainfall.

In Ethiopia, sorghum is cultivated in all regions (14 of the 18 major agro-ecologies) with an altitude between 400m and 2500m (MOA, 1998). From the total cereal production in the country, sorghum took the largest share (14.38%). Nationally, the three regions, Oromiya, Amhara and Tigray are the major producers of sorghum in the last five years (CSA, 2014-2018). More specifically, from the top sorghum producing zones of Ethiopia three of them are found in Amhara region i.e. North Wollo, South Wollo and North Gondar (CSA, 2014). Therefore, Sorghum is one of the focus areas of research and development in Eastern Amhara especially in the lowlands of Wollo. Developing improved sorghum technologies has to be the major solution for the actors involving in the development and research agenda in the area.

Sorghum is one of the focus areas of research for Sirinka Agricultural Research Center. Due to this, the center has devoted to improve the productivity of sorghum in its mandate areas of Wollo. Despite the efforts both by national and regional research centers, the national average productivity of sorghum in Ethiopia is still 2.23 tons/ha (CSA, 2014) which is far below the global average of 3.2 tons/ha (FAO, 2005). This can be resulted from various factors related to bio physical or socioeconomic variables. Of many others, the yield gap might be resulted from the low or non-adoption of improved sorghum technologies. Likewise, the non-adoption of improved technologies is resulted from the deficiency or inadequate participation of farmers in all stages of technology development and promotion (Puskur et al., 2008). Hence developing and evaluating nationally and regionally released sorghum varieties with the participatory approach can contribute a lot in reducing the yield gaps in the area. Therefore, the current study was conducted with the following objectives.

Objectives

*   To provide farmers a menu of improved sorghum technologies

*   To assess farmers and development agents perception towards improved sorghum technologies

*   To enhance participation of farmers in sorghum technology evaluation

Materials and Methods

Description of the study area

This study was conducted in the sorghum producing areas of Wollo i.e. Raya kobo, Kalu and Dawa chefa districts of Eastern Amhara Region. The detailed description of the areas is indicated in Table 1.

Table 1. Study Area Description

	Woredas	Latitude	Longitude	Elevation (masl)
1.	Kobo	12° 08' 60.00" N	39° 37' 59.99" E	1468 m
2.	Kalu	11° 00' 0.00" N	39° 49' 59.99" E	1492m
3.	Dawa chefa	10° 55' 00" N	39° 47' 00" E	1424 m

Source: (District office of Agriculture, 2019)

Figure 1. Location map of the study area

Source: Ethio GIS shape file

Site Selection and Experimental Design

For this participatory technology evaluation, sites and farmers were selected in collaboration with each woreda and kebele office of agriculture. During site selection, interest of farmers and proximity to the main road were considered as the criteria. Prior to the implementation, trainings/orientations were given for experts and development agents regarding the specific activities to be carried out in the field. Both FTCs and farmers' fields were used to conduct the activity. The number of FTCs in each woreda was determined based on their potential and functionality. Based on accessibility, the total area allocated for all treatments ranges from 400-1600m2. The variation of plot sizes across the sites was emanated from the scarcity and fragmentation nature of the land in the study areas. Four improved sorghum varieties were evaluated using the participatory method. Agronomic practices were employed based on the recommendation. NPS fertilizer was applied once while Urea was applied in split application of 50% at planting and 50% at knee height. Weeding and other crop protection measures were conducted by farmers with close supervision with development agents and researchers. Thinning was done at knee height to control weed and improve soil water holding condition.

Data Collection

Data were collected through the formats prepared for this purpose. Both agronomic and perception data were collected for achieving the objectives stated above. Field observation and group discussion were held to gather the required data in the field.

Data Analysis

Both inferential and descriptive statistics was used to analyze the data. Mean comparison of yield data were analyzed using Genstat software version 18th. On the other hand preference ranking was used to analyze perception of farmers towards sorghum varieties. Ranking was used to identify the best varieties preferred by farmers using the following procedure.

*   Identifying selection criteria used to evaluate varieties

*   Prioritizing selection criteria using pairwise ranking (Russell, 1997)

*   Ranking each variety using the criterion identified

*   Determining final acceptability rank

Spearman's rank correlation coefficient was determined to see if the actual rank of varieties coincides with those of the farmers' preference rank (Hwang, 2018).

Results and Discussions

Performance of Sorghum Varieties Across Study Sites

Of many others, yield is one of the major parameter for a given crop variety which determines its acceptability by the farmers. In this study, Kalu and Dawa chefa were considered as one site as a replication. As shown below in Table 2, the highest yield (3.9 ton ha-1) was recorded by variety Dekeba in kalu and Dawa chefa districts and the mean difference is significant at 5% significance level. In Raya kobo, the highest yield was recorded from variety ESH1 (5.13 ton ha -1) and the difference is significant at less than 1% significance level. This result is in agreement with Ademe Mihretu et al. (2018) who reported the highest grain yield from ESH1 in Abergele district.

Table 2. ANOVA Test for Grain Yield Differences Among Varieties

Treatments	Kalu and Dawa chefa	Raya Kobo
	Grain yield ton^{-ha}	Grain yield ton^{-ha}
Dekeba	3.907 [a]	3.518 [b]
Argiti	3.630 [ab]	3.654 [b]
Melkam	3.300 [bc]	4.666 [a]
ESH1	2.973 [c]	5.138 [a]
Grand mean	3.452	4.24
CV (%)	3.2	8.7
p- value	0.003	<.001
LSD(0.05)	0.3504	0.569
SED	0.14	0.276

Source: (Own data, 2019)

Farmers' Perception Towards Sorghum Varieties Across Locations

Participation of farmers on farm-level technology testing can improve information feedback about the technologies and identify existing constraints (Ashby & Gracia, 1993). In this regard, farmers' participation in variety selection process has a paramount role to identify farmers' preferred traits in promoting sorghum varieties. For this study, a total of 153 participants were presented to evaluate sorghum varieties at farmers' fields and farmers training centers. The detailed description of participants in the evaluation process is depicted below in Table 3.

Table 3. Number of participants in evaluation sorghum varieties

		Raya Kobo	Kalu and Chefa
Farmers	Male	45	38
	Female	28	19
	Total	73	57
Development agents	Male	7	5
	Female	1	2
	Total	8	7
Researchers	Male	4	4
	Female	-	-
	Total	4	4
Total participant		85	68

Discussion was held with farmers to help them in identifying selection criterion. Accordingly the following criteria were identified with their own justification.

* Earliness: in areas where the rainfall distribution is very erratic and erosive cultivating early maturing varieties is one of the mitigation strategies which is identified by farmer.

*   Plant height: apart from grain yield, sorghum is the source of feed for animals and fuel

*   Seed size: used as a proxy measure for marketability

*   Productivity: farmers' were able to compare the varieties productivity through visual observation on the field

*   Compactness: birds unless protected timely, they can bring a significant damage on the yield of sorghum. Therefore the variety with compacted head can relatively tolerate from bird damage.

*   Seed color: the color of sorghum variety highly matters in determining its market price and demand. Usually white color is sorghum is preferred to mix with teff.

*   Marketability: Besides home consumption in different food stuffs, farmers have the experience to sell sorghum both as grain and seed. Hence, this criterion highly matters on the variety's preference.

The next step was to rank the criteria so as to easily prioritize each criterion for the selection process. Productivity, earliness and head compactness were found to be the top three priorities of sorghum variety selection by the farmers in Raya kobo (Table 4). Following the procedures, Melkam variety was preferred by farmers in Raya Kobo whereas in Dawa chefa and Kalu sites, variety Argiti was preferred by farmers. Detailed description of the ranking method is in the following tables (Table 4 - 6).

Table 4. Ranking Criteria for Farmer Preference at Raya Kobo

N	Criteria	Earliness	Plant height	Productivity	Seed size	Compactness	Seed color	Marketability	Total	Rank
1	Earliness	X	Earliness	Productivity	Earliness	Earliness	Earliness	Earliness	5	2
2	Plant height		X	Productivity	Seed size	Compactness	Plant height	Plant height	2	4
3	Productivity			X	Productivity	Productivity	Productivity	Productivity	6	1
4	Seed size				X	Compactness	Seed color	Marketability	1	5
5	Compactness					X	Compactness	Marketability	3	3
6	Seed color						X	Seed color	2	4
7	Marketability							X	2	4

Table 5. Final Acceptability Rank (Criteria Given for the Criterion Multiplied by the Ranks Given) at Kobo (82 Participants)

	Earliness (2)	Plant height (4)	Productivity (1)	Seed Size (5)	Compactness (3)	Seed color (4)	Marketability (4)	Total	Rank
Argity	6	4	3	15	3	12	12	55	3
Melkam	4	12	1	5	9	4	4	39	1
Dekeba	8	16	4	20	6	16	16	86	4
ESH1	2	8	2	10	12	8	8	50	2

Table 6. Final Acceptability Rank of Varieties at Kalu and Dawa Chefa

Variety	Earliness (2)	Plant height (4)	Productivity (1)	Seed size (5)	Seed color (2)	Compactness (3)	WLR (6)	Marketability (5)	Total	Rank
Argiti	6	4	1	5	2	3	6	5	32	1
Melkam	4	16	3	10	6	9	18	15	81	3
Dekeba	8	12	2	20	4	6	12	10	74	2
ESHI	2	8	4	15	8	12	24	20	93	4

*Where, WLR= water lodging resistance

Table 7. Coincidences of Farmers Rank and Actual Rank

	Varieties	Raya kobo		Kalu and Dawa Chefa	
		Farmers' rank	Actual rank	Farmers' rank	Actual rank
1	Argiti	3	3	1	2
2	Melkam	1	2	3	3
3	Dekeba	4	4	2	1
4	ESH 1	2	1	4	4
	Spearman's r		0.8		0.8

Field days and Participants Feedback

Agricultural events are the means for accelerating technology transfer for the beneficiaries in the farming system by creating the opportunity to share responsibilities in technology transfer and providing feedbacks in the process. Besides the field days, experience sharing was held in Oromia zone about utilizing Farmers' Training centers for technology demonstration. During field day farmers have forwarded their suggestion about the likes and dislikes of each variety (Table 8 below). At the end of the field day session stakeholders have reached agreement to share responsibility in promoting the selected sorghum varieties.

Table 8. Summary of Specific Feedbacks Given for Each Variety

Varieties	likes	dislikes
Argity	Head compactness, seed size, color, better stalk	Relatively late maturing
Dekeba	Head compactness, green stay	-
Melkam	Early maturing, uniform head	-
ESH1	Too early	Threshability problem

Figure 2. Field performance of varieties

Figure 3. FTCs Experience sharing at Kamisie, Amhara Region

Conclusion and the Way Forward

The study aimed at evaluating four sorghum varieties in three representative districts of Wollo i.e Kalu, Raya Kobo and Dawa chefa. Improved varieties, Melkam and ESH1 were found to be superior both in terms of grain yield and farmers' evaluation criteria at Raya kobo. In Dawa chefa and Kalu, Argiti variety showed better performance and got an acceptance by farmers. Moreover, there exists a strong association between farmer' evaluation result and the actual rank of varieties. Therefore, based on the yield performance and farmers' preference, Argiti and Melkam should be promoted in the respective areas.

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Zero-Grazing Practices and its Level of Adoption by the Livestock Owners of Ethiopia

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Abstract

This study attempted to assess the status of adoption of zerograzing in Tahtay Koraro, Medebay Zana and Asgede Tsibilaworedas of Tigray region, Ethiopia. The study was conducted in three districts of Medebayzana, TahtayKoraro and Asgede Tsimibla Districts of Tigray Region. Random sampling was used to select 117 sample respondents in six Tabias. The main method of data collection was interview with sample respondents to get firsthand information for the study. Additionally, key informants interview was also employed to supplement the data collected from the sample respondents. Descriptive statistics like mean, frequency and percentage were used to analyze the socioeconomic and institutional characteristics of the respondents. Likert scale used to analyze the perception of rural households towards zerograzing practice. The survey indicated that most of the respondents perceived that zerograzing has better performance in comparison with the remaining other economic subsectors. The findings have also shown that majority (72.6%) of respondents practice zerograzing while 27.4% respondents are non-adopters of zerograzing. This indicates that some of the respondents are still practicing free grazing practices in the study area because of zerograzing demands more inputs, the lack of timely and limited availability of the animal feed and feed resources. Therefore destocking of local animals and awareness creation to community about the importance and management aspects of communal grazing land is important to improve the adoption of zero-grazing practice.

Keywords: Zero-grazing, Communal grazing, Livestock raising, Ethiopa.

Introduction

Backgrounds and Justification of the Study

Agriculture is the dominant sector of Ethiopian economy, which contributing more than 40% of the GDP, 85% of the employment and 90% of the total export earnings (Diao, 2010). The livestock production is a major symbol of wealth in the country that is strongly respected by communal farmers, and it accounts for12% of the total GDP and 33% of the agricultural GDP (Solomon et al., 2003). However, the farming methods used by Ethiopian farmers are largely conventional which sometimes not sustainable in terms of environmental preservation (Tranos, 2012).

Communal grazing lands are important sources of livestock feed in the country as well as in the study area which result in overexploitation and degradation of the resource (Solomon et al., 2003; Benin and Pender, 2002). Free grazing system has a negative effect on the conservation efforts, as trampling animals often damage physical conservation structures such as stone terraces and soil bunds in Ethiopia including the study areas. Free grazing and overgrazing contributed significantly to the land degradation problem in the Ethiopian highlands, where grazing on hillsides and other fragile areas is widespread during the rainy season when other sources of feed like stubble grazing and crop residues are in short supply (Gebrehiwet, 2004; Benin and Pender, 2002). The pressure of growing population in the area has forced landless farmers to cultivate soils and graze their livestock on slopes which fosters depletion of communal resources (Tekalign, 2010).

In response of the land degradation, different rehabilitation measures have been launched by government and non-government organizations jointly in the country. Among those measures, continuous setting-aside of degraded land for natural regeneration called area enclosure has been practiced (Yayneshet, 2008). Similarly, a study by Gebreyohannes and Hailemariam (2011) indicate that zero-grazing in Hararghe is a common practice experienced by most farmers for a long time that feed their animals through tethering near crop lands and houses.

However, there are criticisms to adopt zero-grazing practice regarding the economic benefit of the environmental resources (Getseselassie, 2012). Gebreyohannes and Hailemariam (2011) reported this practice is not common in Tigray although efforts

were made to introduce zero (controlled) grazing starting from 2006. If this type of traditional practice is continuing, the ultimate outcome of over grazing and free grazing may lead to deforestation and degradation of these resources which can cause to desertification and will be the challenge to build sustainable agriculture.

In spite that Ethiopian government has outlined and implementing policies on zerograzing and communal grazing lands, free grazing is a major problem due to huge number of livestock. In addition, farmers set local bylaws but the practice and perception of zerograzing is poor. So, little has been done to characterize the practice and perception of farmers about zerograzing in Tigray region. To the extent of the researchers knowledge, no research is conducted about adoption of zero-grazing in the highlands and lowlands of Tigiray specifically in the study area. Constituting to this why the farmers in the AsgedeTsimbla District are not willing to adopt zero-grazing and what factors influence on adoption of zero-grazing are not studied.

Therefore, conducting a study on assessing on adoption of zero-grazing in Asegede Tsimblaworeda with comparative to TahetayKoraro and MedebayZana is important to forward the adoption enhancement of zero-grazing. Therefore, the researchers intend to examine and investigate the factors affecting adoption of zerograzing in the study area. The specific objectives of this study are: To identify farmers perceptions towards zerograzing in the study area; and To assess the status of adoption of zero-grazing in the study districts.

Methodology

Description of Study Area

Medebay Zana Woreda is in the North-Western administrative zone of Tigray region. That has 20 Kebeles (18 rural and 2 urban Kebeles). Its geographical location is in between 38º 20 E longitude and 14º 06 N latitudes. It is bordered with Mereb Leke and Laelay Adiaboworeda in the North, Asgede Tsimbilaworeda in the West, Tahtay Maichew and Naeder Adetworedas in the East and TahtayKoraroworeda in the West. Its area is approximately 1,055 Km^2 .The land use pattern of the Woreda shows that 27,271 hectare is cultivated land; 30,551 hectare is covered with forest and 47,714 hectare with bush and shrubs (MWOoARD, 2014). The Woreda has 138,775 (62,954 males and 75,821 female) total population. The total number of households in the Woreda is 30,685. The

Woredas climatic zones are lowland and temperate with the proportion of 68% and 32% of the area respectively. The altitude of the woreda capital is 1,975 meter above sea level. The daily weather condition runs from 12^0c to 28^0c. The annual rainfall ranges from 500-900 Millimeter.

Agriculture is the mainstay of the economy in the woreda; hence, it provides the largest share of the livelihood for the population. However, it is characterized by lack of access to modern technology, market, low productivity; dependence on rainfall and lack of irrigation practice especially in the lowland part of the Woreda. As a result, the sector remains subsistence in its nature (MWOoARD, 2014). Crop production is considered as an important component in the district. It also mainly produces teff, maize, wheat, sorghum, millet as major crops for household consumption and generating income to cover different household expenses (MWOoARD, 2014). It is estimated that the livestock population is about 462,313 cattle, 101,881 sheep, 51,382 goats, 110,720 poultry, 185,557 camels and 13,035 equines. The major livestock feed resources in the district are natural pasture, crop residues (sorghum, wheat, barley, maize and teff straws) (BoARD, 2017). Therefore, this study mainly focused on the "factors affecting the adoption of zero grazing in the study area.

Tatay-KoraroWoreda is the North-western administrative zone of Tigray region. Its geographical location is in between 15 km west of Shire at $14^015'40"$ - $14^059'00"$ latitude and $38^010'35"$ - $13^015'40"$ longitude. It is bordered with LaelayAdiaboworeda in the North, Medebayzanaworeda in the East, AsgedeTsimbilaworedas in the West and Medebayzana and AsgedeTsimbilaworeda in the West with an altitude of from 1034-2464 meter above sea level. The total area of the woreda is 65,549 ha. The land use pattern of the woreda shows that 18,577 hectare is cultivated land; 46,972 hectare is covered with forest, bush and shrubs. The woreda has 80,104(40,062males And 40,042 female) total population. The total number of households in the woreda is 15,430.The annual rainfall ranges from 800-1100 Millimeter. Crop production is considered as an important component in the district. It also mainly produces teff, maize, dagusa sorghum, as major crops grown in the woreda for household consumption and generating income to cover different household expenses (TWOoARD, 2014).

Research design

This study employed a cross-sectional research design. It compares Woredas (administrative districts) which adopt zerograzing to Woredas which dont adopt zerograzing. Therefore, combinations of both qualitative and quantitative data were used for the study.

Sampling Procedure

To conduct the study from the Tigray region, three Woredas, namely Medebay Zana and Tahtay Koraro which have best practice in zero-grazing and AsegedeTsmiblaworeda which has poor practice of zero-grazing were selected. In this study, three stage sampling technique was employed in sample selection processes. In the first stage, the three Woredaswere selected purposively due to the fact that there is no such study conducted in these Woredas.

In the second stage, with the collaboration and consultation of Woreda agricultural experts and other stakeholders, out of 61 Kebeles 6 Kebeles were selected because of shortage of time, budget and resources. The Kebeles that adopts zerograzing more than others that were help to compare adopters with non-adopters. Finally, a total of 117 sample household heads were selected by using systematic random sampling technique from six kebeles in probability proportion to size (PPS) technique.

The sample size for the study was to be determined by the formula of Yamane (1967) to minimize availability of error and bias during sample determination selection for the study. The formula for sample determination is described as follows:

$$n = \frac{N}{1 + N(e)^2} \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

The sample size based on the sampling formula is 99.89. It is increased to 117 to increase validity and reliability of the study.

In addition to the household survey, interviews with 8 key informants were conducted to collect the necessary data. The key informant interview participants included the religion leaders, farmers, youth and women representatives.

Data Type, Sources and Data Collection Method

To get the necessary information about the adoption of zero-grazing for this study, both primary and secondary data were used. The necessary data for this study were collected from respondents by interviewing and secondary sources like reports, that are readily available with agricultural experts of the districts and relevant department heads.

Primary data were collected through a semi structured questionnaire. The necessary information to assess the perception of rural household heads and factors affecting the adoption of zerograzing were obtained mainly through interviewing household heads. Secondary data were obtained to supplement primary data from Agricultural office of the district and other relevant sources.

Method of Data Analysis

Descriptive and econometric modeling approaches were applied to address the specified research objectives. To assess the perception of farmers toward the adoption of zerograzing system in the study area data were analyzed qualitatively by categorization (grouping) of the collected data from respondents.

On the other hand, qualitative data was analyzed by categorization (grouping) of data and information according to their basic character. The category was inclusive and mutually exclusive; more over data were to be coded according to inclusive category (open-ended answers) and deductive category (for closed ended answers).

In addition, quantitative data were analyzed using techniques such as frequency, mean, average standard division, variances, percentages, besides mean comparisons of independent samples and relation of sample category with variables in questions. The t-test and chi-square tests were used to see the presence of statically significant differences or systematic association respectively, between those Kebeles which adopt and do not zerograzing in terms of some hypothesized variables.

The t-test for continuous, and chi-square tests for dummy/categorical explanatory variables were used to examine data for differences, associations and relationships in terms of some hypothesized variables. Additionally, Likert Scale measurement also used to see the perception of farmers towards the adoption of zerograzing in the study area.

Result and Discusion

Demographic Characteristics of the Respondents

Sex Composition of Respondents

Majority of the adopter farmers are male-headed households in the study area. 83.5% of the adopter and 75% of the non-adopter sample respondents are male headed households. Sex is statistically significant and positive relationship with the adoption decision with x^2-value=12.2 at 5% level of significant (Table 1). This implies that, male-headed households had a capability to participate freely in different social organization to have better exposure on the economic sub-sector than their counterparts. Due to the prevailing socio-cultural values and norms, males have freedom of mobility, participate in different meetings and trainings.

Education Level

The education level affects the adoption decision negatively with the x^2-value=-13.407 at 1% level of significance (Table 1). This implies that the increase in the year of schooling affects the adoption decision with the reference that the increase in year of schooling makes people to engage in different non-farm activities like business, employing in different government organizations to change their livelihood in a sustainable way instead of creating farm jobs in the study area.

Age of Respondents

Age is usually considered in adoption studies with the assumption that older people are easily focus on their own indigenous knowledge rather than adopting new agricultural technologies. With this background in view, age of sample households was influenced the adoption of zero grazing negatively. Accordingly, the maximum and minimum age of the sample households is 88 and 20 year respectively (Table 1). On the other hand, the average age of sample adopter and non-adopter respondents was 44.84 and 47.91 respectively. Therefore, the increase in age makes difficult to participate on zero grazing on which the older farmers have no more capacity to invest on it in a sustainable way.

Table 1: Personal Characteristics of the Respondents

No	Variable	Description	Adopter		Non-adopter		x^2-value	P-value
			N	%	N	%		
1.	Sex	Male	71	83.5	24	75	12.2	0.012**
		Female	24	16.5	8	25		
		Total	85	100	32	100		
2.	Education	Illiterate	13	15.3	07	21.9	13.407	0.001***
		Literate	00	00	00	00		
		Grade 1-4	34	40	08	25		
		Grade 5-8	33	38.8	11	34.4		
		Grade 9-10	05	5.9	05	15.6		
		Grade 11 & above	00	00	01	3.1		
		Total	85	100	85	100		

No	Variable		Adopter		Non-adopter		t-value	P-value
			Mean	SD	Mean	SD		
1.	Age		44.84	10.282	47.91	14.084	-2.124	0.012**
2.	Labor		3.38	1.626	3.00	1.586	5.124	0.045**

No	Variable		Adopter		Non-adopter		t-value	P-value
			Mean	SD	Mean	SD		
1.	Land size in hectare		0.97	0.64	60.77	0.462	3.666	0.009***
2.	Livestock holding		6.9412	4.3544	6.9375	5.34571	2.494	0.019**
3.	Additional income	17531.76		3079.69	12045.93	3545.89	3.509	0.033**

Source: Own survey, 2018

Labor Availability

The availability of active working labor force in the household is considered as the number of individuals who resides in the respondent's house to perform production activities. Large available labor force is assumed as an indicator of performing more to the household tasks in the family. Based on this fact, availability of family labor is an input which is important for increasing the production performance of the sub-sector in the study area.

The total sample households had family labor ranging from 1-5 adult equivalents. In this study, the average family size of the sample households was 3 persons with the maximum and minimum family size of 7 and 3 persons per family with the total respondent's average farming experience of respondents is 20 years.

The average labor force of sample adopter and non-adopter households were 3.38 and 3.00 respectively. Hence, the family labor shows that, there is significant mean difference between both adoption categories with the t-value=5.124 at 5% significant level (Table 1). Therefore, the higher the family labors the higher the probability to adopt zerograzing in the study area. This is due to the fact that, this technology needs manpower from sowing to the final harvesting of the crop.

Total Land Holding

Land is the single and most important production resources base for any economic activity especially in rural and agricultural sector. Land holding and ownership is crucial factor for agricultural production and adoption of agricultural innovation for the farm community. Land in the study area is too scarce in Medebay Zana followed by Tahtay Koraro district mainly due to population pressure and average land size per farmer was 1 hectare. In this study, the average land holding of sample adopter and non-adopter sample respondents was found to be 0.97 and 0.64 hectare respectively (Table 1).

The t-test analysis result show that, land holding had statistically significant and positive relationship with adoption with (t=3.666; p= 0.009) at 1% level of significance. Therefore, this stated that, there is a significant mean difference between adopters and non-adopters sample respondents selected for the study. This implies that farm households with relatively large farm size had adopted the technology more than those with small farm size. This states that the sub-sector needs land to give optimum result at farmers' level.

Livestock Holding

Livestock holding is an important indicator of wealth status for the farm community which is hypothesized to have positive relationship with the adoption of the sub-sector. It is an important source of cash, manure, draft power and food for the agricultural community. The livestock holding of the sample households is ranging from 1.013-13.520 TLU implying

the existence of variation among the households in livestock ownership. The average livestock holding in TLU of the adopter and non-adopter sample households was 6.9412 and 6.1375 TLU. Consequently, livestock holding in TLU had statistically significant relationship with the adoption of zero grazing with (t=2.494, p=0.019) at 5% level of significance in the study area (Table 1).

Institutional Characteristics of the Respondents

Participation in Training

Respondents' participation in training is important for making people to be acquainted with the required knowledge and skills on zerograzing in the study area. It shows that 80% and 43.8% of the adopter and non-adopter sample respondents were participated on training related to zerograzing respectively. Therefore, the x^2-test result revealed that training show that statistically significant relationship with the adoption of decision of the sub-sector with x^2=14.571 at 1% level of significance. This implies that farmers who got training had well equipped with the necessary technical know-how of the economic sub-sector and there is a probability to adopt the sub-sector easily than those who had not undergone training.

Market Access

Access to market is important for the producers to get attractive market price through reduction of transportation cost. In this study, the sample farmers on average travelled about 8.5067 Kms to sell their agricultural produce in general and fattened animal in particular. When compared the average travelled distance of adopters and non-adopters, sample households had 7.1271 and 9.9863 Kms to arrive at the market centers to sell their produce respectively. Additionally, market access had statistically significant and negative influencing with the adoption decision with the x^2-value=7.586 at 1% level of significance (Table 2). Therefore, the increase in market distance make farmers to get out-dates market information and becoming out of adopting zero grazing in the study area. On the contrary, farmers nearby to the market centers had the opportunity to get production inputs easily to adopt new innovation to overcome their own production problem. Additionally, those farmers have the probability to get market linkage with input

supply office. They also had an opportunity to get market information from diversified sources such as agricultural experts, mass media, traders and others like informal discussion with their peers in different social organization.

Access to Credit Service

Access to credit service is the source of finance for the medium and lower income households to buy inputs for agricultural production. The credit service in the study area is given in kind and cash form especially credit services delivered for agricultural production system. Most of the zerograzing adopter farmers got the loan in kind especially the improved seeds and fertilizers; because, those are only obtained from input supply office in collaboration with Dedebit Microfinance, Multi-purpose Kebele Cooperatives and the Woreda Cooperative Union. Additionally, 91.8% and 53.1% of the adopter and non-adopter sample households accessed credit services. The chi-square analysis result revealed that access to credit service shows statistically significant association with the adoption decision with x^2=22.734 at 1% level of significance (Table 2). This might be due to that those farmers who have access to credit service had more probable to adopt the sub-sector than otherwise. It is also important to solve financial shortfalls of the farm community.

Social Participation

In the realm of the rural and agricultural development the importance of social capital is perceived as a willingness and ability to work together. Rogers (1995) conclude that, "the heart of the diffusion process consists of interpersonal network exchanges between those individuals who have already adopted an innovation and those who are then influenced to do so".

The respondents' participation in social organization had significant relationship with the adoption of zero grazing with (x^2=13.874; p=0.000) which is consistent with the positively hypothesized relationship with adoption decision (Table 2). Therefore, respondents participated in social organization had a role on adopting zerograzing in the district. Because, participation in social organization in the study area is mainly focused on socio-economic aspects which is important to develop an awareness on adoption of new agricultural innovation to overcome production problem in the district.

Table2: Institutional Characteristics of the Respondents

No	Variable	Description	Adopter		Non-adopter		x^2-value	P-value
			N	%	N	%		
1.	Training participation	Yes	68	80	14	43.8	14.571	0.000
		No	17	20	18	56.2		
		Total	85	100	32	100		
2.	Access to market	Yes	82	95.5	26	81.3	7.586	0.006
		No	03	03.5	06	18.7		
		Total	85	100	32	100		
3.	Access to use credit was it service	Yes	78	91.8	17	53.1	22.734	0.000
		No	07	08.2	15	46.9		
		Total	85	100	32			
4.	Social participation	Yes	85	100	27	84.4	13.874	0.000
		No	00	00	05	15.6		
		Total	85	100	32	100		

Source Own Survey, 2018

The Status of Adoption of Zerograzing

In the study area there are two types of grazing systems namely zero-grazing and free-grazing. Zero-grazing is a system in which animals are tethering in confined place where feed and water are brought to the animals. Free-grazing is a system that animals graze freely in open areas or in communal grazing lands. Majority (72.6%) of farmers in the three woredas practice zerograzing while 27.4% respondents are non-adopters of zerograzing (Figure 1). Therefore, majority of the respondents are adopter of zerograzing in the study area.
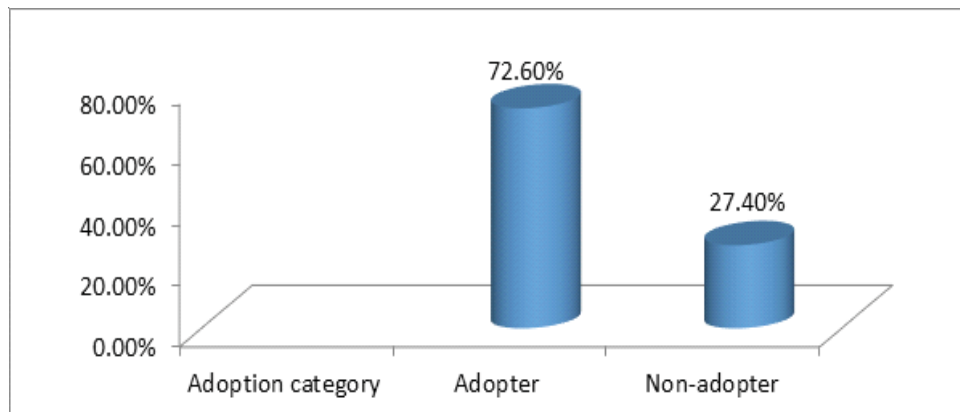
Source Own Survey, 2018

Figure 1: The Status of Adoption of Zero Grazing System

Farmers Perception towards Zerograzing

Farmers perception towards zerograzing is described and measured based on the agreement level of the respondents perceived during the data collection. Perception was measured using a scale with items developed for the purpose of this study. Responses of sample respondents on the perception related were analyzed using Likert type scale. According to the result of the interview with individual households, most of the respondents perceived that zerograzing has better performance in comparison with the remaining other economic sub-sectors. Even if it is highly performed sector, some farmers are discouraged to adopt it because of reasons such as demand more inputs, the lack of timely and limited availability of the inputs in the area specially feed and feed resources. To conclude this, most of the sample households dont adopt zerograzing due to the above discouraging factors. Therefore the extension and research systems have to look into these factors to give solution for the adoption of the sector in a sustainable way (Table 3).

Table 3: Likert Scale Results on Respondents' Perception Towards Zerograzing

No	Responses		Variables/items			
			Technological availability	Input demanded	High production performance	Agro-eco suitability
	Strongly agree	N	12	27	18	24
		%	10.2	23	15.4	16
	Agree	N	32	82	51	65
		%	27.5	70	43.6	43.3
	No opinion	N	07	04	09	06
		%	6.0	3.4	7.7	04
	Disagree	N	53	03	29	43
		%	45.3	2.6	27.8	28.7
	Strongly disagree	N	13	01	12	10
		%	15.3	01	10.2	6.7
	Total	N	117	117	117	150
		%	100	100	100	100
	x^2-value		17.9	74.02	12.70	23.8
	P-value		0.00***	0.001***	0.003***	0.007***

Source: Own survey, 2018

Note: *** Significant at 1% level of significance level

Farmers' Perception Towards the Importance of Zerograzing

Zerograzing is important to increase livestock production performance in the study area. Consequently, the increase in the adoption of zerograzing will lead to the households to improve their economic status by selling fattened animal with in limited time. The survey result indicated that, the majority of the sample households perceived zerograzing is important economic sector in the study area especially for those who are adopting the technology in a sustainable way. Therefore, 63.5% of the adopter sample respondents

perceived that zerograzing is more important economic sector to change their livelihood in a sustainable way. On the other hand, 46.9% of the respondents perceived that, zerograzing is important economic sector to change livelihood of households in a sustainable way.

Therefore, the x^2-value analysis result revealed that, perception of respondents on the importance zerograzing towards had statistically significant relationship with the adoption decision with x^2=12.700 at 5% level of significance (Table 4). This implies that, the increase in perception towards the importance of zerograzing is influencing the adoption decision.

Table 4: Farmers' Perception Towards the Importance of Zerograzing

No	Responses	Adopter		Non-adopter		Total		x^2-value	p-value
		N	%	N	%	N	%		
1.	Not important	00	00	01	3.1	01	0.8	12.700	0.013**
2.	Less important	01	1.2	01	3.1	02	1.7		
3.	Important	17	20	15	46.9	32	27.4		
4.	More important	54	63.5	12	37.5	66	56.4		
5.	Highly important	13	15.3	03	9.4	16	13.7		
6.	Total	85	100	32	100	117	100		

Source: Own survey, 2018

Note: ** significant at 5% level of significance

Discussion

This study was conducted to assess and identify factors that affect farmers' perception on adoption of zerograzing practice. It also explores the implementation and effectiveness of bylaws to manage communal grazing lands as well as to identify perception of farmers to ward zerograzing. Accordingly, 82.5% of the respondents conducted in the study have supportive perception about adoption zerograzing. Farmers in the three districts do not have equal perception about communal grazing land and do not implement the bylaw equally. The common challenges mentioned by farmers on adoption of zero-grazing are

shortage of feed access, low level of awareness, undeveloped market for livestock and livestock products as well as limited availability of watering points.

100% of farmers in Limate M/Zana district and T/Koraro district were practicing zero-grazing dominantly. Collective (community) action involvement in managing the communal grazing lands in this case contributes for their effective implementation of bylaws. In similar vein study by Benin and Pender (2002) indicates that the shift to zero-grazing in the Ethiopian highlands was associated with areas where land redistribution resulted in a reduction in size of grass plots. Although Kebele May-Aderasha of T/Koraro and Lemilem of A/Tsimibela district were selected on middle and poor Kebele based on their practice, according to this finding 49.1% and 17.1% of the grazing system in the Kebele is zero-grazing which indicates a huge gap with Kebele Lemat of M/Zana which considered as in best practice in managing the communal grazing land effective use of the bylaw. Cattle, donkey and equines are managed by tethering or adopted zero-grazing practice and other animals like goat and sheep through controlled grazing in around home or in their cultivated land.

Therefore, most of farmers in the three districts do not perceive equally the advantage of communal grazing land with benefits of zero-grazing practice and seen to violate the bylaw that they manage their animals through free grazing instead of tethering in a confined place or at home. Farmers in Medebay Zana were found implementing the bylaw effectively through collective or community mobilization followed farmers in Tahtay Koraro district. However, farmers in Asgede Tsimbla district were seen to violate the bylaw and poorly manage the communal grazing lands and poor practice of zero-grazing.

Conclusions

In the study area, there are two types of grazing systems namely zero-grazing and free-grazing in the three selected rural districts. About 72% of farmers in MedebayZana practice zerograzing. However, in Asegede Tsimibela majority of respondents practiced free grazing system.There is strong collective (community) action in managing the communal grazing lands in Medebay Zana district followed by Tahtay Koraro district with very strong community action and effective use of bylaws in Tabia May Timiket. However, poor practice and compliance in managing the communal grazing lands is found in Asgede Tsimibela district with ineffective use of bylaws with no equal property right on use to it.

Having good socio-cultural or social laws, best practices of soil and water conservation, good practice of intensification of crop production which left no land for grazing like in Medebay Zana district and in Tabia May Timiket of Tahtay Koraro district. Establishment of emerging towns foreconomic opportunities have good culture of tethering animals in Medebay Zana district and in Tabia May Timiket of Tahtay Koraro district. The current trend of irrigation development and availability of good practice of soil and water conservation could be considered the best opportunities to adopt zero-grazing in the study area.

Shortage of feed in quantity and quality, low level of awareness towards zerograzing, undeveloped market for livestock and livestock products, lack of standards market/ limited availability of watering points in which demand labor to transport water, culture of keeping high number of livestock and limited introduction of improved dairy cows were found the main challenges that farmers face on adoption of zero-grazing practice in the study area.

Recommendations and Policy Implication

* Awareness creation to the community about zerograzing practice and its benefits is important that can help to shift from free grazing to zerograzing system.

* Shortage of feed was a main challenge to practice zerograzing system. Therefore, transferring and distributing the rehabilitated hill bottoms and gullies through soil and water conservation to landless youths for economical purpose is an important method to enhance adoption of zero-grazing practice through closing the communal grazing lands. Thus the closed communal lands should be distributed for youths either for honey bee production and other animal production purposes or even for sale of grass which harvested from the closed lands could be solved the shortage of feed access.

* Irrigated farming could contribute an important role in increasing the production and productivity which ensures rural livelihood and regional food-security. Hence, the extension organizations and the policy makers need to promote and expand demand driven irrigation development to enable farmers to grow forages for livestock production.

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A Study of Analysis of Social Benefits of Agri Clinics & Agri Business Centres (AC&ABC) Scheme

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Abstract

This Paper has quantified and analysed the social benefits viz., tangible and intangible benefits at the entrepreneurial level, at the farmer level and spill over benefits of the Agriclinics and Agri Business Centre Scheme. Primary data were collected from a randomly chosen sample of 160 entrepreneurs and 480 farmers for whom these agripreneurs are providing agricultural extension services. Descriptive statistical techniques and mathematical formulae are used to measure the tangible benefits. Intangible benefits are measured using a Likert 5 point scale. Connecting the tangibles to intangibles using the dummy independent models is another tool used. These Agripreneurs have enjoyed tangible benefits in terms net profit margin, rate of return on investment, net income, increase in household consumption expenditure, increase in the durable assets in their possession, improving quality of education to their children, improving health status and employment generation. There is significant difference between agripreneurs who have improved or rather gained their intangible benefits getting higher tangible benefits than the group of agripreneurs who could not improve the intangible benefits. As a result there is an improvement in investments by farmers, reduction in cost of cultivation, increased productivity, increased income and thereby savings. An econometric model formulated and estimated the impact of agripreneurs extension services on the income of the farmers demonstrate the same result.

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Introduction

Growth and development in entrepreneurship is important for enhancing the employment opportunities to the unemployed, living conditions of the entrepreneurs and a benefit to the society at large.   In order to enhance entrepreneurship development in agriculture and to strengthen the extension services provided to the farmers the Ministry of Agriculture and Farmers' Welfare, Government of India had launched the scheme of 'Agri-clinics and Agri -business Centers' (AC &ABC) on 9th April, 2002. Agri-clinics are envisaged to provide expert services and advice to farmers on cropping practices, technology dissemination, crop protection, market trends, prices of various crops in the markets and also clinical services for animal health etc., Agribusiness centers are envisaged to provide inputs such as farm equipment on hire, seeds, fertilizers and other services.

*   This Scheme has been implemented throughout the country by providing two months training to the selected candidates and providing bank loans with a back ended composite subsidy. Total number of candidates trained for the country as a whole as on May 2021 are 74520 and number of agri ventures established are 31352 which means 42 per cent of the trained candidates could establish agri ventures. Maharashtra ranks number one in terms of trained candidates and number of ventures established with 18937 and 9195 respectively. Uttar Pradesh is in second position with 16494 trained candidates and 7894 ventures established (www.manage.gov.in)With a view to study the Social benefits generated by the Scheme, a study was conducted by MANAGE.

*   This study has its own uniqueness as many existing studies on AC & ABC have analysed the impact of the Scheme on income levels of entrepreneurs and farmers but did not cover the resultant social benefits generated MANAGE (2004) Chandrashekara.P., and Kanaka Durga, P.(2007), Kanaka Durga P. (2016), Shoji Lal Bairwa, et.al (2017), Rajashekhar Karjagi (2018)

Objectives:

The overall objective of this article is to identify measure and analyse the social benefits generated under the AC & ABC Scheme. However, the specific objectives are:

1. To identify, measure and analyse the tangible and intangible benefits accrued to the agripreneurs

2. To identify, measure and analyse the tangible and intangible benefits accrued to the farmers

3. To understand the total benefits (social benefits) generated under the Scheme

This article is divided into three sections. Section1 provides the methodology adopted in terms of sample design and coverage, analytical tools and techniques used to analyse the data. Section 2 discusses the analysis of social benefits (tangible and intangible) accrued to the agripreneurs and farmers. Section 3summarises the findings and recommendations.

Section 1: Methodology

1.1 Sample Design and Coverage:

The study is carried out based on primary data sources which was collected based on multi stage random sampling. In order to have a wider coverage, primary data is collected for all five regions of India viz., South, North, East, West and North East. From each region, one state is selected based on its share in total number of agri ventures established under the AC & ABC Scheme. A state having a maximum number of ventures from each region is selected for analysis. The period considered for the analysis is from April 2002 to December, 2010. In order to have coverage of all the 32 activities which are mentioned in the Scheme Guidelines and benefits accrued activity wise, five (5) agripreneurs are chosen for each activity and hence a total sample of 160 agripreneurs are selected. From the secondary data it is observed that the states Viz., Uttar Pradesh (North) Karnataka (South), Bihar (East), Maharashtra (West) and Assam (North East) are having maximum number of agripreneurs. These states are chosen for conducting this study by collecting the primary data.

The sample 160 agripreneurs are divided among the five states based on the proportionate share in total number of ventures established in their respective states. The same criteria is used for the selection of districts viz. Varanasi,(UP),Bangalore (Karnataka), Patna (Bihar), Pune (Maharashtra) and Kamrup (Assam) as these districts have maximum number of agripreneurs established their ventures Based on this criteria, the sample size are 59 for UP, 43 for Maharashtra, 27 for Karnataka, 27 for Bihar and 4 for Assam (Table 1.1)

With a view to analyse the benefits flowing out of the extension services of agripreneurs three farmers for each Agripreneur are selected at random. Based on this the sample size

of f farmers selected are   177 in UP, 129 in Maharashtra, 81 in Karnataka, 81 in Bihar and 12 in Assam. Thus constitutes a total sample size of 480 farmers (Table 1.1)

Table 1.1: Selected Sample Size of Agripreneurs & Farmers: District Wise

State	District	Number of agripreneurs	Number of Farmers
Uttar Pradesh	Varanasi	59	177
Karnataka	Bangalore	27	81
Bihar	Patna	27	81
Maharashtra	Pune	43	129
Assam	Kamrup	4	12
Total		160	480

1.2 Analytical Tools Used:

The primary data from the selected agripreneurs and farmers is collected with the help of a well-designed pre tested schedule. The collected data has been analyzed based on various qualitative and quantitative techniques. Tangible benefits and intangible benefits accrued to the Agripreneur due to AC & ABC is measured using various qualitative and quantitative techniques. Table 1.2 provides the list of identified tangible and intangible benefits at the Agripreneur level and at the farmer level.

Table 1.2: List of Identified Tangible, Intangible Benefits

At Agripreneur Level		At Farmer Level	
Tangible Benefits	Intangible Benefits	Tangible Benefits	Intangible Benefits
Return on Investment Profitability Diversification in Business Nature of business	Happiness Self confidence stability Risk taking Increase in skill	Increase in farm investment Reduction in cost of cultivation Yield per hectare	Confidence Risk taking Knowledge, Skill

Net Income	Increase in knowledge	Net income earned	Credibility with the banks
Household Expenditure	Social respect	Family expenditure	
Employment Generation	Social contacts	Crop diversification	
Salaries paid to employees	Family confidence		
Housing Vehicles in possession	Credibility with the bank		
Education of children	Credibility with the farmers		
Health Status Nature of business Net Income Household	Media coverage		

Data were analysed using descriptive and inferential statistics with the aid of SPSS. Descriptive statistical techniques and mathematical formulae are used to measure the tangible benefits. Intangible benefits are measured and analysed using a Likert 5 point scale. A dummy independent model is used to connect the tangible and intangible benefits (Bev Maldrum, Peter Read and Colin Harriso, 2017) This approach helped to translate intangibles into tangibles for mapping and building relationship between them. Some relationships mapped are: Credibility with the farmers vs volume of sales, diversification in business vs number of persons employed and self confidence vs the amount of investment made. An Econometric Model is formulated to estimate the effect of agripreneurs' extension services on the agricultural production and thereby income earned by farmers. The following model is formulated and estimated:

$$Yi = \beta 1 + \beta 2\, X1 + \beta 3\, X2 +$$

Where

Y = production (income as a proxy is taken due to the problems of aggregation)

X1 = cropped area

X2 = number of labourers employed

X3 = investment

X4 = irrigated area

X5 = consumption of chemical fertilisers

X6 = agripreneurs extension services (It is a dummy independent variable where it takes the value 1 = with intervention of Agripreneur 0 = other wise

ui = Random Error Term

$\beta 1, \beta 2, \beta 3, \beta 4, \beta 5, \beta 6, \beta 7$ are the parameters to be estimated in the model

Analysis & Results

This section provides the socio-economic profile of the sample agripreneurs and an analysis of tangible and intangible benefits accrued to the agripreneurs and farmers.

2.1: Socio-Economic Profile of the Sample Agripreneurs:

Out of the total 160 agripreneurs, 157 (98 per cent) of the respondents were males. The age wise classification of the respondents shows that 101 respondents belong to the age group of 36-55 years which means 62 per cent of the respondents are below 55 years of age whereas in Varanasi only 49 per cent of the respondents belong to the age group of 25-35 years. Only 6 percent of the respondents belong to the age group of 56 and above. Out of 160 sample agripreneurs, 130 agripreneurs were married, which included 22 from Bangalore, 23 from Patna, and 46 from Varanasi. The field findings showed that unemployment and marital status are strongly linked and the agripreneurs who were well settled in terms of their business, their prospects of marriage have improved. This is one of the important social benefits of AC & ABC Scheme observed in the field. With regard to the status of education, though the guidelines permit the undergraduates

with agriculture subject at their Intermediate or plus two level to undergo training under AC & ABC Scheme, a very less number of sample respondents belong to this category were observed where in 48 sample agripreneurs are post graduates and 101 are graduates. The caste classification of the agripreneurs shows that less than 3 percent of the respondents belong to SC and ST category and it is the case invariably across all sample districts. About 34 per cent of the sample agripreneurs belong to the OBC category which was found to be second important category in caste classification of the sample respondents.

2.2 Business Profile of Sample Agripreneurs:

Table 2.1 shows that out of 160 agripreneurs 60 agripreneurs have established ventures before undertaking AC & ABC training. Majority of the ventures were established after undertaking training in the sample districts.

Table 2.1: Status of Ventures Established by Agripreneur

District	Agripreneurs	Ventures established before the training	Venture established after the training	Total
Bangalore	Number	5	22	27
	Percentage	18.50%	81.50%	100.00%
Kamrup	Number	2	2	4
	Percentage	50.00%	50.00%	100.00%
Patna	Number	13	14	27
	Percentage	48.10%	51.90%	100.00%
Pune	Number	22	21	43
	Percentage	51.20%	48.80%	100.00%
Varanasi	Number	18	41	59
	Percentage	28.60%	25.40%	100.00%
Overall	Number	60	100	160
	Percentage	36.60%	62.40%	100.00%

Table 2.2 shows the activities undertaken by sample agripreneurs. In Bangalore, Agri-Clinics were chosen as the most important activity by sample agripreneurs. Other activities observed were animal feed units, biofertilizer production and marketing, horticulture and tissue culture laboratory. Dairy, poultry and seed processing business units were widely prevalent activities in Kamrup. In Patna, Agriclinics, vermi composting and seed production and marketing activities were undertaken by sample agripreneurs. As per the Guidelines of AC & ABC, the agripreneurs can undertake business in 32 activities (www. manage. gov.in). It was observed that the sample agripreneurs were carrying out business in 19 activities in Pune where as in Varanasi majority of them i.e 51 agripreneurs established agribusiness units only (Table 2.2). The diversity of activities in Pune is due to existing business prospects in these activities which is lacking in Varanasi district.

Table 2.2: Activities Undertaken by Agripreneurs

S.No	Name of the Enterprise	Name of the District				
		Bangalore	Kamrup	Patna	Pune	Varanasi
1	Agri-Clinics	22	0	9	7	1
2	Agri-Clinics and Agri-Business Centres	0		1	5	51
3	Animal Feed Unit	1	1	1	1	1
4	Bio-fertilizer production and Marketing	2		1	1	1
5	Contract Farming				3	
6	Farm Machinery Unit				3	
7	Floriculture				3	
8	Horticulture Clinic	1				
9	Landscaping + Nursery				2	
10	Nursery				2	
11	Organic Production/ Food Chain				4	
12	Pesticides Production and Marketing			2	13	2
13	Value Addition			1		

14	Seed Processing and Marketing	1		4		
15	Soil Testing Laboratory		2		2	1
16	Tissue Culture Unit	1				
17	Vegetable Production and Marketing				3	
18	Vermicomposting / Organic manure			9	3	1
19	Crop Production				6	
20	Dairy/Poultry/Piggary/Goatary		4		4	9
21	Agriculture Journalism				1	

Table 2.3 explains the number of villages and farmers covered by sample agripreneurs across sample districts. It is clear from the table that on an average each agripreneur had covered 17 villages with a maximum of 210 and a minimum of 2 villages. Villages covered by each agripreneur on an average is 28 in Bangalore, 38 in Kamrup, 17,11,16 in Patna, Pune and Varanasi respectively. Each Agripreneur on an average was covering 2451 farmers with a maximum of 50000 and a minimum of 40 farmers. Number of farmers covered per village was highest in Varanasi with 303 and the least in Bangalore with only 13.14 farmers. In Varanasi district, though the number of villages covered by average sample agripreneurs is relatively less when compared to the other districts, the number of farmers covered was relatively higher which was found to be 4848. As the demand for the services of agripreneurs per village is relatively much higher in Varanasi district, the agripreneurs in this district putting concerted efforts intensifying their business in a few villages only.

Table 2.3: Villages & Farmers Covered by Agripreneurs

District	Agripreneurs	Villages Covered	Farmers Covered	Average number of farmers per village
Bangalore	Mean	28	368	13.14
	Minimum	4	60	
	Maximum	210	1100	
Kamrup	Mean	38	1175	30.92
	Minimum	15	200	
	Maximum	50	2000	
Patna	Mean	17	557	32.76
	Minimum	2	40	
	Maximum	165	6000	
Pune	Mean	11	1533	139.36
	Minimum	2	40	
	Maximum	100	50000	
Varanasi	Mean	16	4848	303
	Minimum	2	100	
	Maximum	180	50000	
Total	Mean	17	2451	144.18
	Minimum	2	40	
	Maximum	210	50000	

2.3: Benefits Analysis:

2.3.1: Tangible Benefits:

Tangible benefits which are quantifiable were analysed by measuring the following financial performance indicators:

Investment Analysis

The strength of any business is understood by making an investment analysis. The quantum of economic benefits depends on the financial soundness of an enterprise. In this section, investment carried out on an average by sample agripreneurs was analysed. Investment analysis is carried out by looking at the following aspects:

 1 Return on investment 2. Profitability

Table 2.3.1 Average Annual Return on Investment and Profitability of Agripreneurs

S.No.	District	Investment (Rs lakhs)	Sales / Turn Over (Rs Lakhs)	Net Profit Earned (Rs Lakhs)	Net Profit Margin (%)	Return on Capital (ROI) (%)
1	Bangalore	20.78	49.43	30.05	60.79	144.61
2	Kamrup	53.5	100.67	61.65	61.23	115.23
3	Patna	6.8	22.06	16.82	76.25	247.35
4	Pune	15.3	42.36	36.89	87.09	241.11
5	Varanasi	6.48	19.46	12.6	64.74	194.44
6	Average	20.572	46.796	31.60	67.53	153.61

Source: Calculated from Primary Data

ROI = [(Current Value of Investment - Cost of Investment)/Cost of Investment] X 100

Table 2.3.1 shows the average investment made, sales or turn over, operating expenses and net profit earned by the agripreneurs. Investment made varies across districts with a minimum of 6.48 lakhs to a maximum of rupees 53.5 lakhs. The average investment made by each agripreneur is estimated at rupees 20.57 lakhs. Some entrepreneurs in some districts incurred almost same operating expenses in states like Varanasi where as in other they exceeded by 30 to 40 per cent more. In contrary to other states, in Kamrup the operating expenses are less than the investment made. The net profit earned is able to cover both the fixed costs and operating expenses. This shows the viability of the

business. The net profit margin of the ventures is around 60 to 65 per cent for all enterprises. Maximum net profit margin is observed for ventures in Pune followed by Patna. The return on investment is more than 100 per cent for all ventures and for some ventures it is more than 200 per cent. Since most of the ventures established were in Agriclinics and Agribusiness Centers which are mostly services oriented and do not require investment in fixed capital and therefore ROI would be much higher for such enterprises. The high ROI calculations are justified for the fact that most of the business entities in AC & ABC are service oriented.

Table 2.3.2 shows change in investment pattern of agripreneurs who have established ventures before undertaking training in AC & ABC Scheme. It shows clearly that there is a significant increase of investment made by these ventures after the training. On an average the investment increased from 4.8 lakhs to 11.7 lakhs in all most all districts. There is a change in the pattern of investment made by agripreneurs. About eighty per cent of entrepreneurs in all the selected districts invested less than 5 lakhs In the initial years of their business and only 11 per cent of the them invested more than 10 lakhs.. In Maharashtra 86 per cent of the sample agripreneurs invested less than five lakhs and gradually more than 30 per cent of entrepreneurs invested more than 10 lakhs. This may be due to the increasing opportunities of business prospects, which has been considered as one of the indicators of agri business success

Table 2.3.2: Change in Investment Pattern of Agripreneurs who have established ventures before AC & ABC Training

Sate	District	Investment (Rs in Lakhs)	
		Before	After
Assam	Kamrup	1.1	24.0
Maharashtra	Pune	5.7	13.6
Bihar	Patna	2.6	7.0
Karnataka	Bangalore	12.3	22.5
Uttar Pradesh	Varanasi	2.1	7.1
Overall (Average)		4.8	11.7

Change in Services offered:

There is a change in services offered by agripreneurs to farmers which is evident from Table 2.3.3. In order to prosper in business and enjoy economies of scale and economies of scope, majority of the agripreneurs diversified their services from time to time by offering varied services to farmers. Diversification allows for more variety and options for products and services.

Table 2.3.3 : Perception on Status of Services Offered

District		Services Offered		Total
		No change	Change	
Kamrup	No. of Agripreneurs	1	3	4
	Percentage	25	75	100
Pune	No. of Agripreneurs	19	24	43
	Percentage	44.2	55.8	100
Patna	No. of Agripreneurs	22	5	27
	Percentage	81.5	18.5	100
Bangalore	No. of Agripreneurs	6	21	27
	Percentage	22.2	77.8	100
Varanasi	No. of Agripreneurs	14	49	63
	Percentage	22.2	77.8	100
Total	No. of Agripreneurs	62	102	164

Increase in Net Income of Agripreneurs:

The success of a small business depends on its ability to earn profits in sustained manner. Earning a profit is important to a small business because profitability impacts whether a company can secure financing from a bank, attract investors to fund its operations and grow its business. Companies cannot remain in business without turning a profit. In the previous section discussion was made how agripreneurs could make profit and succeeded in business. Table 2.3.4 explains the net income changes of the agripreneurs within three years. The maximum increase in income per month Rs 1.46 lakhs can be observed in

Kamrup 1.36 lakhs in Pune and in other districts the increase was less than Rs 50000. The entrepreneur in all the districts is earning a minimum income of three thousand rupees in the initial years of business and Rs 12000 after 3 years of starting the business. The maximum earnings were Rs 25000 in the initial years and Rs 40000 after three years.

Table 2.3.4: Net Income Earned per Month (Rs in Lakhs)

District		Income Initial years	Income after 3 years	Increase in Mean Income
Kamrup	Mean	.0.21	1.66	1.45
	Minimum	0.10	0.45	
	Maximum	0.30	3.00	
Pune	Mean	0.82	2.18	1.36
	Minimum	.0.20	0.40	
	Maximum	25.00	40.00	
Patna	Mean	0.23	0.49	0.26
	Minimum	0.05	0.15	
	Maximum	0.70	3.50	
Bangalore	Mean	0.30	0.64	0.34
	Minimum	0.05	0.12	
	Maximum	1.80	3.20	
Varanasi	Mean	0.03	0.36	0.33
	Minimum	0.07	0.25	
	Maximum	0.20	4.00	
Total	Mean	0.32	0.94	0.62
	Minimum	0.03	0.12	
	Maximum	25.00	40.00	

Source: Computed from Primary Data

Increase in Household Expenditure:

Expenses include the amount paid for lodging, food consumption within the house and other costs. Table 2.3.5 and Figure 1 shows the average expenditure per month by agripreneur households towards family expenditure. The income of agripreneurs increased significantly that resulted in increased household expenditure. This is also one of the parameters of increased prosperity. Because the consumption expenditure has not increased in commensurate with the increase in income, savings of the household have gone up. Many of the entrepreneurs converted these savings for the purpose of investment.

Table 2.3.5: Status of Household Expenditure per Month by Agripreneur (Rs. in Lakhs)

District		Expenditure before establishing ventures	Expenditure after establishing ventures
Kamrup	Mean	0.05	0.20
Pune	Mean	0.14	0.49
Patna	Mean	0.19	0.79
Bangalore	Mean	0.61	0.99
Varanasi	Mean	0.05	0.24
Total	Mean	0.19	0.52

Figure 1 : Household Expenditure
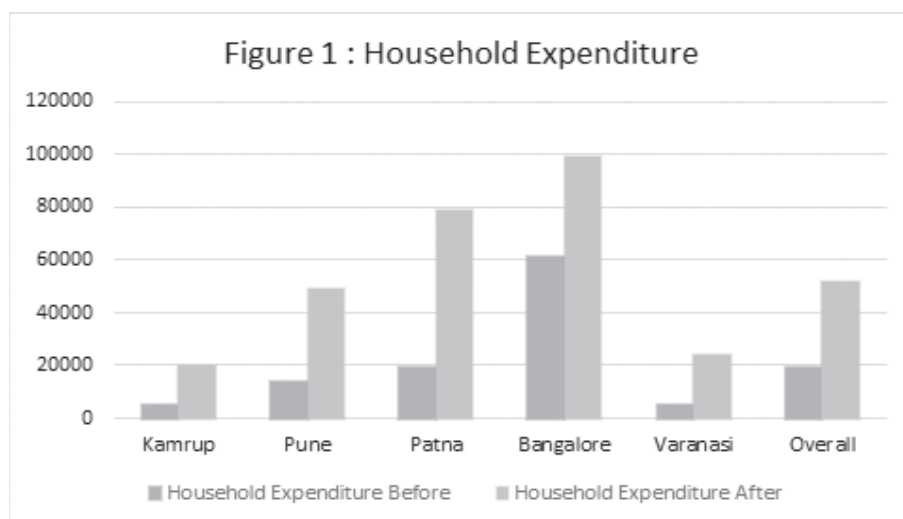
Status of Employment Generation by Agripreneur:

Entrepreneurship development in rural industries appears to be the best potential alternative to find employment avenues for the rural population. The unemployed agricultural graduate who became agripreneurs under AC & ABC Scheme is able to provide employment opportunities to other rural unemployed youth (Table 2.3.6). This is one of the most important and direct social benefits which we can notice due to promotion of agripreneurship by the Scheme.

Table 2.3.6 Status of Generation of Employment by Agripreneurs

District	Number of Persons		
	Mean	Minimum	Maximum
Bangalore	4.67	0	46
Kamrup	4.75	2	9
Patna	2.52	0	7
Pune	6.67	0	100
Varanasi	2.79	0	16
Overall Sample	4.12 (Average)	0	100

Source: Computed from Primary Data

Table 2.3.7 shows the housing status of sample agripreneurs. The data analysis shows that more than 30 per cent of them could shift from kuccha house to pucca house due to increased income levels. Almost 50 per cent of them had pacca houses only for a very long period, the field visit made us to understand that furnishings in the houses have improved significantly. The living standards of the agripreneurs improved as they are able to enjoy certain comforts after starting their ventures. A large number of them could able to move from bicycle to two wheeler. An equally important number could buy cars also comfortably (Table 2.3.8).

2.3.2 Intangible Benefits:

Intangible benefits are the gains attributable to the Scheme performance that are not reportable for formal accounting purposes. These benefits are not included in the financial calculations because they are non-monetary though they may be very significant for social impact. The intangible benefits considered in this study are increase in happiness, increase in self confidence, increase in family confidence, increase in society recognition, increase in respect in the society, increase in stability, increase in risk taking ability, increase in business skills, increase in media coverage, increase in credibility with the banks and with farmers.

Table 2.3.7: Housing Status of Agripreneurs:

		Number of Agripreneurs			Total
		Continues to have kuccha house	Change from to kuccha house puccahouse	Continues to have pucca house	
Kamrup	No. of Agripreneurs	1	2	1	4
	Percentage	25	50	25	100
Pune	No. of Agripreneurs	1	16	26	43
	Percentage	2.3	37.2	60.5	100
Patna	No. of Agripreneurs	0	2	25	27
	Percentage	0	7.4	92.6	100
Bangalore	No. of Agripreneurs	15	11	1	27
	Percentage	55.6	40.7	3.7	100
Varanasi	No. of Agripreneurs	4	29	30	63
	Percentage	6.3	46	47.6	100
Overall	No. of Agripreneurs	21	56	83	160
	Percentage	12.8	36.6	50.6	100

Table 2.3.8: Number of Agripreneurs Possessing the Vehicles

District Name	Bicycle only	Bicycle to two wheeler	Two wheeler to four wheeler	Total
Kamrup	1	0	2	4
Pune	0	8	17	43
Patna	2	2	1	27
Bangalore	0	9	13	27
Varanasi	7	38	14	59
Total	10	60	60	160

The perceptions of the agripreneurs on the benefits accrued to them due to AC & ABC Scheme after they became agripreneurs are captured with the help of Likert Scale and the same is presented in tables 2.3.9 to 2.3.11. The estimated Likert Scale shows that the majority of the agripreneurs across all the sample districts have strongly agreed that their happiness levels increased after they became agripreneurs. The Average Likert Scale[1] in the range of 4.5 to 4.9 in districts such as Kamrup, Varanasi and Pune indicates that majority of the agripreneurs strongly agreed that their happiness levels increased after they became agripreneurs due to AC & ABC Scheme because these scales are close to 5 as 5 represents strongly agree. The average Likert Scale which is close to 4 in Patna and Bangalore shows majority of the agripreneurs have just agreed that their happiness levels increased due to AC & ABC Scheme.

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[1]Average Likert Scale is calculated by multiplying each response with the respective weight to get total score of that response. Adding the total score of all the responses and dividing it by the number of respondents.

Table 2.3.9: Perception of Agripreneurs on Increase in Happiness Levels Due to Agripreneurship (Likert Scale)

District	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Average Likert
Kamrup				8	10	18	4.5
Patna	2	4	15	48	45	114	4.2
Pune	2	10	18	80	100	210	4.9
Bangalore	2	6	18	28	50	104	3.8
Varanasi	0	0	75	80	120	275	4.7

Source: estimated from primary data

Table 2.3.10 shows that the majority of the agripreneurs across all the sample districts have agreed that their confidence levels have increased after they became agripreneurs. The Average Likert Scale of 4.6 in Pune indicates that majority of them have strong agreement on the increased confidence levels. For all other districts majority of them just agreed on this as it is evident from the average Likert Scale at around 4.

Table 2.3.10: Perception of Agripreneurs on Increase in Self Confidence Due to Agripreneurship (Likert Scale)

District	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Average Scale
Kamrup				16	0	16	4.0
Patna	0	0	6	40	60	100	3.7
Pune	0	0	9	48	140	197	4.6
Bangalore	0	0	12	56	45	113	4.2
Varanasi	0	0	12	80	125	217	3.7

The Likert Scale for Kamrup district is close to 5 in case of increase in skills, knowledge levels and societal respect and close to 4 in case of increase in risk taking ability and credibility with the farmers shows that there is a strong agreement on the improvement in case of skills, knowledge levels and societal respect and just agreed in case of increase in risk taking and credibility with the farmers. However, majority of the agripreneurs in this

district disagreed on the improvements in their bank credibility. The same findings are observed in Patna, Bangalore and Varanasi. In Pune, improvement in two parameters such as risk taking and credibility are strongly agreed. In all the districts it was observed that the agripreneurs credibility with the banks has not improved as evident from the Likert Scale ranging from 2.9 to 3.8 (Table 2.3.11)

Table 2.3.11: Perception of Agripreneurs on Benefits of AC & ABC Scheme (Likert Scale)

District	Risk Taking	Increase in Skills	Knowledge levels	Societal Respect	Bank credibility	Credibility with the Farmers
Kamrup	4.1	4.8	4.8	4.9	3.1	3.8
Patna	4.2	4.7	4.7	4.8	2.9	3.9
Pune	4.8	4.2	4.2	4.2	3.5	4.5
Bangalore	4.4	4.6	4.6	4.1	3.8	4.8
Varanasi	4.2	4.9	4.9	4.6	3.2	5.0

Source: estimated from primary data

2.4 Connecting the Tangibles to Intangibles:

This approach connects the intangible to a measure that is easier to value, a tangible which means linking a tangible resource to its intangible meanings. Effective interpretation is about connecting one to the other tangibles and intangibles exist together. The tangible and intangibles mapped in this article are credibility with the farmers with the value of sales; diversification in business with the number of persons employed; self confidence with the amount invested; society recognition with the number of visits to the village. Regression coefficient is estimated to establish a connect between tangible indicators and intangible indicators using the dummy independent variable. The value of the estimated regression coefficients are presented in table 2.4.1

Table 2.4.1: Tangible and Intangible Variable Relationship

S.No.	Intangible Indicator	Tangible Indicator	Regression coefficient	t value
1	Credibility with the farmers	Value of Sales	0.80*	3.5
2	Diversification in business	Number of persons employed	0.50*	2.8
3	Self confidence	Amount invested	0.75*	6.8
4	Society recognition	Number of visits to villages	0.83*	2.8

*significant at 1% level

The regression coefficients estimated between tangible indicator and intangible indicator are statistically significant at 1% level. The regression coefficient between credibility with the farmers and value of sales shows that whenever entrepreneur has strong credibility with the farmers there was an increase in his turn over or sales by 80% more than the entrepreneurs who do not have any credibility. The regression coefficient between diversification of business and number of person employed is 0.5 which means employment increases by 50% more with diversification. The amount invested increased by 75% more if the person has self confidence than the person who does not have self confidence. Likewise societal recognition depends on the number of visits to a village. The society recognition is 83% more to an entrepreneur who makes regular visits to provide advisory to the farmer than an entrepreneur who does not visit villages regularly.

2.5: Impact of Agripreneurs' Extension Services on Farmers' Income

This section is intended to find out the role of AC & ABC Agripreneurs in generating social benefits by way of improving the living conditions of farmers by selling quality inputs and providing extension services to the farmers. The average number of farmers covered per village ranged from 13 in Bangalore to 303 in Varanasi. Though the number of villages covered in Varanasi is less than that of Bangalore, farmers covered per village is much higher in Varanasi. On an average each agripreneurs has provided extension services in 17 villages and for 2451 farmers. While supplementing the public extension work these agripreneurs brought significant benefits to the farming community, not only to

the farmers they had covered but also indirectly to other farmers due to their influence.. These spillover effects are also part of social benefits in addition to the tangible and intangible benefits to the agripreneurs and the farmers covered by them.

The impact of agripreneurs' services to farmers are analysed in terms of change in investment, reduction in cost of cultivation, increase in yield and income of the farmers in the study area. Besides extension, several other factors also influence in increasing the yield and income of the farmers. But our hypothesis here is that due to erratic and poor service delivery, insufficient number of extension officers and workers, and a lack of timely advise from extension officers resulted in less investment by farmers, more cost of cultivation, less productivity and thereby less income, less family expenditure and less savings. The alternative hypothesis is that with the intervention of agripreneurs of AC & ABC as extension service providers there is an improvement in investments by farmers, reduction in cost of cultivation, increased productivity, increased income and thereby savings. These indicators are analysed before and after taking the extension services from agripreneurs.

Increase in Investment:

Farmers invest the highest amount in wells and other irrigation followed by agricultural machinery, transport equipment and land improvements. Table 2.5.1 shows the impact of agripreneurs extension services on the investment made by the farmers in the study districts. It is clearly evident from the table that the farm investments with the intervention of agripreneurs. At overall, there is a 92 per cent increase in investment and the maximum increase can be observed in Kamrup in Assam followed by Pune in Maharashtra and Bangalore in Karnataka. The reason behind this increase in investments is the increase in confidence levels of farmers in carrying out farm operations.

Reduction in Cost of Cultivation

The average cost of cultivation of all crops cultivated by sample farmers reduced by 13% in Maharashtra (lowest reduction) and by 26% in Karnataka (highest reduction) and in between these figures in other sample districts (Table 2.5.2).

Table 2.5.1: Investment Made in Agriculture by Sample Farmers (Rs in Lakhs)

S.No.	Name of the State/District	Before taking extension service from Agripreneur	After taking extension service from Agripreneur	% Increase
1	Assam (Kamrup)	0.58	3.44	491
2	Bihar (Patna)	4.69	6.47	38
3	Karnataka (Bangalore)	0.38	0.98	160
4	Maharashtra (Pune)	1.39	3.99	188
5	Uttar Pradesh (Varanasi)	0.20	0.33	65
	Average	1.30	2.49	92

Source: Computed from Primary data

Table 2.5.2: Total Cost of Cultivation of all crops per acre by Sample Farmers (Rs. in lakhs)

S.No.	Name of the State	Before taking extension service from Agripreneur	After taking extension service from Agripreneur	% Change
1	Assam (Kamrup)	0.30	0.25	16.7
2	Bihar (Patna)	0.40	0.32	20.0
3	Karnataka (Bangalore)	0.42	0.31	26.2
4	Maharashtra (Pune)	0.94	0.82	12.8
5	Uttar Pradesh(Varanasi)	0.21	0.18	14.3
	Average	0.45	0.37	17.8

Source: Computed from Primary data

Increase in Farm Yield:

Table 2.5.3 shows the increase in crop yield of all the crops grown by the selected farmers. For overall districts, about 228 farmers got increase in yield in the range of 10-25 per cent and 40 per cent of the farmers got increase in yield in the range of 26-50 per cent. About 88 per cent of farmers' yield increase range from 26 to 75 per cent for overall. This pattern is almost same across districts except in Maharashtra where 67 per cent of the farmers (highest number) received increased yield in the range of 26 to 50 per cent.

Increase in Income:

Table 2.5.4 shows the increase in income. The increase in income of farmers shows the same pattern as increase in yield because both are directly proportional. For overall districts, about 228 farmers got increase in income in the range of 10-25 per cent and 40 per cent of the farmers got increase in income in the range of 26-50 per cent. About 88 per cent of farmers' income increase range from 26 to 75 per cent for overall. This pattern is almost same across districts except in Maharashtra where 67 per cent of the farmers (highest number) received increased income in the range of 26 to 50 per cent. Tables 2.5.6 and 2.5.7 shows increase in income of the farmers before and after taking extension services from Agripreneurs. The income increased per annum is found out to be 94 per cent for overall sample and highest increase is observed for farmers of Kamrup. In Kamrup, income per annum increased from Rs 51000 to Rs 4.25 lakhs. Except in Patna, the increase in income is more than 100 percent.

Table 2.5.3: Increase in Average Farm Yield of all Crops Grown by Selected Farmers

State Name	District Name	Yield Increase (%)					
	Number of Farmers	less than 10	10-25	26-50	51-75	76-100	Total
Assam	Kamrup	0	0	7 (58)	3 (25)	2 (17)	12 (100)
Maharashtra	Pune	0	30 (23)	86 (67)	12 (9)	1 (1)	129 (100)

Bihar	Patna	4	37	32	6	2	81
		(5)	(46)	(40)	(7)	(2)	(100)
Karnataka	Bangalore	2	39	29	10	1	81
		(2)	(48)	(36)	(12)	(1)	(100)
Uttar Pradesh	Varanasi	13	122	38	4	0	177
		(7)	(69)	(21)	(2)	(0)	(100)
Total		19	228	192	35	6	480
		(4)	(48)	(40)	(7)	(1)	(100)

Source: Computed from Primary data

Figures in the parentheses are share of number of sample farmers in total

Table 2.5.6: Income Earned per annum in Agriculture by Selected Farmers (Rs in lakhs)

S.No.	Name of the State	Before taking extension service from Agripreneur	After taking extension service from Agripreneur	% Change
1	Assam (Kamrup)	0.51	4.25	728
2	Bihar (Patna)	7.40	12.21	65
3	Karnataka (Bangalore)	1.32	3.36	155
4	Maharashtra (Pune)	2.65	5.62	112
5	Uttar Pradesh (Varanasi)	0.86	1.72	101
	Overall	2.48	4.81	94

Increase in Credibility of Farmers with the Banks:

Table 2.5.7 shows the status of credibility of farmers with banks before taking extension services from agripreneurs and after taking extension services from agripreneurs. The Table 2.5.7 shows that a few farmers were having credibility with the banks before taking the extension services from agripreneurs. After a substantial income gain, the credibility with the banks, though not 100 per cent increased rather increased at a significant rate.

Out of 480 sample farmers 232 farmers gained credibility with the banks may be because of increased propensity to repay the bank loan. All the farmers in Bangalore district have shown some improvement with the banks they are linked to. But in Uttar Pradesh, less than 50 per cent of sample farmers gained credibility with the banks. In addition to these gains, sample farmers were ready and able to take risk and their confidence levels increased significantly.

Table 2.5.7: Credibility of Sample Farmers with the Banks

S.No.	Name of the State	Number of Farmers having credibility with the Banks		
		Before	After	Number of farmers with increase in credibility
1	Assam (Kamrup)	1	8	7
2	Bihar (Patna)	43	69	23
3	Karnataka (Bangalore)	2	81	79
4	Maharashtra (Pune)	35	86	51
5	Uttar Pradesh (Varanasi)	10	84	74
	Overall	92	324	232

Source: primary data

2.6 Results of Multiple Linear Regression Model to show the effect of Agripreneurs' Extension Services on sample Farmers Income

The purpose of this section is to analyze the factors influencing farmers' income via increase in crop yields with the help of estimating a multiple regression model specified in section 2. The model gives the following results:

$$Y = 2562 + 1.523\ X1 + 0.85\ X2 + 2.67\ X3 + 3.15\ X4 + 0.65\ X5 + 6.82\ X6$$

t value   (2.43)   (3.85)   (2.87)   (4.25)   (1.98)   (10.25)

$$R^2 = 0.98$$

The coefficient attached to the variable X6 in the above estimated equation provides us the effect of agripreneurs' services on the income of the farmers. The model is in support of our hypothesis that increase in farmers income is mainly due to the extension services of agripreneurs because only this variable distinguishes the two groups of farmers viz., a group of farmers who took extension services from agripreneurs and otherwise.

Conclusion:

This study has quantified and analysed the social benefits viz., tangible and intangible benefits at the entrepreneurial level, at the farmer level and spill over benefits of the Agriclinics and Agri Business Centre Scheme. The study reveals that Agripreneurs have enjoyed tangible benefits in terms net profit margin, rate of return on investment, net income, increase in household consumption expenditure, increase in the durable assets in their possession, improving quality of education to their children, improving health status and employment generation. There is significant difference between agripreneurs who have improved or rather gained their intangible benefits getting higher tangible benefits than the group of agripreneurs who could not improve the intangible benefits. As a result there is an improvement in investments by farmers, reduction in cost of cultivation, increased productivity, increased income and thereby savings.

Because the Scheme has immense benefits in terms of providing employment opportunities to the unemployed and bridging the gap in agricultural extension, the Government has to strengthen the loan and subsidy support by strictly enforcing "One bank branch - One Agriclinics policy" where each branch is mandated to provide support to attest one agripreneurs every year.

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Factors influencing the Return Migration of Rural Youths in South India

Parameswaranaik J[1], Sujeet Kumar Jha[2] and Manjunatha G . R[3]

Abstract

Return migration is the voluntary movement of migrants back to their place of origin. It is the logical consequences of the successful achievement of all migration-related goals and targets. It is becoming a common phenomenon in rural India. Tamil Nadu, Karnataka and Kerala states were selected for the study. Total 180 respondents were investigated and the factors influencing the return migration were categorized into two groups viz, as push factors and pull factors. Low salary and non availability of better job are the most important push factors that influenced the rural youth to come out from the urban area with an RBQ value 84.69 and 78.26 respectively. To continue in family occupation (78.43) was most significant pull factor of return migration. Free in terms of decision making (71.10), to look after age old parents & join family members (68.56) were also significant pull factors responsible for return migration.The push and pull factors influencing the return migration of the rural youth should be considered while devising suitable extension interventions for programmes like ARYA and other youth programmes in agriculture and rural development.

Introduction

Youth being passionate, vibrant, innovative and dynamic in nature is the most important section of the society. Youth shows strong passion, motivation and will power which also makes them the most valuable human resource for fostering economic, cultural and political

development of a nation. Nearly 30 crores of nation's youth reside in rural areas (CSO 2017). The rural youth population, both male and female is higher than the urban population. The total rural youth population is 296.2 million (153.2 million males and 143.9 million females) as against 130.9 million (69.5 million males and 61.4 million female) urban youth population (Census, 2011). Young women and men living in rural areas face challenges brought about by limited and unequal access to resources, healthcare, education, training, and employment. They are the major seekers of employment as they traverse their journey of life from adolescent to youth. If they didn't find a suitable opportunity in their locality of residence, then the chances of migration to other places is a common phenomenon in rural areas.

Migration is a major demographic process that has been an integral and salient feature of human history since time immemorial. It is the geographic movement of people across a specified boundary for the purpose of establishing a new permanent or semi-permanent residence. It is a sign of wide disparities in economic and social conditions between the origin and destination places (Rogaly et al. 2001). But in recent days those people who got migrated are coming back to their place of origin can be stated as return migration. It is defined as the "voluntary movement of migrants back to their place of origin". (Rajan, 2013). Return to the home destination is part of migration strategy (Smoliner et al., 2012). It is the logical consequences of the successful achievement of all migration related goals and targets. Return migration is becoming a very common phenomenon in rural areas.

The rural youths' return migration reflects considerable changes in structural and functional system of both urban and rural areas (NSSO, 2010). The factors which influenced youth to go out of the urban areas (Push factors) and the factors which attracted youths to come back to rural areas (Pull factors) are most important. The present study entitled as 'Factors influencing the Return Migration of Rural youths in South India' was conducted to examine the active push and pull factors that influence the exodus of rural youth and provide inputs to extension interventions in order to retain youth in agriculture.

Methodology

The study was conducted in southern India in Kerala, Karnataka and Tamil Nadu states. Andhra Pradesh and Telangana states were not selected because these two states have

been reorganized in 2014 and proper data were not availing. The survey has been conducted in two districts from each states purposively which rank 1st and 2nd in return migration trend. (Parameswaranaik J et al., 2020). From each district, 30 respondents were selected through quota sampling technique. Hence, a sum of 180 respondents were interviewed with the help of a semi-structured interview schedule for data collection.

Rank Based Quotient

Rank Based Quotient (RBQ) was calculated on the basis of rank assigned by each respondent against push and pull factors responsible for their return migration in the study area by using following formula-

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

Where,

fi= Frequency of farmers for the ith rank of the attribute

N= Total number of respondents

n= Total number of ranks

i= rank of attributes

Results and Discussion

Return migration is consequences of migration (Dustman, 2001) it is caused not only by economic factor but also by many others like social, political, cultural, environmental, health, education etc. Return migration is operationalized as migration that generally takes place from urban areas to rural areas.

Push factors

Table 1 clearly indicates that, low salary and non availability of better jobs are the most important factors that influenced the rural youth to come out from the urban area with an RBQ value 84.69 and 78.26 respectively. It may be due to the fact that majority of youth were offered non-skilled jobs such as watchman, waiter, ice cream suppliers and salesmen etc., in urban areas with low salaries which lead to return migration youth.

Table 1: Distribution of Return Migrated Rural Youth Based on Push Factors   **(n=180)**

Push factors	Frequency of response for respective rank										RBQ Value	Rank
	1	2	3	4	5	6	7	8	9	10		
Low salary	67	24	31	19	7	4	12	5	3	8	84.69	1
Non Availability of better job	71	13	9	17	28	15	8	11	6	2	78.26	2
Feeling of exploitation by the others	23	57	20	13	19	11	9	13	3	12	57.61	3
Leading life in urban area is too costly	43	36	17	21	13	9	5	8	10	18	53.53	4
Unsafe and uncaring work environment	29	18	7	17	21	32	15	10	14	17	47.34	5
Monotony in work	30	9	11	3	15	23	37	16	21	15	42.66	6
Peer pressure	21	13	19	16	11	9	17	12	34	28	38.58	7
Social discrimination	18	11	3	8	12	23	29	15	24	37	36.14	8
Lack of personal secured life	7	4	9	10	14	17	23	22	31	43	30.90	9
Cultural differences and disputes	3	9	0	5	4	17	12	35	39	56	23.71	10

Feeling of exploitation by the others (57.71) was another significant factor influence the return migration. The rural youth perceives that urban people just extract work by just paying nominal wage/salary, and thinks that they can save more money if they work in urban areas to rural areas. Leading life in urban area is too costly and unsafe. The uncaring work environment factors were also played an important role in return migration with an RBQ value 53.53, and 47.34 respectively.

Monotony in work in petty jobs (42.66) was a push factor for return migration. Peer pressure (38.58) was also another important push factor of return migration because many of the friends who employed with in urban area got migrated back to their village so it made them to go out of the urban area.

Factors like social discrimination (36.14), lack of personal secured life (30.90) cultural differences and disputes (23.71) have also emerged as other push factors which influence the return migration of rural youth.

Pull factors

Pull factors refer to those factors which attract youth to back to the rural areas. Table 2 shows that the urge to continue in family occupation (78.43) was most significant pull factor for return migration. Freedom in terms of decision making (71.10) by youth in their agripreneurship activities in rural areas was an important factor which prompted rural youth to revert to villages.

Table 2: Distribution of Return Migrated Rural Youth Based on Pull Factors (n=180)

Pull factors	Frequency of response for respective rank										RBQ Value	Rank
	1	2	3	4	5	6	7	8	9	10		
To continue the family occupation	3	36	29	12	15	7	11	9	3	5	78.43	1
Freedom in terms of decision making	65	23	19	14	19	17	3	8	6	6	71.10	2
To look after aged parents and join family members	57	38	21	15	16	11	7	8	5	2	68.56	3
To get employed in Agriculture and allied activities	37	40	27	16	10	19	5	8	10	8	60.05	4
Feeling of gradual elimination from home community	31	28	17	11	16	26	15	9	17	10	56.38	5

Miss the family festivals and ceremonies	26	21	19	11	26	13	24	17	14	9	48.51	6
To get marriage and settle in village	18	13	10	12	6	16	29	15	24	37	39.34	7
Better social linkage	9	3	15	2	5	12	34	53	26	1	30.67	8
Good and pleasant environment of village	5	9	2	19	13	15	32	25	27	3	27.65	9
To get employed in MGNAREGA	0	0	0	5	4	17	12	35	39	8	16.21	10

To look after aged parents and join family members (68.56) and to get employed in agriculture and allied activities (60.05) were also significant pull factors responsible for return migration. Many of the rural youth were migrated back to the rural area to take care of their ill family members or aged parents.

Feeling of gradual elimination from home community and miss the family festivals and ceremonies were also pull factors influenced the return migration with an RBQ value 60.05 and 56.38 respectively. Rural youth perceive that continuous stay in urban areas for about 5 to 10 years may slowly prompt friends and relatives in villages to forget them. The feeling of missing from festivals and ceremonies is .... pull factor for youth to return to rural areas.

To get marriage and settle in village (39.34) was another factor influences the return migration as maintaining family in urban areas was very costly.

Factors like better social linkage (30.67), good and pleasant environment of village (27.65) and to get employed in MGNAREGA (16.21) have also emerged as other pull factors which influence the return migration rural youths.

Conclusion

On the basis of the findings of the study and afore said discussions as related to the present study, it may be concluded that low salary and non availability of better job are the most important factors that influenced the rural youth to come out from the urban

area. To continue in family occupation was most significant pull factor responsible for return migration. The return migration of rural youth brings the alteration in structural and functional systems in rural areas. Their remittances are sure to have a positive impact on the social development of their place of origin. So the push and pull factors influencing the return migration of the rural youth should be considered while devising suitable extension interventions for programmes like ARYA (Attracting and Retaining Youth in Agriculture) and other youths programme for agriculture and rural development.

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Extent of Participation of Rural Youth in Farm Operations and Management Activities in Dimapur District of Nagaland

Marina[1] and S. Borua[2]

Abstract

Agriculture is an important sector in the economic development and poverty alleviation drive of many countries. Though youth have desirable qualities that can promote agriculture, most of them have strong apathy toward it. This has resulted in mass unemployment and lack of sustainable livelihood among youth. With fewer youth into agriculture, the long term future of agriculture sector is in question. The state of Nagaland predominantly has a rice based agricultural system. The farmers of Nagaland are characterized by small land holding, less cash inflow and poverty. If they cultivate rice crop with proper cultivation methods their cash inflow will be more, which will lead to reduction of rural poverty and increase in capital for further investment.Since majority of the population are youth, they can contribute to a great extent if they participate in farming operations and management. Therefore, a comprehensive study was carried out in Dimapur district of Nagaland in the year 2018 to find out the extent of participation of rural youth in farming operations and management.Purposive and random sampling techniques were used for the selection of respondents. Total 120 respondents were selected for the study. Data were collected by administering a structured schedule. Statistical tools employed to analyse the data included frequency distribution, percentage, mean, standard deviation. The study revealed that majority of the youth had medium level of participation in farming operations and management.

Keywords: Rural youth, Farm operations, Nagaland, India.

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Introduction

Agricultural development is recognized by many as the only means through which rural development is possible as majority of the country's workforce is engaged in agriculture. It is therefore, necessary to analyse the role which the youth can play in agricultural development. Youth is usually determined in terms of age. According to National Youth Policy (2014), youths is defined in the age group of 15-29 years comprising 27.5 per cent of the population. Traditionally the rural youth learned the technique of agriculture from their parents. Now the situation is different; the educated youths have to teach adults the art and science of modern farming. That is why Deshmukh (1961) rightly stressed when he said "Bogged in tradition and ridden with prejudice, the rural world is waiting for the break through which only the clear vision and fresh vigour of the youths can provide." Youth are very important resources for every nation especially for sustaining agricultural productivity, an important sector for the development of a country.

Brooks et al. (2012) and Kararachet al. (2011) found that the creation of non-agricultural jobs may not happen in the short run; as such agriculture is likely to continue being a source of employment and livelihood in the medium to long term especially for countries that heavily depend on agriculture.

The number of youth is over 1.8 billion in the world today, 90% of whom live in developing countries, where they tend to make up a large proportion of the population and needs to be empowered since this is an important means of improving food security, youth livelihoods and employment. But, unfortunately this category of people is virtually left out in policies and programmes. There is insufficient youth participation in the agricultural sector (Mangal, 2009) even though this class of people is the most productive of any society as it contains people in the prime of their lives physically and mentally. Agriculture being one of the foundation pillars of any society can only function as such if this insufficient youth participation is reversed. For instance improving youth productivity in the agricultural sector and exploring effective livelihood diversification is imperative. Also, investing in the youth by promoting good habit is crucial if they are to realize their full potential. The youth with the dynamism and flexibility has the potential as an agent of positive change and this should be ensured by development programmes.

The state of Nagaland predominantly has a rice based agricultural system. The farmers of Nagaland are characterized by small land holding, less cash inflow and poverty. If they

cultivate rice crop with proper cultivation methods their cash inflow will be more, which will lead to reduction of rural poverty and increase in capital for further investment. The production and productivity of rice could be brought through increased adoption of modern technology and increasing the quality participation of rural youths in this sector. Further, the participation of rural youths in rice cultivation will be motivating factor for developing a sense of work culture for the youths of the non-sampled area and also for generating income through such production oriented activities.

From the above discussion it is clear that youth can be a considerable force which can be instrumental in bringing necessary changes in agriculture. But now - a - days agriculture in its present state appears not to be attractive to the youth. Thus it was felt that it will be worthwhile to study the extent of participation of the rural youth in farming also to find out in which operations or activities rural youth take part.

Methodology

The study was conducted in Dimapur district of Nagaland. A purposive cum random sampling design was followed for selection of respondents for the study. Under Dimapur district 2 sub-divisions namely Medziphema and Chumukedima were purposively selected. Two villages from each sub-divisions were selected randomly. Thirty respondents were selected from each of four villages by using random sampling procedure. Thus, the total sample size constituted 120 respondents (youth between 15-29 years).

The extent of participation of rural youth in farm operations and management activities was measured in terms of sixteen and nine dimensions respectively. The data collected were scored and analyzed using frequency and percentage.

Based on this index, the respondents were classified in to three categories as given below:

Category	Range
Low	$(\bar{X} - SD)$
Medium	$(\bar{X} \pm SD)$
High	$(\bar{X} + SD)$

The scale developed by Gill (1986) was used with slight modification.

Results and Discussion

i) Extent of participation in farm operations

The extent of participation of the respondents in farm operation is the frequency at which the respondents were taking active part in various farm operations.

From Table 1, it was found that (20.83%) of the respondents regularly participated in the land preparation followed by 60.83 per cent who participated sometime and (18.33%) never participated. In case of preparation of seed bed, 17.5 per cent regularly participated followed by 54.16% who participated sometime and 28.33 per cent never participated at all. 16.66 per cent of the respondents regularly participated on seed sowing followed by 67.5 per cent who sometime participated and 15.83 per cent who never participated in seed sowing. It was also observed that 16.66 per cent regularly puddle in the main field followed by 39.16 per cent who sometime puddle and 44.16 per cent never puddle in the main field. In case of application of fertilizer and manure, 10 per cent and 9.16 per cent of the respondents regularly apply fertilizer and manure followed by 28.33 per cent and 39.16 per cent of the respondents who apply sometime and 61.66 per cent and 51.66 per cent of the respondents never apply at all. Moreover it was seen that 19.16 per cent, 20 per cent, and 15 per cent of the respondents regularly participated in weeding, bunding and spraying/ dusting respectively whereas 25.83 per cent, 41.66 per cent, 63.33 per cent, never do those activities. Relating to harvesting very few (34.16%) participated regularly. In case of preparation of bundles, transportation of bundles from field to threshing floor, storage of straw, grains and transportation of storage to market majority of the respondents never participated in all this field farm operation.

## Table 1 Distribution of respondents based on frequency of extent of participation in farm operations

Sl. No.	Category	Regularly		Sometime		Never	
		f	%	*f*	%	*f*	%
1.	Land preparation	25	20.83	73	60.83	22	18.33
2.	Preparation of seed bed	21	17.5	65	54.16	34	28.33
3.	Seed sowing	20	6.66	81	67.5	19	15.83
4.	Puddling in main field	20	16.66	47	39.16	53	44.16
5.	Application of fertilizers	12	10	34	28.33	74	61.66
6.	Application of manures	11	9.16	47	39.16	62	51.66
7.	Weeding	23	19.16	65	54.16	31	25.83
8.	Bunding	24	20	46	38.33	50	41.66
9.	Spraying/ Dusting	18	15	26	21.66	76	63.33
10.	Harvesting	41	34.16	66	55	13	10.83
11.	Preparation of bundles	30	25	63	52.5	27	22.5
12.	Transportation of bundles from field to threshing floor	25	20.83	57	47.5	38	31.66
13.	Threshing	20	16.66	47	39.16	53	44.16
14.	Storage of straw	17	14.16	39	32.5	64	53.33
15.	Storage of grain	33	27.5	41	34.16	46	38.33
16.	Transportation of storage to market	9	7.5	18	15	93	77.5

The Table 1.1 shows the extent of participation of the respondents in farm operations. An examination of the table reveals that majority of the respondent 65.83 per cent had medium level of participation followed by 20 per cent high and 14.16 per cent low

Table 1.1 Distribution of respondents based on extent of participation in farm operations

Sl. No.	Category	Score range	Frequency	Percentage	Mean	S.D
1	Low	<4.35	17	14.16		
2	Medium	4.35-20.93	79	65.83	12.64	8.29
3	High	>20.93	24	20		
	Total		120	100		

The mean score of the respondents was 12.64 with standard deviation of 8.29. Thus it can be concluded from the findings that majority of the respondents showed medium extent of participation in farm operations.

Participation in farm operations Percentage
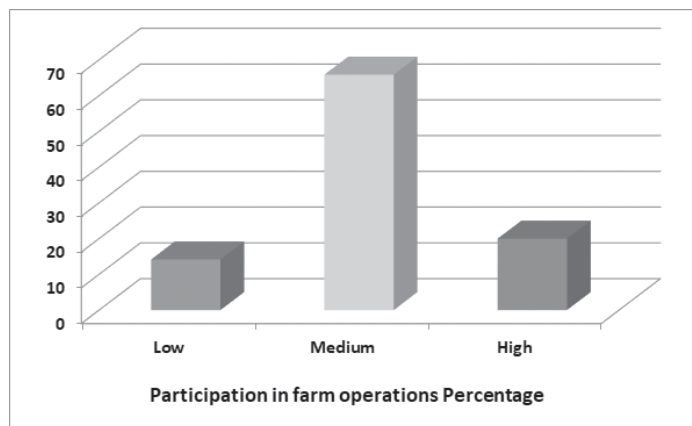
ii) Extent of participation in management activities

The extent of participation of respondents in management activities is the frequency at which the respondents took active part in various farm management activities.

From the Table 2, it was observed that majority of the respondents (47.5%), (45.83%), (43.33%), and (48.33%) regularly participated in distribution of labour in different farm activities, keeping contact/ vigilance for obtaining proper share from tenants, supervising labours in their day to day activities and allocation of funds to meet the expenses on different farm activities. Very few respondents (8.33%), and (5.33%) regularly participated in maintaining records of different farm produce and farm inputs. It was also observed that 16.66 per cent, 24.16 per cent, and 32.5 per cent of the respondents regularly

participated in collection or procuring inputs like seeds/ fertilizers/ plant protection chemicals from different agencies, contacting wholesaler/ middle man for selling of farm produce and arrangement of funds to meet the expenses on different farm activities followed by 39.16 per cent, 30.83 per cent and 27.50 per cent who sometime participated and (44.16%), (45.00%), and (40.00%) of respondents who never participated in those management activities.

Table 2 Distribution of respondents based on frequency of extent of participation in management activities

Sl. No.	Category	Regularly		Sometime		Never	
		F	%	*f*	%	*f*	%
1.	Distribution of labour in different farm activities	57	47.5	29	24.16	34	28.33
2.	Collection or procuring inputs like seeds/ fertilizers/ plant protection chemicals from different agencies	20	16.66	47	39.16	53	44.16
3.	Contracting wholesaler/ middle man for selling of farm produce	29	24.16	37	30.83	54	45
4.	Maintaining records of different farm produce	10	8.33	22	18.33	88	73.33
5.	Maintaining records of different farm inputs	7	5.83	21	17.5	92	76.66
6.	Keeping contact for obtaining proper share from tenants	55	45.83	32	26.66	33	27.5
7.	Supervising labour in their day to day activities	52	43.33	43	35.83	25	20.83
8.	Allocation of funds to meet various expenses on farm activities	58	48.33	32	26.66	30	25
9.	Arrangements of funds to meet the expenses on different farm activities	39	32.5	33	27.5	48	40

It is evident from the Table 2.1 that majority of the respondents had medium (65.83%) level of participation in management activities. About 17.5 per cent of the respondents had high participation and the rest 16.66 per cent had low level of participation in management activities.

The mean score of the respondents was 7.55 with standard deviation of 3.99. Thus, it can be concluded from the findings that majority of the respondents showed medium extent of participation in management activities.

Table 2.1 Distribution of respondents based on extent of participation in management activities   n=120

Sl. No.	Category	Score range	Frequency	Percentage	Mean	S.D
1	Low	<3.56	20	16.66		
2	Medium	3.56-11.54	79	65.83	7.55	3.99
3	High	>11.54	21	17.5		
	Total		120	100		

Participation in management activities
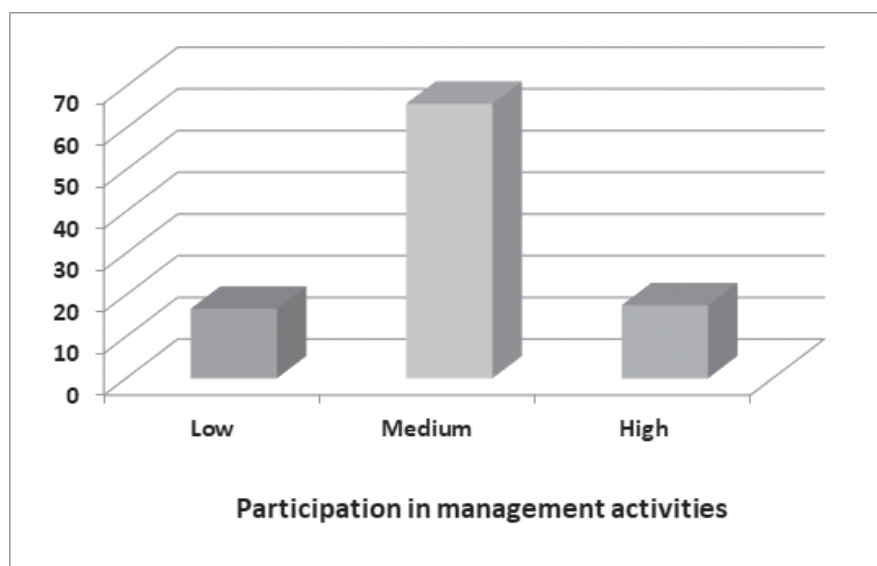
Conclusion

It may be concluded that majority of the rural youth had medium level of participation in farm operations as well as management activities which suggest that extension experts should continue putting their efforts targeting this vibrant portion of the population so that their energy can be tapped and utilized for the development of agriculture.The extension functionaries may also communicate to the rural youth who are practicing farming with the help of ICTs so that they can get necessary information as and when required.

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Marvels of Ground Water Sharing - A Case Study of Farmers of Kummaravandlapally Village in Anathapur District of Andhra Pradesh

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Abstract

Groundwater is the preferred source of irrigation for many smallholder farmers on its involves its low capital cost. The depletion and contamination of groundwater require the development of a robust framework for utilization of groundwater and management practices for sharing ground water by communities. The present case study explains the success story of kummaravandlapally- a drought prone village in Anathapur district of Andhra Pradesh in a project initiated by Watershed Support Services and Activities Network (WASSAN) which aimed to increase producivity crops by providing protective irrigation and promote sharing of ground water by farmers. This study shows that the farmers increased their profit managining by sharing ground water, shifted to less water intensive crops and became model for other farmers in the area.

Introduction

Groundwater is the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers. India is more dependent on water pumped from aquifers than any other nation.

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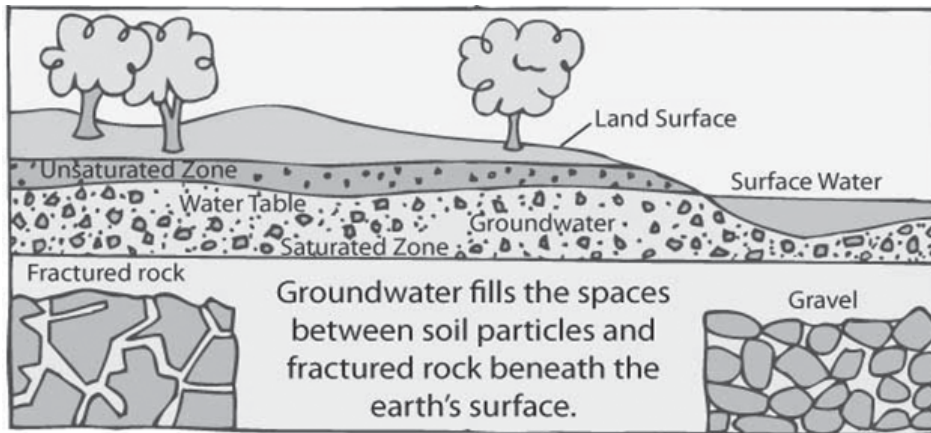[2&3] Project Coordinator, WASSAN, Tarnaka, Hyderabad.

Fig 1: Image of Ground water

Groundwater has emerged as the primary democratic water source and poverty reduction tool in India's rural areas. Its importance as a precious natural resource in the Indian context can be gauged from the fact that more than 85 percent of India's rural domestic water requirements, 50 percent of its urban water requirements and more than 50 percent of its irrigation requirements are being met from ground water resources. The aquifers that host groundwater are the primary buffers against drought for both human requirements, and crop production.

Why ground water sharing

General Scenario

More than half of India's total area suffers from high baseline water stress and very low water storage (including reservoirs and groundwater) per capita. India uses some 230 km3 of groundwater per year, making it the world's largest user of groundwater (World Bank, 2012). In India, about 90% of the groundwater extracted is used for irrigation-a much higher proportion than the global average of 40%.

Groundwater is a common resource pool that ensures economic security by ensuring livelihood security across the globe. It is also considered as the buffer source of irrigation which is indiscriminately exploited, leading to its depletion over the years. India is the major consumer of groundwater. This is indicated by the rising numbers of tube well structures from 1% in 1960's to 40% in 2006 - 07, in irrigated areas and the net draft of

ground water was either close to or excess to the net availability of ground water, thereby indicating an alarmingly overexploitation of the available ground water resources. The state of Andhra Pradesh is given the tag of a water scarce state due to its deteriorated situation. As per the UN standards the permissible levels for drawing ground water is 40%, but the state draws about 58% indicating that most of the policies have contributed to exploitation rather than addressing ground water depletion. To decrease the ground water depletion and to protect farmers from crop loss the "protective irrigation" systems have been developed.

Scenario at Anantapur

Variability in rainfall distribution results in frequent crop losses in low rainfall areas like Anantapur. The impending Climate Change further accentuates these disturbances and crop failures. Depending on the span of drought spell, the crop losses may range from moderate to total failure. These failures result into loss of investment making farmer indebted, leading to a substantial decline in productivity. Failures in early stages might also increase the investments as farmers have to re-sow the crop. This often results into acute fodder scarcity affecting the livestock sector also.

Karuvu Kavacham - The Initiative

Karuvu Kavacham, a program insulating crops and farmers against climate variability. It was designed to achieve drought proofing, using a strategic approach in a given area. Some experiences have been generated in this strategic framework as a part of the World Bank and Government of AP supported program called AP Drought Adaption Initiative (APDAI) implemented in Anantapur and Mahabubnagar districts and under National Agriculture Innovation Project (NAIP), anchored by CRIDA and WASSAN as a lead agency.

This system involved voluntary compliance of farmers in pooling and sharing of groundwater even with farmers who do not own a bore well, for Kharif crop stabilization. Access was created to large number of farmers who do not own bore wells, for protection of their Kharif crops. Necessary facilitation processes, program structure, incentives and investment requirements were assessed in partnership with communities. The overall objective of the program was to secure rainfed crops and farmers livelihoods irrespective of the variations

in rainfall by developing a mechanism of sharing and conserving the groundwater and economical usage of the same.

Kummaravandla Pally

Kummaravandla pally is a village in Gandlapenta Mandal of Anantapur district in Andhra Pradesh. This village houses about 53 families and 41 farmers. In case of farmers who do not own bore wells, the produce from the crops and the economic state of their families was at the mercy of rains. While this was the scenario with this group of farmers, farmers who owned bore wells began to realize that the increasing number of individual bore wells would cause depletion of ground water levels very soon in the near future. This thought process paved way for the resolution "Let us share ground water to sustain our crops", thus leading to the concept of networking of bore wells for ground water sharing.

Kolagunti Ummadi Neeti Yejamani Sangam

The concept of ground water sharing swung into action when the farmers in the village identified the following problems.

* Cultivation of crops that requires excess of water;

* Poor awareness regarding usage of bore wells and sprinklers for rainfed crops;

* Poor awareness regarding expansion of cultivation if ground water is made available

* Poor awareness regarding the requirement of livestock for agriculture and concept of sharing bore wells for agriculture.

A group of 25 farmers; 15farmers who own 8 bore wells and 10 who do not own bore wells formed a committee called "Kolagunti Ummadi Neeti Yejamani Sangam". The committee laid down certain conditions for its functioning and practicing networking.

The conditions for Functioning of the Committee Included:

* The representative of the committee would be a non-bore well (change this) farmer and a bore well farmer

* A joint account should be opened in the names of the representative bore well and non-bore well farmer

* The contribution towards share capital should be equal from the bore well as well as the non-bore well farmers.

* Annual contribution towards the committee fund will be decided by the committee. It will be based on acres. If a farmer with 1 acre of land contributes Rs 100, farmer with 2 acres of land contributes Rs 200.

* One farmer from the group will be elected for monitoring the schedule for water distribution.

The Conditions for Practicing Networking Included

* The irrigated area under bore wells should not be increased from the current status, whereas the critically irrigated area can be increased

* In the critically irrigated areas, water should be given during four phases of cultivation of crops and it is a must to provide critical irrigation for a minimum of 3 phases. The four phases are :

    * First phase when the seed is sown

    * Second phase when the flowers bloom

    * Third phase when the pod is developed

    * Fourth phase the harvesting of crop.

* Crop water budgeting exercise should be conducted before sowing of seeds

* If paddy is to be cultivated, the System of Rice Incentive (SRI) should be practiced.

* Micro Irrigation system such as drips and sprinklers should be used in order to conserve water

*   No new bore wells should be dug for 10 years without the permission of committee.

*   During the period of critical irrigation (June to November), in case of any problem with the working condition of the bores, the expenses for its maintenance will borne by the common fund of the committee with collective permission from the committee. During the rest of the year the expenses for its maintenance will be borne by the respective farmers.

The Impact

General Profile

The group of 25 farmers comprises of 40% (10) of farmers who do not own bore wells and 60% (15) of farmers who own bore well. About 56% of farmers own 1 acre of land, 36% own 2 acres, 4% own 2.5 acres and 4% own about 4.75 acres of land.

Scenario in the Past

In the era prior to ground water sharing, the average investment on crops per acre of land was about Rs. 11,600. The average value of the produce per acre of land was about Rs. 18,900 and the average profit per acre of land was about Rs 7,200.The farmers who do not own a bore well have very low profit margin.
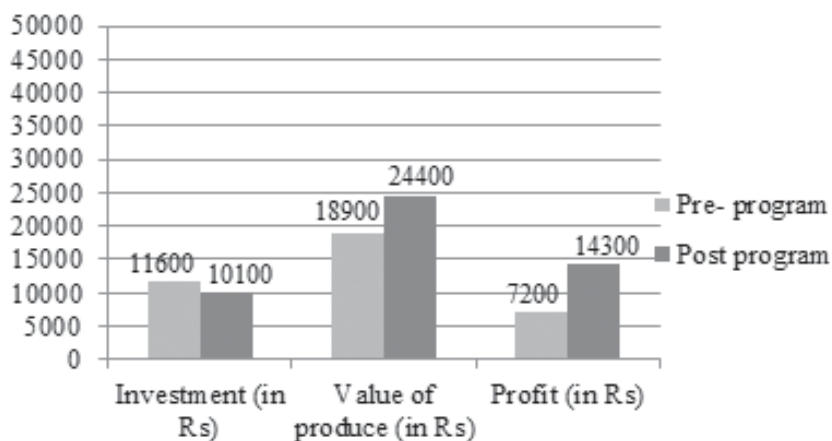

Fig. 2 Pre and Post Scenario of ground water sharing

The produce of the crop sown was better only when the rains were merciful. The farmers who owned bore wells had different sets of woes; they had issues of wastage of water on account of leakages. The leakage was due to lack of proper pipelines. As a result, the area under irrigation was less.

Current Scenario

In the current scenario, the average investment per acre of land is about Rs 10,100. The average value of the produce per acre of land is Rs24,400 and the average profit per acre of land is aboutRs14,300. The average profit percentage is about 146% per acre of land. It is to be noted that ground water sharing has enhanced their profit margin by two folds.

Assets

About 84% (21) of farmers in this group of 25 have invested their profits in building up their assets such as house, land, education, health, vehicle, agriculture, television, cattle and cash deposits. The average worth of these assets is about Rs 38,358. The details of average worth of each asset owned by the farmers are given in Table 1. However, when we narrow down our focus to the assets of the non-bore well farmers 6 out of 10 i.e. 60% of the non-bore well farmers have invested their profits in assets predominantly in house, land, television, cattle, agriculture and as cash deposits. This lot of farmers prior to groundwater sharing who barely managed a meager amount as profit, now own assets of an average worth of Rs 50,800.

Table: 1 Details of assets of farmers at Kummaravandla Pally

S.No	Asset	Average Worth (in Rupees)
1	House	51,000
2	Land	1,27,000
3	Education	40,000
4	Health	53,000
5	Agricultural Equipment	31,000
6	Cattle	65,000
7	Cash Deposit	28,300
8	Television	15,000
9	Vehicle	25,000

Crop Pattern

The crop pattern consists of 9 varieties of crops practiced in various combinations. These included groundnut, red gram, jowar, chrysanthemum, mulberry, castor, paddy, mango plantations and tomato. About 52% farmers sow the combination of groundnut, red gram and jowar with red gram and jowar being the border crops. Prior to ground water sharing, farmers who do not own a bore well prefers groundnut. In the current scenario, they look beyond groundnut by choosing other crops such as red gram, jowar (as intercrop), tomato and mango plantation along with groundnut. When we look at the choice of crop of the farmer who owns a bore well, the choice of crops includes mulberry, paddy, groundnut, red gram, jowar, castor, mango plantations and chrysanthemum. The details of the amount invested, value of produce and profit for the crops for per acre of land are given in Table 2.

Table: 2 Details of the average investment, value of produce and profits of crops for per acre of land

S.No	Crops	Investment (in Rs)	Value of Produce (in Rs)	Profit (in Rs)
1	Red gram	5,080	13,600	8,520
2	Mulberry	19,400	38,400	19,000
3	Groundnut, Red gram, Jowar	9,540	23,550	14,010
4	Groundnut, Jowar, Tomato	9,720	64,100	54,380
5	Paddy, Groundnut, Chrysanthemum	12,820	18,840	6,020
6	Groundnut, Red gram, Jowar, Castor, Mango plantation	10,230	22,800	12,570
7	Mulberry, Groundnut, Red gram, Jowar	15,280	38,900	23,620
8	Paddy, Mango plantations	10,900	25,500	14,600
9	Groundnut, Red gram, Jowar, Mango Plantations	5,770	11780	6,010
10	Groundnut, Red gram, Jowar, Castor	12,290	26,000	13,710

Ground Water Levels

According to a study conducted by Department of Rural Development and Social Work, Sri Krishna Devaraya University, Anantapur it was noted that there was an increase in water use efficiency which was due to the change from field channels to pipeline system. The pipeline system has facilitated linking of different bits of the farmers. A decline in cultivation of paddy and shift towards less water intensive crops was observed. Critical irrigation has not only helped in preventing loss of crop, but has also resulted in increased productivity of groundnut. Ground water levels were noted to be stable and have shown certain level of improvement from 32.04 ft in Apr 2011 to 29.25 ft in Apr 2012 and from 27.44 ft in Jan 2012 to 25.27 ft in Jan 2013. The factors cited for sustainability were:

* No construction of new wells causing failure of existing wells;

* Assured water in times of failure/repair of any one bore well;

* Water is being saved due to pipelines that were given for critical irrigation

Convergence

Through sharing of groundwater farmers realized the power of synergy and available benefits under defferent projects and schemes which facilitated convergence of goverment efforts at the grassroots level.

The happy farmers….

Mr. K Sivaramappa

K Sivaramappa, a farmer who does not own a bore well is a happy man now. He owns 1 acre of land. In 0.5 acres he cultivates groundnut along with jowar as inter crops and tomato in the remaining 0.5 acres. He had invested Rs. 9,720. The value of the produce for this investment was Rs. 64,100, giving him a profit of a wholesome Rs. 54,380. Groundnut was worth Rs. 17,500 (5 bags at Rs 3500/bag) with a profit of Rs. 12,300; jowar was worth Rs. 100 with a profit Rs. 80 and tomato was worth Rs. 46500 (3 yields of 600 kgs at Rs. 35/kg; 450 kgs at Rs. 30/kg and 600 kgs at Rs. 20/kg) with a profit of Rs. 42000. Prior to ground water sharing, Sivaramappa

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opted for only groundnut in1 acre of his land with an investment of Rs. 8,800 his yield was Rs. 12,000 with a profit of Rs 3,200, this is the scenario only when the rains showered considerably. Sharing of ground water and thoughtful crop selection manifested in the form of surging profits for him. His assets currently are a house worth Rs. 50,000, cattle worth Rs. 35,000 and he has also invested about Rs. 50,000 on agricultural equipment. Sivaramappa who used to earn a meager profit is now the happy owner of assets of average worth Rs. 45,000

C Mallikarjuna

C Mallikarjuna owns a bore well and about 1 acre of land. He cultivates groundnut along with red gram and jowar as inter crops in this 1 acre of land. He had invested Rs. 9,540. The value of produce for this investment was Rs. 23,550 giving him a profit of Rs. 14,010. Groundnut was worth Rs. 19,250 (550kgs at Rs 35/kg) with a profit of Rs. 10,450; Red gram was worth Rs. 4,200 (120kgs at Rs 35/kg); Jowar was worth Rs. 100 with a profit of Rs. 80. Prior to Ground water sharing, Mallikarjuna in his 1 acre of land used to cultivate paddy and vegetables. His total investment then was Rs.18, 400. His produce for this investment was Rs. 27,000 with a profit of Rs. 8,600. Paddy was worth Rs. 12,000 with a profit of Rs. 2,100 and vegetables were worth Rs. 15,000 with a profit of Rs. 6,500. Thus, by sharing ground water sharing his profits has risen up by more than 1.5 folds. His asset possession presently includes a House worth Rs. 70,000 and a Television worth Rs. 10,000.

These are the happy tales of two farmers of Kummaravandlapally. They are not alone, along with them ground water sharing has enhanced the socio economic status of 23 other farmers in Kummaravandlapally.

Conclusion

The success of 25 farmers from Kummaravandlapally village has been a great motivator for other farmer groups in the neighboring villages and they stand out as a wonderful example for sustaining groundwater to sustain crops. It was found that Karuvu Kavacham and Kolagunti Ummadi Neeti Yejamani Sangam enabled farmers to cope up the crop failure by providing irrigation at most critical stage. Farmers received 5 micro irrigation sets from Andhra Pradesh Micro Irrigation Project (APMIP) for a contribution of 10% from farmers. The National Food Security Mission (NFSM) provided redgram and groundnut seeds to farmers. Similarly, water storage and conservation structures under MGNREGS and NADEP compost pits helped farmers to enhance their farming activities and get more profits. Sharing of groundwater by farmers in Kummaravandlapally village has also promoted a shift from high water usage crops to low water usage crops.

In the study area, about 56 per cent of farmers own one acre of land and the average profit is about 146% per acre of land. It is to be noted that ground water sharing has enhanced their profit margin by two folds. Increase in water use efficiency due to usage of drip system of irrigation and shifted towards less water intensive crops. Finally those 25 farmers became ideal example for other village farmers to initiate these methods to improve their livelihood.

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Relational analysis of Selected Entrepreneurial Characteristics of Oil Palm Growers with the Level of Adoption.

Neelaveni, S.[1] Venkatarao P.[2] and Prasad M.V.[3]

Abstract

Oil palm is the crop of present and future vegetable oil economy of world as well as India. The present study was conducted with main objective of studying the farming performance of oil palm growers in terms of level of adoption and entrepreneurial characteristics and how their entrepreneurial characteristics are influencing the level of adoption. Correlation analysis revealed that management orientation, decision making ability, innovativeness, training received, achievement, motivation, information seeking, cosmopoliteness, market orientation, self confidence, value orientation, education, socio economic status, extension contact, socio economic status, education and risk orientation were found positive and significant relationship with extent of oil palm cultivation at 1 per cent level of significance. Leadership status had shown non significant relationship with level of adoption. This paper suggests research, extension and administrative strategies to improve oil palm cultivation.

Introduction

Oil palm is known to be the highest edible oil yielding perennial crop. It produces two distinct oils i.e palm oil, and palm kernel oil. Oil palm is the crop of present and future vegetable oil economy of world as well as India. Palm oil has good consumer acceptance as cooking oil because of its price advantage. It is good raw material for manufacturing oleo chemicals used in making soaps, candles, plasticizers, etc. It has also a variety of uses ranging from edible oil, cosmetics, pharmaceuticals, to bio fuel to bio lubricants. The

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present study was conducted with main objective of studying the farming performance of oil palm growers in terms of level of adoption and entrepreneurial characteristics and how their entrepreneurial characteristics are influencing the level of adoption.

Materials and Methods

Ex post facto research design was followed in present investigation. East Godavari, West Godavari and Krishna districts were selected from Krishna - Godavari zone of Andhra Pradesh investigation on the basis of highest coverage of the area under oil palm cultivation. Two mandals from each district, two villages from each mandal thus 12 villages were selected from three districts randomly. A total of 180 oil palm growers from each village were selected randomly. Fifteen independent variables and five components of farming performance index were identified for the study. Data were collected from the respondents face to face through pre-tested structured interview schedule individually.

Results and Discussion:

Correlation and prediction of contribution of selected entrepreneurial characteristics of Oil palm growers with the level of adoption were studied and correlation between selected entrepreneurial characteristics with the level of adoption Null hypothesis - There will be no significant relationship between the scores on entrepreneurial characteristics and the scores on level of adoption and empirical hypothesis- there will be a positive and significant relationship between the scores on entrepreneurial characteristics and the scores on level of adoption were tested. Table 1 shows correlation and multiple linear relationships between selected entrepreneurial characteristics and level of adoption . Correlation analysis revealed that management orientation, decision making ability, innovativeness, training received, achievement motivation, information seeking, cosmopoliteness, market orientation, self confidence , value orientation, education, socio economic status, extension contact, socio economic status, education and risk orientation were found positive and significant relationship with extent of oil palm cultivation at 1 per cent level of significance. Leadership status had shown non significant relationship with level of adoption. Null hypothesis was accepted for the variable leadership status and rejected for the remaining variables based on the relationships arrived.

Table 1: Correlation between belected entrepreneurial characteristics with the level of adoption

S.No.	Variable	r-value
1.	Education	0.3076**
2	Socio -economic status	0.2578**
3	Extension contact	0.2458**
4	Training received	0.3914**
5	Cosmopoliteness	0.3447**
6	Information seeking	0.3475**
7	Leadership status	0.1377NS
8	Innovativeness	0.4233**
9	Risk orientation	0.2215**
10	Self confidence	0.3301**
11	Market orientation	0.3424**
12	Management orientation	0.5988**
13	Achievement motivation	0.3569**
14	Value orientation	0.3266**
15	Decision making ability	0.487**

NS-Non Significant   *significant at 5 percent level   ** Significant at 1 percent level

Education had shown positive and significant relationship with level of adoption of recommended practices of oil palm cultivation. Oil palm growers having more education usually exposed to all kinds of information sources and help them to increase their knowledge which made them to adopt all recommended practices. This might be the reason for positive and significant relationship between education and level of adoption. (Rao, 1985) Socio economic status had shown positive and significant relationship with level of adoption. Because of more material possession and financial resources, oil palm growers migh have adopted all the recommended practices. This might be the reason for positive and significant relationship between socio economic status and level of adoption.

Training received, extension contact, information seeking, and cosmopoliteness were also found to be positive and significant relationship with level of adoption. Oil palm growers who received training and had more extension contact, information seeking, and cosmopoliteness might have gained knowledge on the recommended practices. This might be the reason for positive and significant relationship i.e. between above said variables and level of adoption. Innovativeness was found to be positive and significant relationship with the level of adoption. Oil palm growers having more innovativeness usually adopt the recommended practices earlier than other members. Decision making ability was found to be positive and has significant relationship with the level of adoption. Oil palm growers having more decision making ability would have adopted all the recommended practices. Hence, positive and significant relationship was observed between decision making ability and level of adoption. (Surgeon ,1989), (Goud,1990).

Prediction of the contribution of selected entrepreneurial characteristics with the level of adoption was tested. The Null hypothesis- additional sum of squares of regression added by the independent variable X1 to X15 is zero in explaining the amount of variation in level of adoption. The Empirical hypothesis - from the scores of 15 independent variables will explain a significant amount of variation in level of adoption.

Table2. Multiple linear regression analysis for prediction of independent variable that contribute for variation in level of adoption

S.No.	Variable	Regression co efficient(b)	Standard error of b	t-value
1.	Education	0.290	0.126	2.299*
2	Socio -economic status	0.675	0. 287	2.353*
3	Extension contact	1.102	0.436	2.527*
4	Training received	2.438	1.223	1.994*
5	Cosmopoliteness	0.116	0.790	0.140NS
6	Information seeking	0.052	0.319	0.165NS
7	Leadership status	0.335	0. 343	0.979NS
8	Innovativeness	0.609	0.306	1.990*

9	Risk orientation	0.154	0.464	0.334NS
10	Self confidence	0.104	0.227	0.457NS
11	Market orientation	0.277	0.283	0.981NS
12	Management orientation	0.470	0.134	3.511**
13	Achievement motivation	0.285	0. 384	0.743NS
14	Value orientation	0.183	0.400	0.458NS
15	Decision making ability	0.278	0.230	1.210NS

R^2 =0.5705   F=14.48

NS-Non Significant   *significant at 5 per cent level   ** Significant at 1 per cent level

The result of multiple linear regression analysis for prediction of independent variable that contribute for variation in level of adoption were presented in the Table 2. Multiple regression analysis revealed that the variables namely education ($P<0.05$), extension contact ($P<0.05$), training received ($P<0.05$), innovativeness ($P<0.05$) and management orientation ($P<0.01$) were found to have positive and significant regression coefficients. The value of R^2 (0.5704) indicates that all the independent variables put together explain the variation on level of adoption to the extent of 57.04 per cent. The computed F value (14.48) was found to be significant.

 Based on the R^2 variance ratio the null hypothesis was rejected and concluded that the data supported the original proposition that the score on15 independent variables explained a significant amount of variation in level of adoption. Training received and extension contact were the most important determinants of level of adoption with unit change in these variables, there was a change of 2.43 and 1.1 units, respectively in the level of adoption.

Strategy for improving area under Oil palm cultivation:

Various activities should be properly planned and carried out at various fronts.

Activities to be carried out on research front

1. Researchers should develop drought tolerant varieties which will help the oil palm growers to get more yields even during the period of water scarcity.

2. Widening the germplasm should be intensified by the researchers to identify stress tolerant and high yielding varieties.

3. Researchers should identify elite palms for quality seed production.

4. Researcher should evolve suitable agricultural implements (eg. Harvesting tools) for oil palm cultivation.

5. Research should be conducted on by-product utilization and intercrops to explore and utilize the entrepreneurial characteristics of oil palm growers.

Activities to be carried out at development front

1. Development agencies like Department of Horticulture, Private agencies should generate trained manpower in the field of oil palm cultivation. Maintenance of demonstration plots for every five villages to demonstrate the recommended oil palm cultivation practices to oil palm growers.

2. Development agencies should produce sufficient number of oil palm seedlings to meet the demand of seedlings from the oil palm growers. Growers awareness campaigns should be conducted to extend the area under oil palm cultivation.

3. Training programmes should be conducted to impart skills to the oil palm growers in oil palm production, harvesting of FFB, management of pests and diseases.

4. Staff of Department of Horticulture should increase their field visits. They should give more emphasis on optimum utilisation of resources to get more profits.

5. More number of collection centres should be established to avoid transportation problem from the oil palm grower's side.

6. Supervision and monitoring of field staff is needed during weighing the fresh.

7. Immediate payments should be made by processing units for fresh fruit bunches of oil palm.

Activities to be carried out at administrative front

1. Assured power supply and generator subsidy must be given on priority basis to oil palm growers.

2. Minimum support price should be continued for the benefit of oil palm growers to sustain oil palm cultivation.

3. Increased import duty on crude palm oil should be maintained to prevent dumping of it on large scale.

Thus concerted efforts of Research Organisation, Department of Horticulture and Oil palm promoters with proper Government policies can help development of oil palm growers.

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Perceptions of Farmers on Resilience to Stress: A Study in Rajasthan

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Abstract

In the Indian context, farmers constantly undergo occupational stress due to frequent drought, erratic rain fall, non-availability of timely agricultural inputs, agricultural loans etc. In this context, a study was conducted to understand the perceptions of the farmers and how they cope up with the stress and what factors contribute to relieve the stress. The study was conducted in Dausa and Tonk districts of Rajasthan state. A total of 202 farmers were interviewed and their responses are analyzed using descriptive and factor analysis techniques. A total of six factors are successfully constructed using factor analysis and the factors are named as 1. Agriculture activities that supplement additional income 2. Social Factors 3. Factors related to family 4. Religious factors 5. Cultural factors 6. Health factors. The results show that several factors are responsible for reduced stress. Which included farmers welfare schemes, funny moments, love from family members going to pilgramages and good health.

Introduction

Agriculture has been an important component of India's economy and more so in rural areas for centuries. This sector provides direct or indirect employment to 48 percent of India's population and contributes around 13 percent to the GDP (Economic survey, 2019-20). Acceleration of growth in the agricultural sector remains a key policy concern in India, since growth in agriculture is crucial to the livelihood of millions of rural poor. It is also pertinent to know that for achieving 8 percent of growth in Indian economy, agriculture

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should grow at 4 percent. The growth in agriculture sector has been impressive in the recent decades. During 2019-20, the gross Value Added (GVA) by agriculture & forestry was Rs. 32, 57, 443 crore accounting to 17.76 percent of total GVA. India has set a food grain production target of 298.3 million tonnes for 2020-21 fiscal year against 291.95 million tonnes in 2019-20 and 285.20 million tonnes in 2018-19. India is a leading producer of important agricultural commodities and is the second largest fruit producer in the world. Although the contribution of its agricultural sector has declined to around 13 per cent from more than 50 per cent during independence, it is still way higher in comparison to the western countries.

About to 86 per cent of farmers in our country are small and marginal farmers. India has over 92 million small holdings or nearly 21 per cent of the world's small holdings of 450 million. Any development strategy in consideration should be able to address the specific issues pertaining to these resource-poor farmers.

Non remunerative prices, low productivity, poor knowledge base towards production technology, access to credit, input, market and the below-par adoption behaviour are the main issues that our farmers face. Due to small quantity available for marketing and resultant low bargaining power, most of our small and marginal farmers are in the clutches of market intermediaries.

These small holders are disadvantaged lot for various problems like availability of limited financial resources, lower marketable surplus, lack of technical know-how and information, disguised unemployment, distress sale and poor access to market. Under the present dispensation of demand for high value crops, addressing these constraints faced by small holders is vital for their inclusion in the development process of Indian agriculture and rural India.

In the colonial rule, Indian agriculture suffered but after independence it saw a significant recovery in the first two five-year plans with credible improvement in production and productivity along with self-sufficiency. However, in the past three decades, agrarian structure has changed and majority of farming community is under distress. The distress among the farming community mainly due to increasing transaction cost, lack of scientific price discovery, heavy dependence on rainfed, cultivation, input intensive crops, etc.

It is also observed that farmers are resorting for cultivation of commercial crops not

suitable for a particular agro-ecological conditions. All these factors coupled with other psychological factors is leading to distress among farmers.

However, this trend in agrarian distress varies from region to region in the county. Against this backdrop, an attempt has been made to ascertain and analyze the resilient practices adopted by farmers in India.

Stress

In India, agriculture is not only treated as a profession, but as a way of life. Yet, for the past few decades, the scenario has changed dramatically and brought in immense stress among farmers. With changing life styles, family systems, competitive environment, entry of private sector into agriculture, monopolized markets, etc. changed the dynamics of agricultural industry.

Farming is ranked as one of the most stressful occupations and rural communities suffer from many occurrences of depression (Kerby, 1992). A 1999 Iowa Farm and Rural Life Poll survey revealed that approximately 57% of respondents in Iowa said that their personal stress levels had increased during the previous five years (Lasley, 1999).

Stress is our response to anything that threats our survival. The survival can be physical, emotional, financial or any kind of survival that is important to human life. Stress can arise from an opportunity, demand, constraint, threat or challenge when the outcome of the event is both important and uncertain (Lazarus& Cohen, 1977).

Kosslyn and Rosenberg (2001), conceptualized that stressors can be short-term (acute) or long-term (chronic): they can be physical, psychological or social (or some combination).

Occupational stress is the negative effect on the individual from the sum of different factors in a work place, which may act as a stress. Beehr and Newman (1978) defined occupational stress as a condition arising from the interaction of people and their jobs and characterized by changes within people that force them to develop from their natural functioning.

Occupational stress contributes not only to life stresses, but has an impact on health and, thus, on the quality of farm life experienced by farmers (Pollock et al., 2002, Walker & Walker, 1987). According to Burrow (2002), the negative impact of occupational stress on health and wellbeing is on the increase.

Bruce and Abdullah (1990) developed a measure for farm stress. With the help of the data collected from 362 farmers using factor analysis they come out with the factors - life satisfaction, emotional strain, illness frequency, personal finances and time pressures.

Occupational stress is not the specific problem of one sector but pervades the whole agricultural industry, although some groups are better able to handle stressful situations (Lobley, et al., 2004).

Research concerning stress associated with life events over several decades has demonstrated the efficacy of the methodology for a variety of populations (Rahe, 1978; Rahe et al., 1980; Shrout et al., 1989; Raphael et al., 1991; Miller and Rahe, 1997). This literature on the stress of life events attempts to produce a summative stress score for participants and highlight the link between overall stress and health related issues. Connecting stress (and the accumulation of stress) from life events to depression and other health related issues has been established in the literature.

Research shows that farming in New Zealand is inherently more dangerous than other occupations as it entails coming in contact with heavy machinery and livestock as well as often working alone, frequently in isolated, rugged terrain (Morgaine, et al.,2006).

In order to maintain and improve the current level of agricultural productivity in the country, all conditions that reduce farmers' efficacy must be eliminated. Stress reduces motivation for work (Akinboye et al., 2002)

With this background an attempt has been made to elicit the factors that are causing stress to the farming community in Rajasthan. The data is collected through a mix of qualitative and quantitative methods.

Materials and Methods

The study was conducted to understand the perceptions of farmers on factors that account for stress. A structured questionnaire with five-point Likert Scale was used to collect the opinion of the respondents. A total of 202 farmers were interviewed and the required data were collected. Factor Analysis and descriptive statistical tools were applied using SPSS software. Factor Analysis refers to a set of statistical procedures applied on a dataset to reduce the observed variables in less number by calculating the interdependencies between the variables. The main objective of factor analysis is to represent a set of variables

into less number of variables. The fundamental assumption of factor analysis is that some underlying factors which are less in number than the observed variables are responsible for the co-variation among the observed variables. (https://en.wikipedia.org/wiki/Factor_analysis)

Results and Discussion

From the Table 1 , it is evident that majority of the farmers belong to 51-60 years age group (24.26%) followed by 41-50 age group (20.79%) and 31-40 age group are about 19.80%. About 98.02% male respondents participated in the survey and only 1.98% represented from women. With regard to caste, majority of the respondents are from OBC category with 42.57% followed by OC (33.66%), SC (14.85%) & ST (8.91%) categories.

Education plays a vital role in one's social, economic and intellectual development. The results with respect to education showed that majority of the farmers (32.18%) studied upto primary level, followed by illiterates (29.70), Secondary education (24.26), Graduation (6.93), Intermediate (4.46) and Post-graduation (2.48).

From the table, it is also evident that about 95.54% of the respondents are married and only 3.47% are unmarried and minute percentage are divorced or widowed.

Table 1. Socio-demographic profile of the respondents

S.No	Parameter	Frequency	Percentage
1	Age		
	20-30	20	9.90
	31-40	40	19.80
	41-50	42	20.79
	51-60	49	24.26
	61-70	39	19.31
	71-80	11	5.45
	>80	1	0.50
	Total	202	100

2	Gender		
	Male	198	98.02
	Female	4	1.98
	Total	202	100
3	Caste		
	OBC	86	42.57
	OC	68	33.66
	SC	30	14.85
	ST	18	8.91
	Total	202	100
4	Educational Qualifications		
	Illiterate	60	29.70
	Primary	65	32.18
	Secondary	49	24.26
	Intermediate	09	4.46
	Graduation	14	6.93
	Post-Graduation	05	2.48
	Total	202	100
5	Marital Status		
	Married	193	95.54
	Un-married	7	3.47
	Divorced	1	0.50
	Widowed	1	0.50
	Total	202	100
6	Status of Family		
	Joint Family	167	82.67
	Nuclear Family	17	8.42
	Extended family	06	2.97

	NA	12	5.94
	Total	202	100
7	Type of House		
	Pucca	133	65.84
	Semi-pucca	31	15.35
	Kutcha house	27	13.37
	NA	11	5.45
	Total	202	100

The institute of family is the greatest positive strength in Indian context. From the above table it is evident that about 82.67% of the respondents belong to joint family system. In a focus group discussion held in Narayanpur village of Bandikui block in Dausa district, the farmers opined that in Rajasthan, majority families continue to prefer to live in joint family. Each member of the family is occupied with one or other works and if any one of them get loss in their occupation, the other members help them to come out of difficult situation. Only around 9% of the respondents are from nuclear family category. Almost 66% of the respondents have pucca houses followed by 15.35% and 13.37% have semi-pucca and kutcha houses respectively.

The descriptive analysis of the study relating to perception of farmers on resilience to stress is presented in table 2. From the table, it is observed that the mean and standard deviation, is in the range of 3.22 to 4.58 and 1.401 to 0.666 respectively. The sample size is 202. To analyze the strength of association among variables, the Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was applied. This tool is used to know the suitability of using factor analysis to the sample. It certifies whether data are suitable to perform factor analysis. The value of KMO varies from 0 to 1 and high values generally indicates that a factor analysis may be useful with the data. KMO score (0.899)obtained is adequate for testing (Table 3). From the table, it is clear that KMO score indicates adequacy fostesting.(https://www.ibm.com/support/knowledgecenter/en/SSLVMB_24.0.0/spss/tutorials/fac_telco_kmo_01.html)

Table 2: Descriptive statistics

S.No	Statement	N	Mean	Std. Deviation
1	Adopting different farming systems	202	4.30	.974
2	Keeping backyard livestock	202	4.31	1.035
3	Assured helping hand from fellow farmers	202	4.40	.915
4	Benefits through farmers welfare schemes	202	4.24	1.068
5	Joint family systems absorbs stress	202	4.47	.799
6	family supports in all situations	202	4.47	.811
7	I value family	202	4.54	.786
8	I give preference to my family responsibilities than my personal emotions	202	4.58	.666
9	There is love and belongingness in my family	202	4.33	.830
10	Having relatives nearby house whom i can rely upon for guidance in time of stress	202	4.34	.826
11	Attending cultural/ religious gatherings	202	4.27	.880
12	Following morals and traditional values provide guidance and strength to my life	202	4.50	.761
13	Attending social gatherings	202	4.29	.846
14	I regularly attend social activities	202	4.31	.856
15	I get strength from my religious activities	202	4.30	.854
16	Going to pilgrimages	202	4.22	.899
17	Interacting with friends and neighbors on regular basis	202	4.48	.799
18	I have a network of friends and acquaintances for sharing my emotions	202	4.39	.773
19	I have one or more friends to confide in about personal matters	202	4.46	.740
20	I can speak openly about feelings, emotions and problems with people I trust	202	4.37	.789

21	I have regular conversations with the people I live with about domestic problems	202	4.41	.843
22	I have a network of friends who enjoy the same social activities I do	202	4.46	.780
23	Being content with the present life style	202	4.25	.897
24	Difficulties are part and parcel of life and we have to adjust with the situations	202	4.41	.801
25	Being affectionate, giving and receiving love from others	202	4.29	.815
26	Limited personal expectations	202	4.31	.833
27	Daily Hassels are part of life	202	4.33	.825
28	Other people rely on me for help	202	4.31	.827
29	I am able to keep my feelings and anger and hostility under control	202	4.42	.826
30	I often provide service to others	202	3.59	1.491
31	I am in good health	202	3.90	1.102
32	I do something for fun at least once in a week	202	3.22	1.401

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.899
Bartlett's Test of Sphericity	Approx. Chi-Square	3097.328
	df	496
	Sig.	.000

Eigen value reflects the number of extracted factors whose sum should be equal to number of items which are subjected to factor analysis. The next item shows all the factors extractable from the analysis along with their Eigen values. The Eigen value table has been divided into three sub-sections, i.e. Initial Eigen values, extracted sum of squared Loadings and Rotation of sums of squared loadings. Here, it may be noted that the first factor accounts for 38.131%, the second factor accounts for 6.812%, third factor accounts for

is 5.628%, fourth factor responsible for 5.137%, fifth factor accounts for 4.544%, sixth factor responsible for 3.672% and finally the seventh factor is responsible for 3.556% of total variance (Table4)

Table 4: Total variance explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative%	Total	% of Variance	Cumulative %
1	12.202	38.131	38.131	12.202	38.131	38.131	5.362	16.758	16.758
2	2.180	6.812	44.943	2.180	6.812	44.943	4.226	13.206	29.964
3	1.801	5.628	50.571	1.801	5.628	50.571	3.193	9.977	39.941
4	1.644	5.137	55.708	1.644	5.137	55.708	2.304	7.199	47.140
5	1.454	4.544	60.253	1.454	4.544	60.253	2.247	7.022	54.163
6	1.175	3.672	63.924	1.175	3.672	63.924	2.185	6.829	60.991
7	1.138	3.556	67.481	1.138	3.556	67.481	2.077	6.490	67.481

Extraction Method: Principal Component Analysis.

In order to produce theoretical results, fixed number of components has been specified instead of extracting the factors based on Eigen value creation. Principal component analysis (PCA) was carried out to explore the underlying factors associated with 32 items. The Table 4 shows that 67.481 variation inperception of farmers' resilience to stress was explained by 7 factors.

The rotation of the component matrix has been done by applying Varimax rotation method with Kaiser Normalization and the results are presented in Table 5.

Table 5: Rotated component matrix

Rotated Component Matrixa	Component						
	1	2	3	4	5	6	7
Adopting different farming systems						.816	
Keeping backyard livestock							.752
Assured helping hand from fellow farmers						.755	
Benifits through farmers welfare schemes							.850
Joint family System Absorbs Stress		.562					0.50
Family supports in all situations							0.440
I value family		.623					
I give preference to my family responsibilities than my personal emotions						0.50	
There is love and belongingness in my family	.635						
Having relatives nearby house whom i can rely upon for guidance in time of stress			.774				
Attending cultural/ religious gatherings	.571						
Following morals and traditional values provide guidance and strength to my life			.509				
Attending social gatherings	.523	.559					
I regularly attend social activities	.599						
I get strength from my religious beliefs		.512					
Going to pilgrimages	.711						
Interacting with friends and neighbors on regular basis		.510	.526				
I have a network of friends and acquaintances for sharing my emotions	.746						
I have one or more friends to confide in about personal matters		.605					
I can speak openly about feelings, emotions and problems with people I trust	.759						
I have regular conversations with the people I live with about domestic problems		.715			.054		

	1	2	3	4	5	6	7
I have a network of friends who enjoy the same social activities I do			.610				
Being content with the present life style	0.50						
Difficulties are part and parcel of life and we have to adjust with the situations			.586				
Being affectionate, giving and receiving love from others		.554					
Limited personal expectations	.721						
Daily Hassels are part of life				0.50			
Other people rely on me for help		0.474					
I am able to keep my feelings and anger and hostility under control				.509			
I often provide service to others							.137
I am in good health				.781			
I do something for fun at least once in a week	0.832						

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

As per the below table component one is labeled as Agri. activities that provide income (F1) and it is represented through three items namely serial number 1,2 & 4 (Table 5). In F1, the factor loadings ranged between 0.752 to 0.850 which implies that farmers depended on allied agricultural activities that supplement income.

Component two is labeled as Social Factors (F2). It is represented through Item 3, 8,6,10,13,14,17,18,19,20,21,22,25,28,30 and 32. The factor loadings for these variables ranged between are 0.130 and 0.832. In this factor, the farmers voluntarily help not only the fellow farmers but also the general public of the village. Sharing the problems with friends, relatives and other trusted persons may make them ventilate the emotions and become psychologically strong.

Table 6: Naming of factors

Factor No.	Name of the Dimension	Item No	Variables	Factor loading
F1	Agri.activities that supplement income	1	Adopting different farming systems	0.816
		2	Keeping backyard livestock	0.752
		4	Benefits through farmers welfare schemes	0.850
F2	Social Factors	3	Assured helping hand from fellow farmers	0.755
		8	I give preference to my family responsibilities than my personal emotions	0.500
		10	Having relatives nearby house whom I can rely upon for guidance in time of stress	0.774
		13	Attending social gatherings	0.559
		14	I regularly attend social activities	0.599
		17	Interacting with friends and neighbors on regular basis	0.526
		18	I have network of friends and acquaintances for sharing my emotions	0.746
		19	I have one or more friends to confide in about personal matters	0.605
		20	I can speak openly about feelings, emotions and problems with people I trust	0.759
		21	I have regular conversations with the people I live with about domestic problems	0.715

		22	I have a network of friends who enjoy the same social activities I do	0.610
		25	Being affectionate, giving and receiving love from others	0.554
		32	I do something for fun at least once in a week	0.832
		6	Family supports in all situations	0.440
		28	Other People rely on me for help	0.474
		30	I often provide service to others	0.137
F3	Factors related to Family	5	Joint family system absorbs stress	0.562
		7	I value my Family	0.632
		9	There is love and belongingness in my family	0.635
F4	Religious Factors	11	Attending cultural/ Religious activities	0.571
		12	Following morals and traditional values provide guidance and strength to my life	0.509
		15	I get strength from my religious activities	0.512
		16	Going to pilgrimages	0.711
F5	Cultural Factors	23	Being content with the present life style	0.500
		24	Difficulties are part and parcel of life and we have to adjust with the situations	0.586
		26	Limited personal Expectations	0.721
		27	Daily Hassles are part of life	0.500
		29	I am able to keep my feelings, anger and hostility under control	0.509
F6	Health Factors	31	I am good at health	0.718

Component 3 is labeled as "Factors related to family". It is represented through items, 5, 7 and 9 and their factor loadings are 0.562, 0.632 and 0.635 respectively. From the factor loadings, it can be inferred that farming community of Rajasthan are very attached to their families and majority times, they share their feelings with their families that relieves the stress and make them happy.

Component 4 is labeled as "Religious factors". It is represented through 11, 12, 15& 16 and their factor loadings are 0.571, 0.509, 0.512 and 0.711 respectively. From the factor loadings, it can be inferred that farmers are spiritual and they participate in the religious ceremonies in the village and are very much fond of going to pilgrimages.

Component 5 is labeled as "Cultural factors" and is represented through items 23, 24, 26,27 and 29 whose loadings are 0.500, 0.586, 0.721, 0.500 and 0.509 respectively. From the factor loadings, it can be inferred that farmers highly value the culture and follow sincerely.

Component 6 is labeled as "Health factors". It is represented through item 31 with factor loading of 0.718, which implies that majority of the farmers responded to the statement very positively and are with good health.

From Table 6, few of the variables were extracted and ranked which are more impacting the farmers than other factors and are shown in Table 7.

Table 7. Ranking of major influential factors according to factor loadings

S.No	Name of the variable	Factor loading	Rank
1	Benefits through farmers welfare schemes	0.850	1
2	I do something for fun at least once in a week	0.832	2
3	Adopting different farming systems	0.816	3
4	Having relatives nearby house whom I can rely upon for guidance in time of stress	0.774	4
5	I can speak openly about feelings, emotions and problems with people I trust	0.759	5

6	Assured helping hand from fellow farmers	0.755	6
7	Keeping backyard livestock	0.752	7
8	I have network of friends and acquaintances for sharing my emotions	0.746	8
9	Limited personal Expectations	0.721	9
10	I am good at health	0.718	10

From the above table, it is evident that majority of the farmers well utilized the government schemes operating time to time and which is the main factor that is contributing to their stress free life and happiness. As discussed earlier, adopting different farming systems gives an edge in terms of monitory benefits to farmers. In Rajasthan, majority of the farm families get income from various sources and by adopting different farming systems (rank 3), they make better returns from farming. To add to this, even though "keeping backyard livestock" got 7th rank, majority of the farmers in Rajasthan maintains backyard livestock to supplement the farm income in case of drought or other natural calamities. In fact, in the farmers' group discussion held in Narayanpur village, Bandikuiblock of Dausa District, farmers shared their emotional bondage with the livestock they rear.

Further, the study team observed that in many of the villages visited and also while travelling, there is a gathering of people who are playing games in their neighbourhood. In discussion, many of the respondents confined that they usually play indoor games in leisure time and it makes them happy. The same has been reflected in the data collected and "I do something for fun at least once in a week" got 2nd rank.

Being majorly joint families, they always socialize and there is less chance to stay in isolation. This kind of environment makes people to share their problems and get guidance from the elders and experienced persons. Hence, "having relatives nearby house whom I can rely upon for guidance in time of stress" got 4th rank.

It is observed from the focus group discussions that the farmers of Rajasthan are open to discussions and frank in expressing their opinions. The same is reflected for one of the statements "I can speak openly about feelings, emotions and problems with people I trust" and farmers perceived as very important factor and attributed 5th rank.

Another important factor is getting help from the fellow farmers when they are in need. Villagers in Rajasthan are very cordial and they help each other in difficult times. The farmers felt assured helping hand from fellow farmers is the 6th important influential factor.

Network of friends and with the acquaintances for sharing emotion also make them free from stress and they attributed 8thrank for the factor. The farmers of Rajasthan are well aware of their limitations when it comes to farming and they adapt themselves to the prevailing conditions. The same is reflected in the table (rank 9). Having good health is also majorly contributing to ones' happiness and it has got 10th rank as seen in the table.

To sum up, there is a good mix of factors related to agriculture, livestock, friends, relatives, other villagers, being open and expressive and good health are contributing to resilience to stress among the farmers of Rajasthan.

Conclusion

Majority of the previous research studies related to farmers stress focused more on their economic aspects. The present study attempted to assess the perceptions of farmers on factors that reduce/relieve stress. The study revealed what lifestyle makes the farmers to be self-contended and stress-neutral, despite living under erratic climatic conditions. The study looked at different aspects like agricultural, social, cultural, family related, religious and health related factors. While conducting a focus group discussion with the farmers and the empirical study, interesting patterns of thinking of the farmers were identified. Majority of the farmers opined that they are aware of their limitations regarding climatic conditions, soils, availability of rain and irrigation water and other adverse conditions. They always cultivate traditional crops that demand less water like finger millet (Bajra), Pearl millet (Jowar), Chickpea (Chana) and commercial crops like cumin (Jeera), carom seeds (Ajwain),Cluster bean seeds and fruits, unlike the other states where the farmers prefer commercial crops irrespective of the prevailing adverse local agricultural conditions. Majority of the farmers also opined that Joint family system gives immense confidence in difficult times and every one helps one another in the family when in need. Friends and relatives are very helpful and make the farmers comfortable in difficult times. Religious activities are part of Rajasthan culture and majority of the farmers opined that they are interested in participating in melas, going to place of worship, pilgrimages etc.

Looking at the above factors, thought needs to be focused on non-economic factors also that make the farmers resilient to adverse situations and address stress.

Besides financial stress, there are other factors like nuclear family system, following existing traditional practices of farming rather than consulting the agricultural experts for latest agricultural technologies, following the crowed without knowing their limitations, cultural factors, and health related issues also impact farmers adversely. Financial packages alone may not be a panacea to address the stress among the farmers.

Meeta and Rajivlochan, 2006 suggested that agricultural extension system needs to be strengthened. They mentioned that "spreading knowledge about improved ways of cultivation, including responsible use of appropriate type of seeds, fertilizers, pesticides etc., checking the quality of the farm inputs and reliable professional advice during times of trouble, like when a sowing fails or the crop is infested with pests or the land is visited upon by a drought or excess rainfall"

Closer look at Rajasthan farmers bring out several farmer friendly aspects related to agricultural, socio-cultural, spiritual and family related factors. Close knit family, robust network of friends and relatives, vivid and expressive in their emotions, etc. added value to relief of stress. Respondent farmers expressed pride about their agricultural practices, especially about choosing the niche crops and strict water management practices.

From the findings of the study, it can be suggested that in every district of the country, an institutional help may be provided to address the issues faced by the farming community and to develop resilience among the farmers. Village camps may be conducted by sociologists, psychologists and other developmental departments to strengthen farmers' resilience to stress and motivate them to practice wise decision making for choosing the cropping pattern as per the agro-climatic situation and develop skills in emotional intelligence.

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Impact of Training on Knowledge and Adoption of Soybean Growers in Maharashtra State

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Abstract

The research was conducted in ten selected villages of Washim District of Maharashtra to study the impact of training programs conducted by KVK, Karda on knowledge and adoption levels of soybean growers. A sample size comprised of 150 trainees and 150 non-trainees from the KVK operated villages. The results of the study revealed that the trainee farmers had greater knowledge and adoption levels on improved soybean cultivation practices than the non-trainee farmers. The knowledge and adoption indices for various soybean cultivation practices were also more for trainee farmers than their counterparts. Impact of farmers training programme on soybean production technology organized by KVK Washim was found to be 48.15 per cent. This indicates that KVK played a significant role in improving the knowledge and adoption levels among soybean growers.

Keywords: Training, Krishi Vigyan Kendra, Soybean, Technology adoption, Maharashtra, India.

Introduction

Soybean (Glycinemax L. Merril) is the world's most important seed legume, which contributes to 25% of the global edible oil and about two-thirds of the world's protein concentrate for livestock feeding. In India, Soybean is cultivated in an area of 11.00 million ha and the production of 9.30 million tonnes with a productivity of 8.65 q / ha under rainfed crop system in Madhya Pradesh, Rajasthan, Karnataka, Chattisgarh and Telengana. There persist wide variation in the productivity from 9.5 q / ha in Karnataka and Chattisgarh to 14.8 q / ha in Telengana. Pricing are to farm level of efficiency. In Maharashtra, soybean is cultivated in an area of 3.73 million ha with production of 3.94

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million tonnes and productivity of 10.55 q / ha with second rank in India (SOPA Databank, 2019). However, low productivity of the crop remains a major problem of soybean cultivation.

KVK conducts training programs for farmers to update their knowledge and skills on modern technologies. They provide several farm support activities like providing technology dissemination to farmers, training, awareness, etc. They play a vital role in conducting on-farm testing to demonstrate location specific agricultural technologies. KVKs conduct demonstrations to prove the potential of various crops at farmers' fields. They also conduct need based training programs for the benefit of farmers, farm women, and rural youths. KVKs are creating awareness about improved agricultural technologies through large number of extension programs. KVK, Karda organizes regular training programs for soybean growers on improved soybean production technology. In order to study the impact of training on knowledge and adoption levels of soybean growers, the present study was undertaken.

Methodology

The study was conducted in Washim district of Maharastra state during 2018-19. A list of farmers attended training on improved soybean cultivation practices was obtained from KVK, Karda. Out of six taluks of Washim district, three taluks namely, Risod, Washim and Malegaon were selected as these taluks had highest number of soybean trainees. Six villages from Risod, two villages from Washim and two villages from Malegaon were selected based on the availability of maximum number of trainees. The selected villages were Bhapur, Tandalwadi, Belkhed, Gobhani, Warud Tofa and Karda from Risod taluk, Shelgaon bagade and Tiwali from Malegaon taluk, Hiwara rohila and Sawargaon jire from Washim taluk. A sample size of 150 trainee farmers was selected from all these ten villages by following the proportionate random sampling technique and considered as an experimental group. In order to study the impact of training among the trainees, a sample size of 150 non-trainee farmers were also selected to have them as control group. The non-trainees were also selected from the same villages again following the proportionate random sampling method. Thus a total of 300 farmers were selected for the study.

The improved soybean production technologies imparted during training organized by KVK, Karda were selected to study the knowledge and adoption levels of both the trainees and non-trainees. The data were collected with the help of pre-tested and structured interview schedule by personal interview method. Independent t-test was applied

to test the significant difference between mean knowledge and adoption scores of trainees and non-trainees.

The impact index was worked out with the help of following formula.

Impact Index =[MKI of trainees - MKI of non- trainees] [MAI of trainees - MAI of non- trainees]

MKI - Mean Knowledge Index

$$\text{Knowledge Index} = \frac{\text{Score obtained by respondents}}{\text{Maximum obtainable score}} \times 100$$

MAI - Mean Adoption Index

$$\text{Adoption Index} = \frac{\text{Score obtained by respondents}}{\text{Maximum obtainable score}} \times 100$$

Results and Discussion

Knowledge of Trainee and Non-Trainee Farmers on improved Soybean cultivation practices

Knowledge was crucial factor for an adoption of an innovation so the extent of knowledge among trainee and non-trainee farmers was studied and the results are presented in Table 1.

Table1 .Distribution of respondents on their knowledge about improved soybean cultivation practices.

S. No.	Category	Trainee farmers (n=150)		Non-trainee farmers (n=150)	
		Number	Per cent	Number	Per cent
1.	Low	-	-	71	47.33
2.	Medium	45	30.00	54	36.00
3.	High	105	70.00	25	16.67
	Total	150	100.00	150	100.00

Mean	77.60	45.50
Difference between the means	32.1	
't' value	34.49**	
** - Significant at 0.01 level of probability		

Based on the mean scores Table 1, it may be stated that the trainee farmers possessed higher knowledge than non-trainee farmers. Hence, it may be concluded that the trainee farmers were with more knowledge about improved soybean cultivation practices, while the non-trainee farmers were with low knowledge about the same. The general hypothesis on difference between the trainee and non-trainee farmers on their knowledge about improved soybean cultivation practices is supported by this finding.

It may also be seen from Table 1 that majority of the trainee farmers (70.00 per cent) were with high level of knowledge, whereas majority of non-trainee farmers (47.33 per cent) were with low level of knowledge. The table further shows that the proportion of respondents found under medium level of knowledge was 30.00 per cent for trainee farmers and 36.00 per cent for non-trainee farmers. No trainee farmer was found to have low level of knowledge.

The trainee farmers have attended training programs organized by Krishi Vigyan Kendra on improved soybean cultivation practices. This would have enabled them to gain more knowledge about soybean cultivation. On the contrary, the non-participation of non-trainee farmers in the training program on soybean cultivation may be the major reason for their lower knowledge.

Extent of Adoption

The adoption level of trainee and non-trainee farmers on improved soybean cultivation practices are presented in Table 2.

Table 2. Distribution of Respondents on their Extent of Adoption of Improved Soybean Cultivation Practices

S. No.	Category	Trainee farmers (n=150)		Non-trainee farmers (n=150)	
		Number	Per cent	Number	Per cent
1.	Low	-	-	71	47.33
1.	Low	17	11.33	84	56.00
2.	Medium	39	26.00	43	28.67
3.	High	94	62.67	23	15.33
	Total	150	100.00	150	100.00
Mean			77.30		47.20
Difference between the means			30.10		
't' value			25.31**		
** - Significant at 0.01 level of probability					

It is interesting to see from table that majority of the trainee farmers (62.67 per cent) were found to be the high adopters of improved soybean cultivation practices, whereas majority of the non-trainee farmers (56.00 per cent) were found to be the low adopters. Around 30.00 per cent of the trainee farmers (26.00 per cent) and non-trainee farmers (28.67 per cent) were found in the medium category. Only less than one-fifths of the non-trainee farmers (15.33 per cent) were high adopters and only 11.33 per cent of non-trainee farmers were low adopters.

The table 2 further shows that the mean score of trainee farmers was more than that of non-trainee farmers. The difference between the means was significant at 5.00 per cent level. Based on the mean scores, it may be concluded that the trainee farmers were high adopters, while the non-trainee farmers were relatively low adopters. This supports the general hypothesis namely there will be difference between the trainee and non-trainee farmers in their adoption levels of improved soybean cultivation practices.

The higher adoption level of trainee farmers compared to their counterparts needs no explanation. The trainee farmers undergone training program on soybean cultivation practices organized by Krishi Vigyan Kendra, they have gained more knowledge from those training programs. The higher knowledge level of respondents coupled with their

best extension contact, media exposure, scientific orientation, economic motivation and innovativeness would have enabled the trainee farmers to adopt more practices. On the contrary the non-participation of non-trainee farmers would not have enabled them to acquire knowledge and hence would have led to poor adoption. Similar findings were also reported by Malabasari and Hiremath (2016) and Mankar et. al., (2014).

Impact of Training

In order to study the impact of training, the mean knowledge and adoption indices were worked out for all the selected technologies. The mean knowledge and adoption indices were also worked out for both the trainees and non-trainees. The results are presented in Table 3.

Table 3. Knowledge and Adoption Indices of Trainees and Non-Trainees for Soybean Cultivation Practices

S. No.	Soybean cultivation practices	Knowledge Index (%)		Adoption Index (%)	
		Trainees (n=150)	Non-trainees (n=150)	Trainees (n=150)	Non-trainees (n=150)
1.	Recommended varieties	100.00	45.33	100.00	42.67
2.	Seed germination test	94.67	14.00	87.33	0
3.	Chemical seed treatment	98.00	34.67	95.33	22.67
4.	Bio-fertilizer seed treatment	98.67	32.00	95.33	22.67
5.	Seed rate	100.00	48.00	100.00	46.67
6.	Spacing	100.00	46.67	100.00	46.67
7.	Broad bed and furrow system	100.00	80.67	100.00	93.33
8.	Weed management	98.67	43.33	92.67	39.33
9.	Application of FYM	100.00	94.67	100.00	71.33
10.	Application of chemical fertilizer	94.67	82.67	98.00	69.33
11.	Pest management	92.00	39.33	90.00	28.00
12.	Disease management	92.00	36.00	90.00	28.00
13.	Time of harvest	100.00	84.00	100.00	73.33
	Mean Index	97.59	52.41	96.05	44.92

Knowledge

The mean knowledge index was found to be higher for the trainee farmers (97.59 per cent) rather than non-trainee farmers (52.41 per cent).

The data furnished in table 3 reveals that cent per cent of the trainee farmers had knowledge on the practices namely, recommended varieties, seed rate, spacing, broad bed and furrow system, application of FYM and time of harvest, whereas the corresponding knowledge level for the same practices for the non-trainee farmers were 45.33 per cent, 46.67 per cent and 80.67 per cent, 94.67 per cent and 84.00 per cent respectively.

Table 3 further shows that a vast majority of trainee farmers had knowledge on the remaining practices namely, seed germination test (94.67 per cent), chemical seed treatment (98.00 per cent), bio-fertilizer seed treatment (98.67 per cent), weed management (98.67 per cent), application of chemical fertilizer (94.67 per cent), pest management (92.00 per cent) and disease management (92.00 per cent). In case of non-trainee farmers, less than half the proportion of the respondents had knowledge on recommended varieties (45.33 per cent), seed rate (48.00 per cent), spacing (46.67 per cent) and weed management (43.33 per cent). About 40.00 per cent of the respondents had knowledge on pest management. The practices namely, chemical seed treatment (34.67 per cent), bio-fertilizer seed treatment (32.00 per cent) and disease management (36.00 per cent) were found to be known by only less than 40.00 per cent of the respondents. Only a smaller proportion of the respondents had knowledge on seed germination test (14.00 per cent).

Adoption

The mean knowledge index calculated was greater for the trainee farmers (96.05 per cent) compared to the non-trainee farmers (44.92 per cent). In case of adoption, the practices namely, recommended varieties, seed rate, spacing, broad bed and furrow system, application of FYM and time of harvest were adopted by all the trainee farmers, whereas in the case of non-trainee farmers, these practices were found to be adopted by 42.67 per cent, 46.67 per cent, 46.67 per cent, 71.33 per cent and 73.33 per cent of the respondents.

Majority of the trainee farmers had adopted the remaining practices namely, seed germination test (87.33 per cent), chemical and bio-fertilizer seed treatment (95.33 per cent), weed management (92.67 per cent), application of chemical fertilizer (98.00 per cent) and pest and disease management (90.00 per cent). In the case of non-trainee farmers, about 70.00 per cent of the farmers adopted application of chemical fertilizer.

Only a lesser proportion of the non-trainee respondents had adopted chemical and bio-fertilizer seed treatment (22.67 per cent) and pest and disease management (28.00 per cent). None of them had adopted the seed germination test.

Impact of Training on Knowledge and Adoption of Improved Soybean Cultivation Practices

The mean knowledge and mean adoption indices were calculated for both the trainees and non-trainees and the impact index was also computed. The results are furnished in Table4.

Table 4. Impact of training on knowledge and adoption levels of trainee and non-trainee farmers

S. No.	Particulars	Trainees	Non-trainees	Difference
1.	Mean Knowledge Index	97.59	52.41	45.18
2.	Mean Adoption Index	96.05	44.92	51.13
	Total	193.64	97.83	96.31

3.   Percentage of Impact = $\dfrac{\text{Sum of differences of indices}}{2}$

$$= \dfrac{96.31}{2}$$

$$= 48.15$$

The impact of training program imparted by the KVK as a whole was computed as the sum total of the differences of both the indices namely, Mean Knowledge Index (MKI) and Mean Adoption Index (MAI) divided by two. The data thus obtained have been presented in Table 4.

Table shows that the mean knowledge index and mean adoption index were found to be 98.59 per cent and 96.05 per cent for the trainee farmers, whereas for the non-trainee farmers the mean knowledge index was 52.41 per cent and mean adoption index was 44.92 per cent. It clearly shows that the trainee farmers had greater knowledge and adoption levels compared to the non-trainee farmers.

It could be further observed that there was an impact of KVK training up to 48.15 per cent over the existing knowledge and adoption by the trainee farmers which were found to be substantial over the non-trainee farmers. Therefore, it could be stated that there was a remarkable impact of training on those respondents who attended the training program conducted by KVK, Washim in terms of knowledge and adoption of improved soybean cultivation practices as compared to their counterparts.

This shows a positive and significant impact of training programs conducted by KVK on knowledge and adoption levels of trainees. Similar findings were also reported by Singhal S and Vatta L (2017), Sowmya and Bindu(2017) and Deshmukh et.al.(2020).

Conclusion

The study shows that the trainee farmers had greater knowledge and adoption levels with regard to improved soybean cultivation practices compared to the non-trainee farmers who were relatively lesser in their knowledge and adoption levels. The mean knowledge index and mean adoption index were found to be higher for the trainee farmers rather than their counterparts. The impact of KVK training was observed to be 48.15 per cent. Hence, it may concluded that the Krishi Vigyan Kendra contributed positively in enhancing the knowledge and extent of adoption of improved soybean cultivation practices among the trainee farmers.The knowledge imparted during training by KVK scientists and follow up extension activities would have helped in enhancing the knowledge level of trainee farmers and in turn would have led to higher level of adoption of improved soybean production practices. Hence, it could be suggested that more number of training programs

on soybean production may be organized for all the non-trainee farmers in the KVK operated villages so as to ensure better knowledge and adoption among all the farmers.

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Transportation in Agriculture: A Case of Kisan Rath App

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Abstract

Transport is regarded as a key factor in improving agricultural development all over the world. It is also important for making agricultural marketing efficient as it is required at each stage of marketing. Considering the importance of transport, the Government of India launched Kisan Rath Mobile Application to facilitate farmers and traders in getting linked with the appropriate mode of transportation for movement of farm produce. The App failed to maintain the interest generated among different stakeholders initially as suggested by the declining downloads over time. According, a study was undertaken by MANAGE in collaboration with the Ministry of Agriculture and Farmers Welfare to analyze different aspects of Kisan Rath App. The study revealed that level of awareness was more among the market players like traders, wholesalers and logistic service providers having better understanding of market and easy access to market information. More than half of the users are relying on locally available transportation facility which makes it important to integrate such service providers with the App. to bring in more efficiency in the delivery of service. The use of application may be enhanced by improving literacy of farmers on ICT, providing better information technology infrastructure and making the App. more user friendly and comprehensive by integrating others services like market information.

Keywords: Agricultural marketing, Transportation, Mobile app, Kisan Rath, India.

Introduction

Agriculture for its importance in national output and employment has always received special attention in policy making process (Chand, 2008). Though, the emphasis of policy

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makers kept on changing from keeping food prices low to macro-level food security to household and individual food security which subsequently shifted to sustainable use of natural resources and equity between rural and urban population (Acharya, 2009). Such shift in focus overtime along with market liberalization and globalization are causing a transformation in agriculture and agri-food markets in India (Birthal et al, 2007). These changes required evolution of agricultural marketing, new institutional mechanisms and liberation of agriculture sectors (Chand, 2019). Accordingly, a number of reform measures have been introduced by the Government to strengthen agricultural marketing system in the country in recent past (Paty et al, 2017). A snapshot of these reforms is provided in Table-1.

Table 1. Agri-marketing reforms in India

S. No	Reforms Initiated	Provision	Influence
1.	Model State Agricultural Produce Marketing (Development and Regulation) Act, 2003	• Establishment of private/ cooperative markets • Direct marketing • Establishing farmer/ consumers market • Single point levy of market fee	State
2.	Model State/UTs Agricultural Produce and Livestock Marketing (Promotion and Facilitation) Act, 2017	• Declaration of whole state/ UT as one unified market • APMCs to regulate practices only in respective principal market yards and sub-yards • Warehouses to operate as sub-market yards	State

S. No	Reforms Initiated	Provision	Influence
3.	Warehouse Development and Regulation Act, 2007	● Negotiability of warehouse receipt	National
4.	National Agricultural Market	● Integration of whole sale markets ● Integration of other services like warehouses, banks, grading and assaying, etc	State (Subsequently National)
5.	The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020	● Barrier free inter and intra state trade across the country ● Freedom of trade in farming produce outside APMC Market Yards	National
6.	The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act 2020	● National framework for farming agreements ● Safeguarding the interest of farmers ● Protection of agricultural land	National
7.	Essential Commodities (Amendment) Act, 2020	● Removal of commodities like cereals, pulses, oilseeds, edible oils, onion and potatoes from the list of essential commodities ● Encourage investment by private players	National

These measures are expected to improve agricultural marketing infrastructure and gradually help evolve a national market for agricultural commodities. Improving physical infrastructure is important but price formation in agricultural markets will be influenced by linkage among market centers facilitated through transportation and communication network (Acharya, 1998). Though, agricultural marketing system performs wide range of functions including assembling, handling, storage, processing, transportation, wholesaling, retailing and export along with support services like market information, grade and standards, commodity trade, financing and price risk management and also the institutions involved in performing above functions (NITI, 2007), the importance of transportation in improving efficiency, diversification, development of integrated agri value chains and achieving a national common market has been highlighted by various reports and studies (NFC, 2006; NITI, 2007; Acharya, 1998; Sharma and Chauhan, 2013 and FICCI, 2017).

Importance of transportation

Transport is regarded as a key factor in improving agricultural development all over the world. Transport creates place utility and opportunities for better marketing, enhances interaction among geographic and economic regions. An efficient transportation system offering cost, time and reliability advantage; permits goods to be transported quickly (Rodrigue, 2006; Tunde and Adeniyi, 2012). Though, Government of India in consonance with the state governments has taken numerous initiatives to strengthen agricultural markets and facilitate integration of farmers with market farmers are not able to market their entire harvest successfully. They are unable to sell 34 per cent of fruits and 44.6 percent of vegetables (DFI, 2017a). This translates into loss of around Rs 63,000 crore for not being able to sell their produces for which investment has already been made by the farmers. In the absence of robust and sustainable logistics mechanisms, more than half of fruits and vegetable produce end up as waste even before they reach the market (NHB). Transport is considered to be an important aspect in improving agricultural marketing efficiency. It is required at each stage of marketing (Table 2).

## Table 2. Means of transportation used at different stages of agricultural marketing in India

Stages of marketing	Agencies involved	Means of transport used
From farm gate to the village market or primary market	Farmers and Local/Village traders	By bullock or truck or tractor
From primary market to secondary wholesale market and processor	Traders/ Processors	By trucks, railways
From wholesale markets and processor to retailer	Processors/Wholesalers/ Retailers	By trucks, railways, tractor
From retailer to consumer	Consumers	By hand and any other means of transport used by the consumer
For export and import	Exporters and Importers	By air or ship

India has availability of huge rail and road transport network throughout the country. However, road transport is important for agriculture mainly for horticultural crops. In case of major agricultural produce, 67.75 percent of rice, 70.46 percent of wheat and wheat flour and 75.92 percent of the sugar and khandsari is moving through roads. Whereas, in case of horticultural crops, 97.38 percent of fruits and vegetables are moving through road transport and only 1.89 percent is using rail transport (DFI, 2017b).In case of road transport, it is very important to improve access of farmers and other service seekers to easy and economical mean of transport. Government of India has taken various steps in this direction. One such initiative is the introduction of Kisan Rath Mobile Application to facilitate farmers and other stakeholders from throughout the country to have easy access to transport facilities by connecting them with transporters.

Kisan Rath App

Kisan Rath Mobile Application was launched on 17thApril 2020 by the Ministry of Agriculture and Farmers Welfare to facilitate farmers and traders in getting linked with the appropriate mode of transportation for movement of farm produce ranging from food grains (cereals and pulses) to fruits and vegetables, oilseeds, spices, fiber crops, flowers,

bamboo, forest produce, coconuts, etc. This App facilitates interface with leading transport aggregators and individual transporters for providing a wide range of transport vehicles at required date and place, in a quick and easy way (Figure-1).

Source: https://kisanrath.nic.in
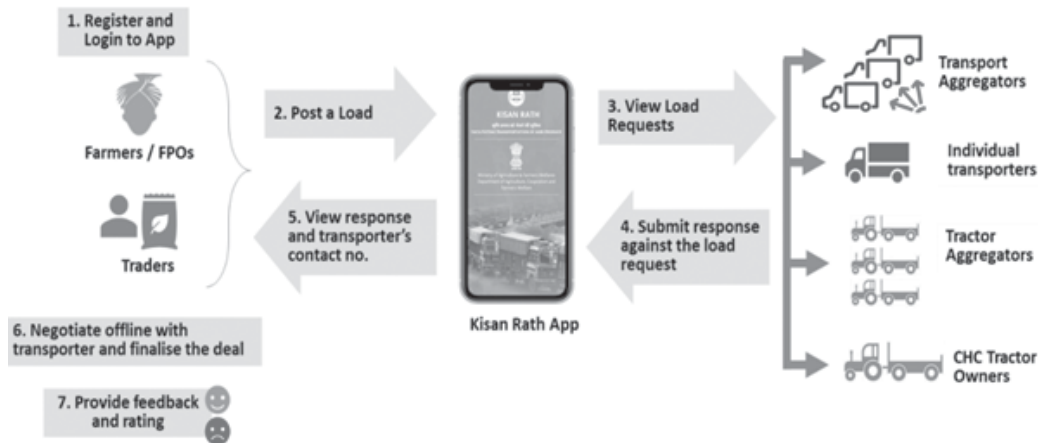
The App allows posting the requirements of part load as well as full load. The transporter can register using the application and view the posted loads and respond back with their availability and quotes. The farmers and traders can view the responses to their posted loads, communicate with the transporters to finalize the deal and can provide a rating for the transporter once the trip is completed. The application was able to generate lot of interest among the users during the first month of its launch with more than 1.5 lakh registered users. The Application could not maintain the same level of interest in subsequent months among stakeholders as suggested by the number of downloads, average user rating of 3.5 on a scale of five and low level of transport executed through the Application. The portal has received only 8550 request for a load amounting to 22247 tonnes.

With this background, a study was taken up by MANAGE in association with the Ministry of Agriculture and Farmers Welfare (GoI)to analyse factors responsible for the limited use of Kisan Rath App by framers and other players.

Methodology

The study is based mainly on the primary information collected from existing Kisan Rath Mobile Application users and Kisan Call Centre (KCC) users. The information was

collected from a total of 5919 respondents including 3199 existing users and 2716 KCC users spread across 31 states/UTs. The information was collected in the month of September 2020 by administering a well-structured Schedule designed specifically for the study using KCC network with the help of Extension Division of the Ministry of Agriculture and Farmers Welfare (GoI). The farmers were selected randomly from a list provided by National Informatics Centre (NIC) of existing users and KCC users as available with the Ministry. Simple descriptive statistical techniques were employed to analyse the information collected and draw logical inferences.

Result and Discussion

The information under the study was collected on various aspects covering level of awareness, source of information, major mean of transport, availability of smartphone for using application based services and level of use of Kisan Rath Mobile Application. Attempt was also made to compile information on limited use of the Kisan Rath App. though transportation is considered to be an important mean to improve market access by farmers. The component-wise analysis is provided in this section.
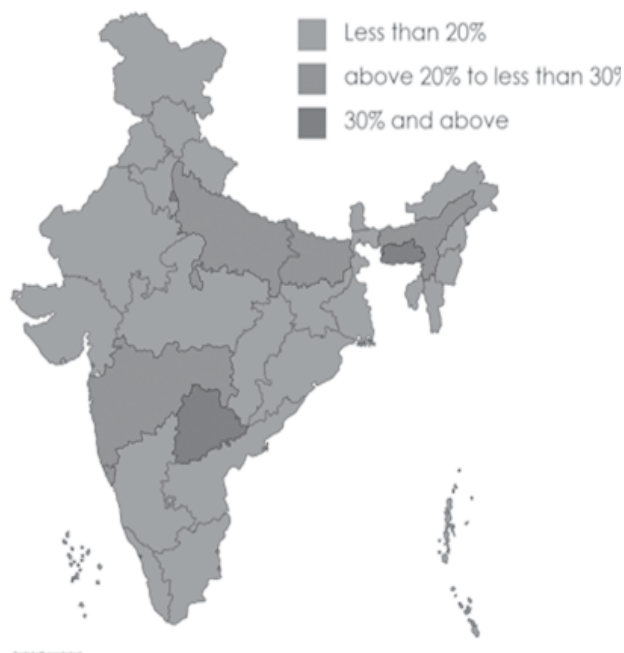

Figure 2. State-wise level of awareness (%)

Level of Awareness

Awareness level was analyzed mainly in the non-existing user group. Only 17.14 percent of the respondents from non-existing user group were found to be aware about the Kisan Rath App. The level of awareness is again not uniform across the states (Figure-2). Response is observed to be better from states like Rajasthan, Gujarat and Maharashtra. It may be in tune with the diversification of crops and enterprises prevailing in the respective states.

Source of Information

KCC respondents primarily farmers are relying mainly on traditional sources like Department and TV/Radio for information, whereas, major proportion of respondents in case of existing users relied on social media and internet. In the existing user group, more than 55 percent respondents came to know about the App from internet and social media (Figure-3). It appears that there is a category of farmers who are information technology (IT) literate and relying on such sources for their information requirements. Hence, there is need to concentrate on such farmers to popularize the use of Kisan Rath App.
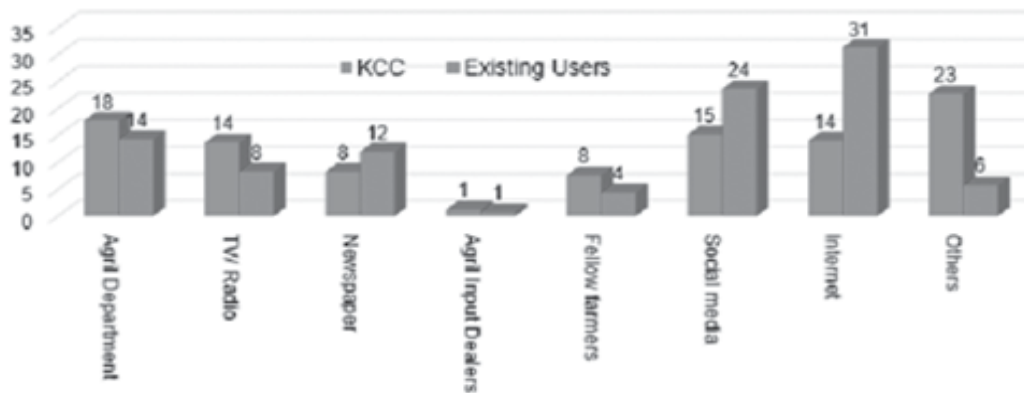

Figure 3. Source of Information

Availability of smart phone and download

The availability of smart phones with farmers is encouraging. About 59 percent of the farmers are having smart phones across both categories, whereas, this percentage is 80 percent in the case of other players. Of those, who are having smart phone, only 16 percent of the farmers downloaded the application, while this proportion was 25 percent in the case of traders/wholesalers and 50 percent in the case of transporter. Lack of IT literacy may be limiting the use of the App by the farmers, in-spite of having good download rate.
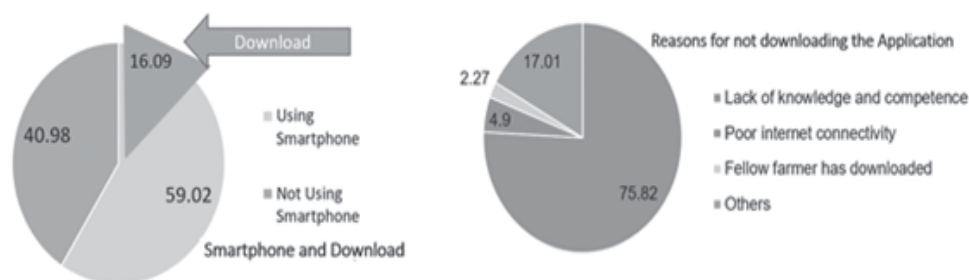

Figure 4. Availability of Smartphone and Download

Popular Means of Transportation

Local transport and own transport are the major mode used by farmers for transporting their produce. About three-fourth under both the categories of respondents are either having their own transport or availing local transport available and therefore did not use transport facilities through the App. This may be due to availability of limited surplus with farmers for marketing and therefore, aggregation may have a role to play in facilitating farmers integration with distant markets.
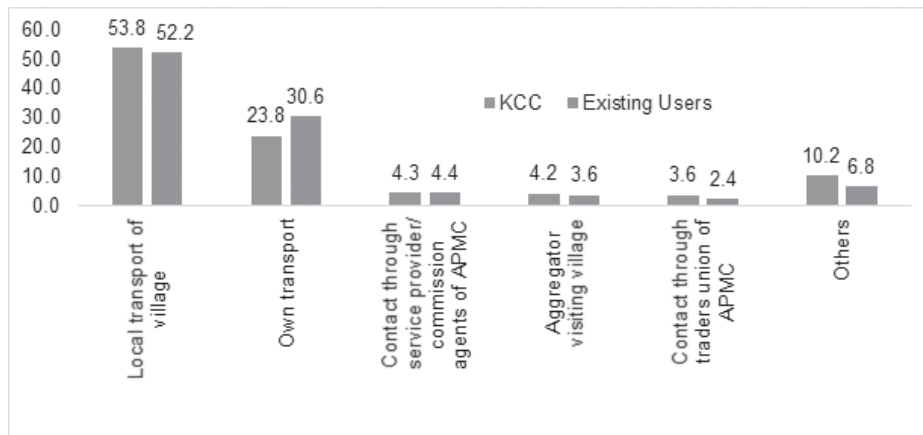
Figure 5. Popular means of transporation

Level of use of App

The level of use of Kisan Rath App is presented in Figure-6. The figure reveals that about 40 percent of the KCC Respondents having downloaded the mobile Application have never used it whereas, 45 percent are using occasionally. Only 15 percent of such respondents are using the App regularly. In case of existing users, 37 percent have never used the application whereas about 53 percent are using occasionally. Only 15 percent KCC respondents and 10 percent existing users are availing the transportation services using App on regular basis.
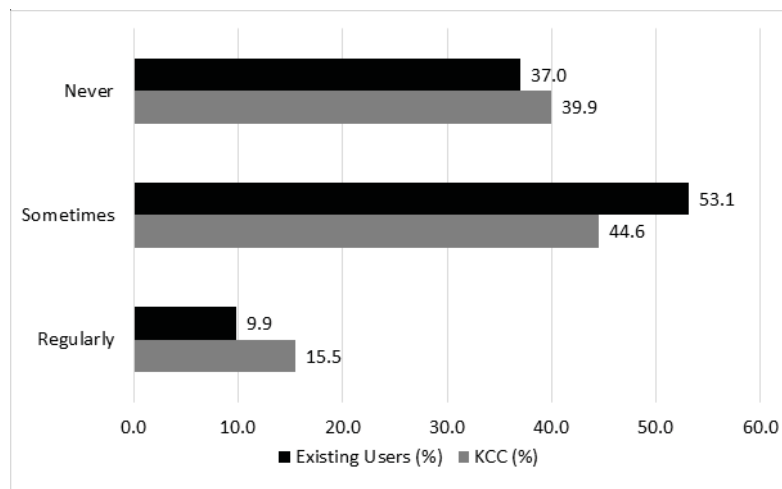

Figure 6. Level of Use of Application

The figure also suggest that more than one-third of the respondents across both the categories have downloaded the App but never used which suggest either the application is difficult for them to follow or is not able to offer services as per their expectations. However, about 70 percent of the respondents feel that the Kisan Rath App is beneficial. The Farmer Producer Organizations are more able to foresee the benefits offered by the App. in changed agri-trade environment (Figure-7).
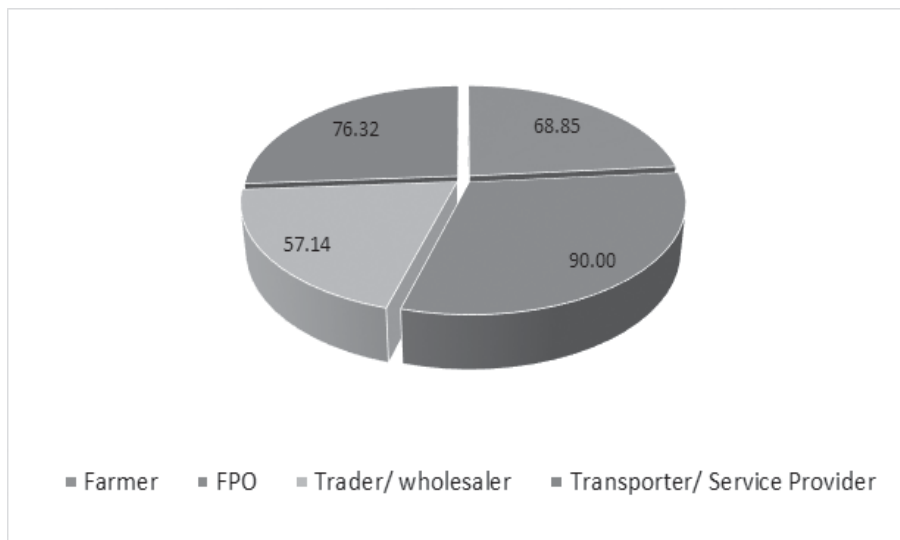
Figure 7. Percent of Respondents who feel that the Kisan Rath App. is beneficial

Reasons for Poor Acceptability of App

The major limitations as suggested by the farmers and other stakeholders have been depicted in Figure-8 considering the limited use of application. The major limitation as expressed by respondents are non-availability of service providers, poor internet connectivity and lack of booking being honored. Some of the respondents have also expressed the issue of rate not being competitive mainly the KCC Respondents.

Figure 8. Reasons for Poor Acceptability of App

Besides Kisan Rath, the Government is also implementing schemes like Transport and Marketing Assistance (TMA) Yojana and Pradhan Mantri Gram Sadak Yojana. The TMA Scheme covers freight and marketing assistance for export by air as well as by sea (both norm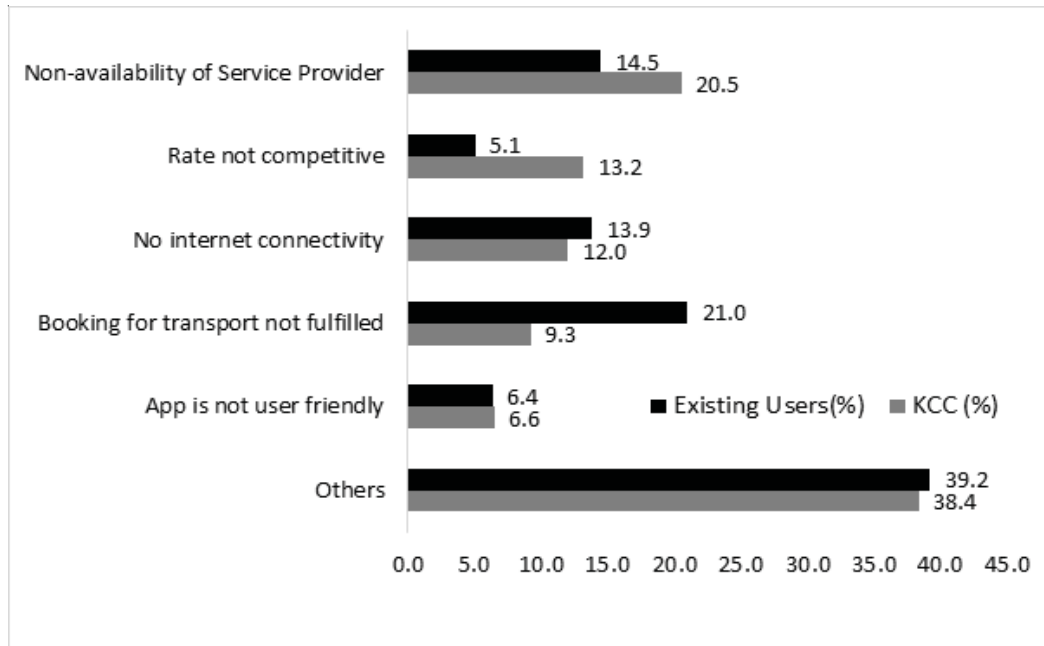al and refrigerated cargo) whereas Pradhan Mantri Gram Sadak Yojana is a nationwide plan in India to provide good all-weather road connectivity to unconnected villages.

Conclusion and Suggestions

The market players like traders, wholesalers and logistic service providers who are well versed with the market and have access to market information seem to be proportionately more aware about the app in comparison to farmers. Application seems to be more useful for traders, wholesaler and service provider as suggested by the higher percentage of download to Smartphone availability ratio. As more than 50 percent of the users are relying on locally available transportation facility, it is important to integrate such service providers to bring in more efficiency in the delivery of service. Better awareness among farmers group may enhance the usages of Kisan Rath App as suggested by the ability of FPOs to foresee the benefits offered by the App. The states practicing diversified agriculture

and even allied enterprises seem to have more potential to transport the produce to distant markets and hence more downloads of Kisan Rath App are effected. Poor use of application may be due to farmers having low ICT literacy leading to inability to understand the full benefits of the service. IT infrastructure may also need strengthening as internet-connectivity has been suggested as one of the major limiting factors by many respondents. There is need to make the App more user friendly and wider in terms of integration of other services like market information and registration from different kinds of service providers mainly from local environment so as to make it more comprehensive for the end user.

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Training Need Analysis of Faculty Members of SAMETIs

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Abstract

Training is a proactive, planned and continuous process of change and development for an individual and also organization as a whole. Through training, an individual can acquire new knowledge, improve skills, reorient and redesign his/her attitude for growth and efficiency together with the organizational effectiveness and development. Training helps in changing the internal dynamics of an individual to cope up with the changing scenario in the organization and society. Thus, Training is an essential part of any organization. Training Need analysis (TNA) is the first and foremost step in designing the training programs for targeted group of participants. TNA gives an opportunity to assess the training needs of the participants for whom the training is to be conducted. TNA helps to identify the specific themes or topics among several themes/topics in which the participants are interested to take training. The article analyzes the training needs of faculty members of State Agricultural Management and Extension Training Institutes (SAMETIs).Five competency areas viz, training related competencies, technical competencies, administrative competencies, HRM competencies and soft skills related competencies are identified to elicit the felt needs of SAMETI faculty members. A total of 64 faculty members from 19 SAMETIs participated in the study. Relative Importance Index (RII) procedure was employed to analyze the data. The study results indicate different combination of training needs that may directly be beneficial for the SAMETI faculty to train upon and in turn beneficial for the extension functionaries and farmers for whom SAMETIs organize training programs. Further, the findings may help the capacity building institutes in preparing the training calendars and themes to be included in the refresher trainings for the SAMETI faculty members.

Keywords: Agricultural Extension, Training need analysis, SAMETI, India.

Introduction

The basic idea of training is to train a particular set of people in a specific skill or task or a process. Training makes the participants to equip themselves with particular skills which may increase their efficiency, accuracy and also accelerate their working pace. Training fills the gap between the present competencies and the required competencies which in turn gives the opportunity for the participants to do the same work or task or process with improved quality in less time. Training is a process of overhauling and improving the knowledge, skills of the employees so that their efficiency, effectiveness and competence get augmented. Training is beneficial both to the individual and the organization.

Training may be defined as a planned program designed to improve performance and to bring about measurable changes in knowledge, skills, attitude and social behavior of employees for doing a particular job. Now a days, training has an additional purpose of facilitating change and management training is basically equipping managers such knowledge, skills and techniques as are relevant to managerial tasks and functions (Pattanayak, 2018).

Fig-1: Conceptual framework of training cycle

Source: Online reference of Training and Development services: development-opportunities.co.uk

As can be seen from the above diagram, training cycle consists of four major aspects viz., Training Needs Analysis, Designing Training Program, Delivery of the Program and Evaluation and Validation. Training cycle starts with Training Need Analysis.

Before organizing any training program, a very important practical step to be undertaken is carrying out Training Need Assessment. The main purpose of a Training Needs Assessment is to identify performance requirements or needs within an organization in order to help direct resources to the areas of greatest need, those that closely relate to fulfilling the organizational goals and objectives, improving productivity and providing quality products and services. The Training Needs Assessment is the first step in establishment of a training and development program. It is used as the foundation for determining instructional objectives, the selection and design of instructional programs, the implementation of the programs and the evaluation of the training provided. These processes form a continuous cycle which always begins with a needs assessment. Needs assessment helps to identify present problems and future challenges to be met through training and development.

Agricultural Extension Reforms scheme in the country introduced new institutional arrangements and operational procedures to address the field constraints and make the agricultural extension more farmer-driven. Thus, Agricultural Technology Management Agency (ATMA) at district level and State Agricultural Management & Training Institute (SAMETI) at state level came into existence. SAMETIs play significant role in building the capacities of officers of State Agriculture and Allied Departments and Farmers. Since, extension functionaries play a crucial role in serving the end users of any technology, they must undergo refresher programs regularly to refresh and build their capacities. Faculty members of SAMETIs are primarily involved in conducting the capacity building programs for extension functionaries and hence, assessment of their capacities and making the faculty well-equipped with the emerging trends is imperative.

Need assessment helps to discover problems and identify future challenges to be dealt by means of appropriate training interventions (ICAR 2020).

The objective of the present study is to analyze training needs of the SAMETI faculty members across the country.

II. Methodology

The present study basically focuses on training need analysis of the faculty members of SAMETIs. Hence, a purposive sampling technique was employed to collect the data from the faculty members of SAMETIs situated across the country. The purposive sampling technique targets specific people to study and infer conclusions. The data were collected in 2019-20. Keeping in view, the resources and time, online mailed survey method was employed to collect the data. Out of 32 SAMETIs situated across the country, 64 faculty members from 19 SAMETIs responded to the survey.

A structured questionnaire was designed after several discussions with eminent persons who had experience of working in SAMETIs to make the questionnaire more relevant and to serve the purpose of the study. The questionnaires were distributed through e-mails to all the SAMETI faculty members to get their responses. Apart from personal profiles, the questionnaire contained statements with Likert scale in different competencies that are required by SAMETI faculty members. The present study employed a five-point Likert scale continuum to mark the importance of a competency (5- Extremely Important, 4- Very Important, 3- Important, 2- Somewhat Important, 1- Not at all Important)

Further, Relative Importance Index (RII) procedure was employed to analyze the data collected. The main purpose of using the RII is to establish relative importance given by the respondents over a set of required competencies in the context of the study. The Relative Importance Index (RII) was calculated using the formula adopted by Fagbenle et al., (2004). Although, majorly RII was used in construction industry, the procedure was also employed in assessing the competencies of project managers (Hashim et al., 2018), Ernest Kissi et al., 2015 used it in assessing the entrepreneurial learning competencies of built environment students, etc.

$$RII = \frac{5*(n5) + 4*(n4) + 3*(n3) + 2*(n2) + 1*(n1)}{5*(n1+n2+n3+n4+n5)}$$

Where: n1, n2, n3, n4 and n5 = the number of respondents who selected

n1= number of respondents who selected "Not at all Important"

n2= number of respondents who selected "Somewhat Important"

n3= number of respondents who selected "Important"

n4= number of respondents who selected "Very Important"

n5=number of respondents who selected "Extremely Important"
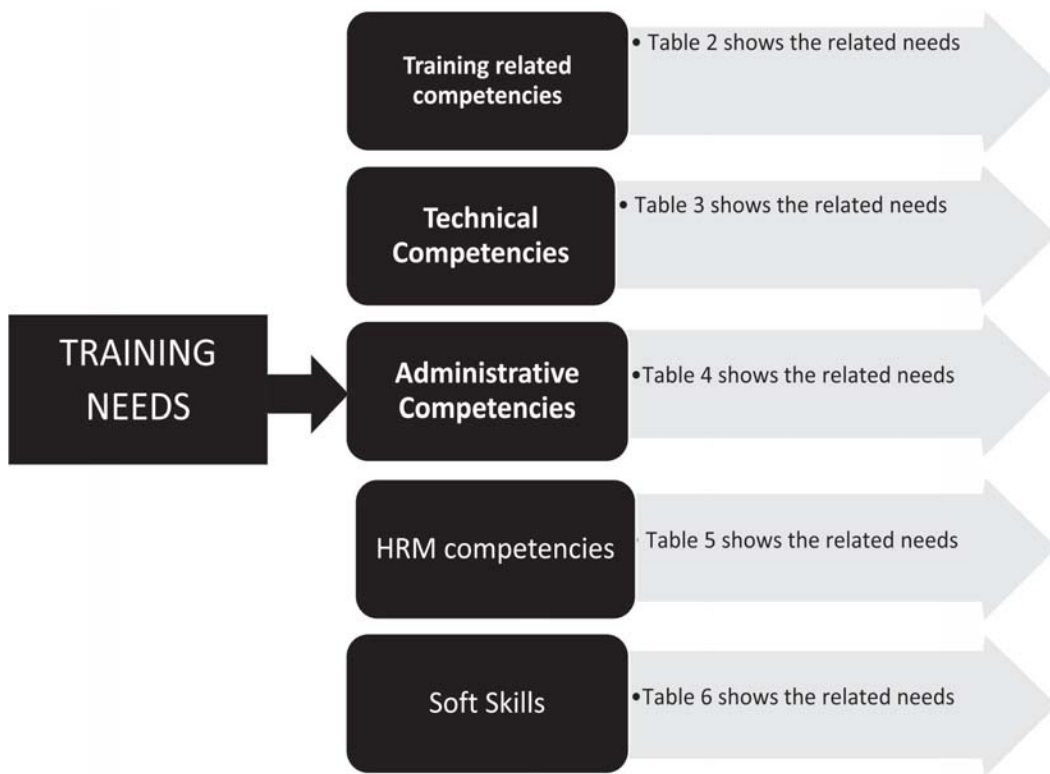
Fig. 2: Analytical Framework: Training need analysis variables identified for SAMETI Faculty

III. Results and Discussion

Table 1: Profile of the Respondents

Gender-wise distribution	Number	Percentage
Male	41	64.06
Female	23	35.94
Total	64	100.00
Age Distribution		
20-30	3	4.69
31-40	12	18.75
41-50	16	25.00
51-60	24	37.50
>60	9	14.06
Total	64	100.00
Education-wise Distribution		
PhD	16	25.00
M.Sc	23	35.94
M.V.Sc	3	4.69
M.Tech/ME	4	6.25
B.V.Sc	1	1.56
B.Tech	1	1.56
MBA	3	4.69
MCA	1	1.56
B.Sc	12	18.75
Total	64	100.00

From table 1, it is evident that majority of the respondents were men with 64.06 percent and remaining 35.94 were women. In case of age distribution, higher representation (37.50%) were from 51-60 age group ,followed by25 percent from 41-50 age group; as SAMETIs re-employ retired professionals also, 14.06 percent are from above 60 years

of age, 18.75percent were from 31-40 age group and only 4.69percent belonged to 20-30 years of age group. In case of education, 35.94 percent of the respondents were from M.Sc. background while 25percent were Ph.D. Degree holders and 18.75percent were from B.Sc. background and few were from M.V.Sc, M.Tech, MBA and MCA background.

Training needs of Faculty members of SAMETIs

The study elicited the training needs that are perceived by the SAMETI faculty members in terms of five different competencies viz, training related activities, technical/core subjects, administrative skills, human resource management and soft skills.

Training related competencies

From table 2, it is evident that course designing is extremely important as perceived by the SAMETI faculty members. The Relative Importance Index (RII) is about 0.92 for course designing and stood with first rank. The other aspects like module designing with an RII of 0.88 (II), training material designing (0.87), conducting sessions (0.85), managing the entire training program and session planning got an RII of 0.83 each and finally arranging logistics for the entire training program got an RII of 0.82.

Table 2: Ranking of Training Related Needs of SAMETI faculty members

S.No	Training Related Needs	EI (5)	VI (4)	I (3)	SI (2)	NI (1)	Total	ΣW	Mean	RII	Rank
1	Course Designing	44	15	5	0	0	64	295	4.61	0.92	I
2	Module Designing	34	22	8	0	0	64	282	4.41	0.88	II
3	Training Material Designing	30	29	5	0	0	64	281	4.39	0.87	III
4	Session Planning	27	24	13	0	0	64	270	4.22	0.83	V
5	Conducting Sessions	27	27	10	0	0	64	273	4.27	0.85	IV
6	Arranging Logistics	25	26	9	4	0	64	264	4.13	0.82	VII
7	Managing the Entire Training Program	29	19	15	1	0	64	268	4.19	0.83	V
	Average RII									**0.86**	

EI: Extremely Important, VI: Very Important, I: Important, SI: Somewhat Important NI: Not at all Important, RII: Relative Importance Index

The overall RII is 0.86 and received II Rank among the five different competencies. To conclude, the data and further analysis suggests that the respondents are clearly in favour of taking training in the above mentioned aspects. The reason may be attributed to the experience of the SAMETI faculty members i.e., majority of the faculty members possess field experience and may not have much experience in training function.

Technical Subject Competencies

Another important aspect in which the faculty members may be given refresher training programs is on the latest technological innovations and other core aspects of their subject concerned. Keeping in view the importance of the technical/core subjects, an attempt is made to know the perceived training needs of the SAMETI faculty members.

Table 3: Ranking of Technical Subject Needs of SAMETI faculty

S.No	Technical Subject	EI (5)	VI (4)	I (3)	SI (2)	NI (1)	Total	ΣW	Mean	RII	Rank
1	Quality Control of Seed	30	15	13	2	4	64	257	4.02	0.80	VI
2	Quality Control of pesticides	29	15	14	2	4	64	255	3.98	0.80	VI
3	Quality Control of fertilizers	29	17	13	2	3	64	259	4.05	0.81	V
4	Weed Management	24	19	14	3	4	64	248	3.88	0.78	X
5	Integrated Pest Management	31	15	13	2	3	64	261	4.08	0.82	III
6	Integrated Nutrient Management	28	17	14	2	3	64	257	4.02	0.80	VI
7	Integrated Crop Management for cereals	22	21	16	2	3	64	249	3.89	0.78	X
8	Integrated Crop Management for pulses	23	20	16	2	3	64	250	3.91	0.78	X
9	Integrated Crop Management for oilseeds	22	19	17	3	3	64	246	3.84	0.77	XIV

10	Integrated Crop Management for commercial crops	21	20	16	3	4	64	243	3.80	0.76	XVI
11	Integrated Crop Management for millets	16	24	13	5	6	64	231	3.61	0.72	XVIII
12	Natural Resource Management	33	14	13	2	2	64	266	4.16	0.83	I
13	Soil Health Management	35	11	12	3	3	64	264	4.13	0.83	I
14	Environmental degradation	32	13	14	2	3	64	261	4.08	0.82	III
15	Alternative Cropping	18	27	12	4	3	64	245	3.83	0.77	XIV
16	Contingency Planning	24	22	12	4	2	64	254	3.97	0.79	IX
17	Crop Bio-diversity	24	20	14	2	4	64	250	3.91	0.78	X
18	Post harvesting technology	24	16	16	2	6	64	242	3.78	0.76	XVI
19	Nutri- cereals	17	22	14	4	6	64	229	3.58	0.72	XVIII
		Average Relative Index								0.79	

EI: Extremely Important, VI: Very Important, I: Important, SI: Somewhat Important NI: Not at all Important, RII: Relative Importance Index

From the table 3, it is evident that natural resource management and soil health management got an RII of 0.83 each, followed by environmental degradation and integrated pest management which secured an RII of 0.82 each; quality control of fertilizers (0.81),quality control of seeds, quality control of pesticides and integrated nutrient management got an RII of 0.80 each; the remaining subjects like contingency planning (0.79);weed management, integrated crop management for cereals, integrated crop management for pulses and crop bio-diversity got an RII of 0.78 each, alternative cropping and integrated crop management for oilseeds with an RII of 0.77, integrated crop management for commercial crops and post-harvest technology with an RII of 0.76 and finally, integrated crop management for millets and nutri-cereals got an RII of 0.72.The calculated RII gives indications that though majority of the faculty members may be well-versed in their core subject areas, yet refresher training programs may be organized on topics like natural resource management, soil health management, integrated pest management and environmental degradation etc. as revealed by the RII values. The overall average RII is

0.79 for the training needs on technical subjects. These needs scored V rank and stood last among the five different competencies under the study.

Administrative competencies

Further, an attempt is made to know the training needs related to administrative competencies that are required by the SAMETI faculty members. Among the Training needs related to administrative competencies, office management is rated with a Relative Importance Index of 0.85. Among these skills, record management (0.83), monitoring skills (0.81) and writing reports got an RII of 0.70.

The overall Average RII is 0.80 for administrative skills and got IV rank (Table 4) among all the training related aspects assessed.

Table 4: Ranking of training needs related to Administrative Skills of SAMETI faculty members

S.No	Administrative Skills	EI (5)	VI (4)	I (3)	SI (2)	NI (1)	ΣN	ΣW	Mean	RII	Rank
1	Office Management	31	24	6	0	3	64	272	4.25	0.85	I
2	Monitoring Skills	18	37	5	1	3	64	258	4.03	0.81	III
3	Record Management	26	29	6	0	3	64	267	4.17	0.83	II
4	Writing Reports	19	21	12	0	8	64	223	3.48	0.70	V
		Average RII								0.80	

EI: Extremely Important, VI: Very Important, I: Important, SI: Somewhat Important NI: Not at all Important, RII: Relative Importance Index

Training needs related to Human Resource Management competencies

Another important aspect where every professional must have sufficient knowledge is Human Resource Management. Managing human resources is one of the important skill sets that every faculty member should possess. With this background, the researchers made an effort to identify the perceptions of respondents about Human Resource Management competencies. Table 5 indicates that time management is the most important training need as per the data with an RII of 0.89, followed by training and development with an RII of 0.87. Managerial skills, organizational culture and networking skills got an RII of 0.86 each and HR system designing attracted an RII of 0.83.

Table 5: Ranking of Huma Resource Management needs of SAMETI faculty members

S.No	Human Resource Management	EI (5)	VI (4)	I (3)	SI (2)	NI (1)	Total	ΣW	Mean	RII	Rank
1	HR system designing	25	25	13	0	1	64	265	4.14	0.83	V
2	Training & Development	26	34	4	0	0	64	278	4.34	0.87	II
3	Managerial Skills	27	31	5	1	0	64	276	4.31	0.86	III
4	Time Management	33	27	4	0	0	64	285	4.45	0.89	I
5	Organizational Culture	26	32	5	1	0	64	275	4.30	0.86	III
6	Networking Skills	28	30	4	1	1	64	275	4.30	0.86	III
		Average RII								0.86	

EI: Extremely Important, VI: Very Important, I: Important, SI: Somewhat Important NI: Not at all Important, RII: Relative Importance Index

The overall average RII is 0.86 and the overall rank is II for Human Resource Management competencies when compared to the other competencies under study.

Training Needs related to Soft Skills Competencies

Besides the hard skills, soft skills or life skills are very important for all cadres of employees working in organizations and more so for faculty members. Keeping this in view, data were collected on 16 different soft skills that are required by the faculty members. From table 6, it is discernable that the topics of positive attitude, communication skills and work ethics got an RII of 0.90 each. The other essential soft skills that are perceived by the SAMETI faculty members are leadership qualities and presentation skills with an RII of 0.89 each; how to deal with higher officials and systematically doing work with an RII of 0.88 each; team building and stress management with an RII of 0.87 each; happiness management and developing work culture with an RII of 0.86 each; emotional intelligence and anger management with an RII of 0.85 each; personality profiling and conflict management with an RII of 0.84 each and negotiation skills got an RII of 0.83. The overall average RII is 0.87 and ranked I among the other competencies under the study.

Table 6: Ranking of Soft Skills needs of SAMETI faculty members

S.No	Soft Skills	EI (5)	VI (4)	I (3)	SI (2)	NI (1)	Total	ΣW	Mean	RII	Rank
1	Stress management	27	32	4	1	0	64	277	4.33	0.87	VIII
2	Leadership Qualities	35	22	7	0	0	64	284	4.44	0.89	IV
3	Presentation Skills	36	21	6	1	0	64	284	4.44	0.89	IV
4	Emotional Intelligence	26	28	10	0	0	64	272	4.25	0.85	XII
5	Developing Work Culture	28	28	7	1	0	64	275	4.30	0.86	X
6	Work Ethics	38	21	4	1	0	64	288	4.50	0.90	I
7	How to Deal With Higher Officials	32	25	6	1	0	64	280	4.38	0.88	VI
8	Anger Management	24	32	7	1	0	64	271	4.23	0.85	XII
9	Happiness Management	26	32	6	0	0	64	276	4.31	0.86	X
10	Positive Attitude	39	20	4	1	0	64	289	4.52	0.90	I
11	Communication Skills	39	20	4	1	0	64	289	4.52	0.90	I
12	Conflict Management	24	30	9	0	1	64	268	4.19	0.84	XIV
13	Negotiation Skills	24	27	11	1	1	64	264	4.13	0.83	XVI
14	Team Building	34	22	6	1	1	64	279	4.36	0.87	VIII
15	Personality Profiling	26	26	11	1	0	64	269	4.20	0.84	XIV
16	Systematically Doing Work	32	24	8	0	0	64	280	4.38	0.88	VI
	Average RII									0.87	

EI: Extremely Important, VI: Very Important, I: Important, SI: Somewhat Important NI: Not at all Important, RII: Relative Importance Index

Overall Training Needs of Faculty Members of SAMETIs

The overall average RII and the ranks of the five competencies are listed in table 7. From the table, it is evident that soft skills related competencies have scored an overall RII value of 0.87 and got I rank among the other competencies, followed by Training Related competencies and Human Resource Management competencies with an RII of 0.86each

and got II rank. Administrative competencies got an RII of 0.80and secured IV rank. Finally technical subject competencies got an overall average RII of 0.79 and stood at V rank.

Table 7: Overall Average RII of five competencies under the study

S.No	Competency	Overall Average RII	Rank
1	Training related competencies	0.86	II
2	Technical competencies	0.79	V
3	Administrative competencies	0.80	IV
4	Human Resource Management competencies	0.86	II
5	Soft Skills related competencies	0.87	I

In order to list a blend of extremely important training needs, the competencies which recorded greater than average RII in five different competencies under study are taken into consideration for listing overall training needs required by the SAMETI faculty members as shown in Table 8.

Thus, in training related aspects, course designing, module designing and training material designing have more RII value than the overall average; hence they are included in the overall training needs. In case of Technical/core subjects, the topics like natural resource management, soil health management, environmental degradation, integrated pest management, quality control of fertilizers, quality control of seeds, quality control of pesticides and integrated nutrient management which are having more than the average overall RII are included in overall training needs. In administrative competencies, office management, record management and monitoring skills have attracted more RII than the average overall RII, hence, are eligible for inclusion in overall training needs. Further, in case of Human Resource Management competencies, topics of time management and training & development attracted more RII value than the overall RII and hence included in the overall training needs. Finally, with regard to soft skills, positive attitude, communication skills, work ethics, leadership qualities, presentation skills, how to deal with higher officials and systematically doing work are included in the training needs of the SAMETI faculty members as they got more RII value than the overall average RII in this set of competencies.

Table 8: Overall training needs of SAMETI faculty members

S.No	Training needs	RII
I	**Training Related Aspects**	
1.	Course Designing	0.92
2.	Module Designing	0.88
3.	Training Material Designing	0.87
II	**Technical Subjects**	
4.	Natural Resource Management	0.83
5.	Soil Health Management	0.83
6.	Environmental Degradation	0.82
7.	Integrated Pest Management	0.82
8.	Quality Control of Fertilizers	0.81
9.	Quality Control of Seeds	0.80
10.	Quality Control of pesticides	0.80
11.	Integrated Nutrient Management	0.80
III	**Administrative Skills**	
12.	Office Management	0.85
13.	Record Management	0.83
14.	Monitoring Skills	0.81
IV	**Human Resource Management**	
15.	Time Management	0.89
16.	Training & Development	0.87
V	**Soft Skills**	
17.	Positive Attitude	0.90
18.	Communication Skills	0.90
19.	Work Ethics	0.90
20.	Leadership Qualities	0.89
21.	Presentation Skills	0.89
22.	How to deal with higher officials	0.88
23.	Systematically doing work	0.88

RII: Relative Importance Index

Conclusion

The Indian public agricultural extension system is one of the largest knowledge and information dissemination institutions in the world. The system played a critical role during the Green Revolution period, but in recent years, it has undergone a high level of scrutiny (Sontakki et al., 2010).To meet the challenges, different agricultural extension reforms were brought which included institutional reforms, capacity building activities, organization and management of extension and also the advisory services. One of the institutional reforms at the state level is establishment of SAMETIs.

SAMETIs are the state level nodal agencies aimed at capacity building of middle and grassroots level extension functionaries and farmers. These extension functionaries will provide extension advisory services to farmers directly. Hence, extension functionaries need to be trained with relevant skills sets which in turn demands building the capacities of faculty members of SAMETIs. Hence, identification of training needs is vital for designing the training programs covering the most important felt needs of SAMETI faculty members.

From the findings of the study, it can be inferred that most of the faculty members of SAMETIs have many training needs. This information indicates that the faculty members need to undergo training programs of different themes on regular intervals to build their competencies so that they are equipped to build the capacities of agricultural extension personnel of their respective states. The study revealed 23 training needs as perceived by the faculty members of SAMETIs which are listed in Table 8.

There should be strengthened and rigorous capacity building of extension personnel to promote professionalism, partnerships, pragmatism, prudence, technology-interface (e.g. ICTs), and pride in the form of morale boosting, attitudinal improvement and knowledge intensive training programmes in addition to skill development(Annual Report, NAARM, 2010).

As stated by Birner and Anderson (2007), the capacity of the potential service providers are very important for agricultural extension. Well trained extension functionaries are very essential not only to farmers but also for the development of the country since majority of the population are dependent on agriculture directly or indirectly. Hence, the trainers of extension functionaries i.e., faculty members of SAMETIs need to be trained and equipped

with the necessary skills so that the extension functionaries get better learnings from the capacity building programs.

Finally, the content of the training programs should be relevant to the participants' functional needs. In order to design a suitable training program, there always comes the need of conducting Training Need Analysis through which the real felt needs of the target group may be assessed and accordingly the training programs may be designed. Further, appropriate training methods may be used according to the intellectual capacities of the target group for whom the trainings are designed. Besides, third party impact evaluations also may be conducted occasionally to gauge the impact of the training programs and accordingly changes may be brought into the training mechanisms.

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